Centre Universitaire d'Informatique

2018

Activity Report

CUI UNI GE

TecDay, Collège de Candolle, Geneva, 2019 April 4th

UNIVERSITÉ DE GENÈVE

Centre Universitaire d'Informatique
Battelle - Bâtiment A
7, route de Drize
CH-1227 Carouge

UNIVERSITÉ DE GENÈVE

Foreword

The Centre Universitaire d'Informatique, funded in 1975, federates research and teaching activities at the University of Geneva. With more than 200 members of staff, we develop key research competences in several areas, particularly on: Artificial Intelligence, Virtual and Augmented Reality, Services for Smart Cities, Modelling and Simulation, Information Security, E-Health and Quality of Life, supported by more than 4.526 MCHF of externally funded money (42% of our total budget).

Key facts of 2017 include several reach out activities. We established the "Infoscope", a young public activity providing weekly workshops for schools and teachers in areas such as: algorithms, digitalising writers' manuscripts, programming games for mobile phones, and experiencing virtual and augmented reality. The Infoscope formally starts next year with a team of students all ready to go live. We also co-organised and participated to the "Digital Day" taking place at the Cornavin train station, a day dedicated to showing University of Geneva research involving digital activities. This was one of the many national places dedicated to engaging with the public with digital activities, all taking place the same day. At the international level, we organised in Geneva the European Dependability in Computing Conference in September.

On the teaching side, besides strong doctoral programs, we doubled the number of BSc, MSc students, with now more than 300 students across our various programs. We regularly develop new continuous education programs in line with the demands and needs of industry. We have new programs in digital transformation, data protection and internet of things.

Several awards punctuated our research, namely Prof. Thierry Pun has been elected to the Swiss Academy of Engineering Sciences, one of the four Swiss Academies of Sciences, and Ms Sarah Sabbagh received the Arditi prize in Computer Science for her master thesis in message encryption.

I seize this opportunity to thank all CUI members of staff, students and researchers for their hard work, commitment, innovation and research activities, all participating to our national and international visibility and excellence.

The coming years will see the development of interdisciplinary partnerships with other disciplines of the University of Geneva, and the establishment of links with the local industry and administration.

Prof. Giovanna Di Marzo Serugendo
Director of the CUI
University of Geneva

Organisation

Centre Universitaire d'Informatique

Director:
- **Giovanna Di Marzo Serugendo**

Academic Advisor:
- Marc Pochon

Direction assistant:
- Elie Zagury

Secretaries:
- Marie-France Culebras
- Coralie Grossrieder
- Maëlle Rumbeli

Student secretary:
- Séverine Walter (from July 2017)
-

System Engineer:
- Nicolas Mayencourt

Department of Computer Science

Director:
- **Bastien Chopard**

Academic Advisor:
- Stéphane Marchand-Maillet

Secretary:
- Anne-Isabelle Guintini

System Engineer:
- Daniel Agulleiro

Humanities Computing Unit

Director:
- **Paola Merlo**

Academic Advisor:
- Sandra Rubal

Secretary:
- Eva Capitao

Information Service Science

Director:
- **Giovanna Di Marzo Serugendo**

Secretary:
- Marie-France Culebras

Information Science Institute

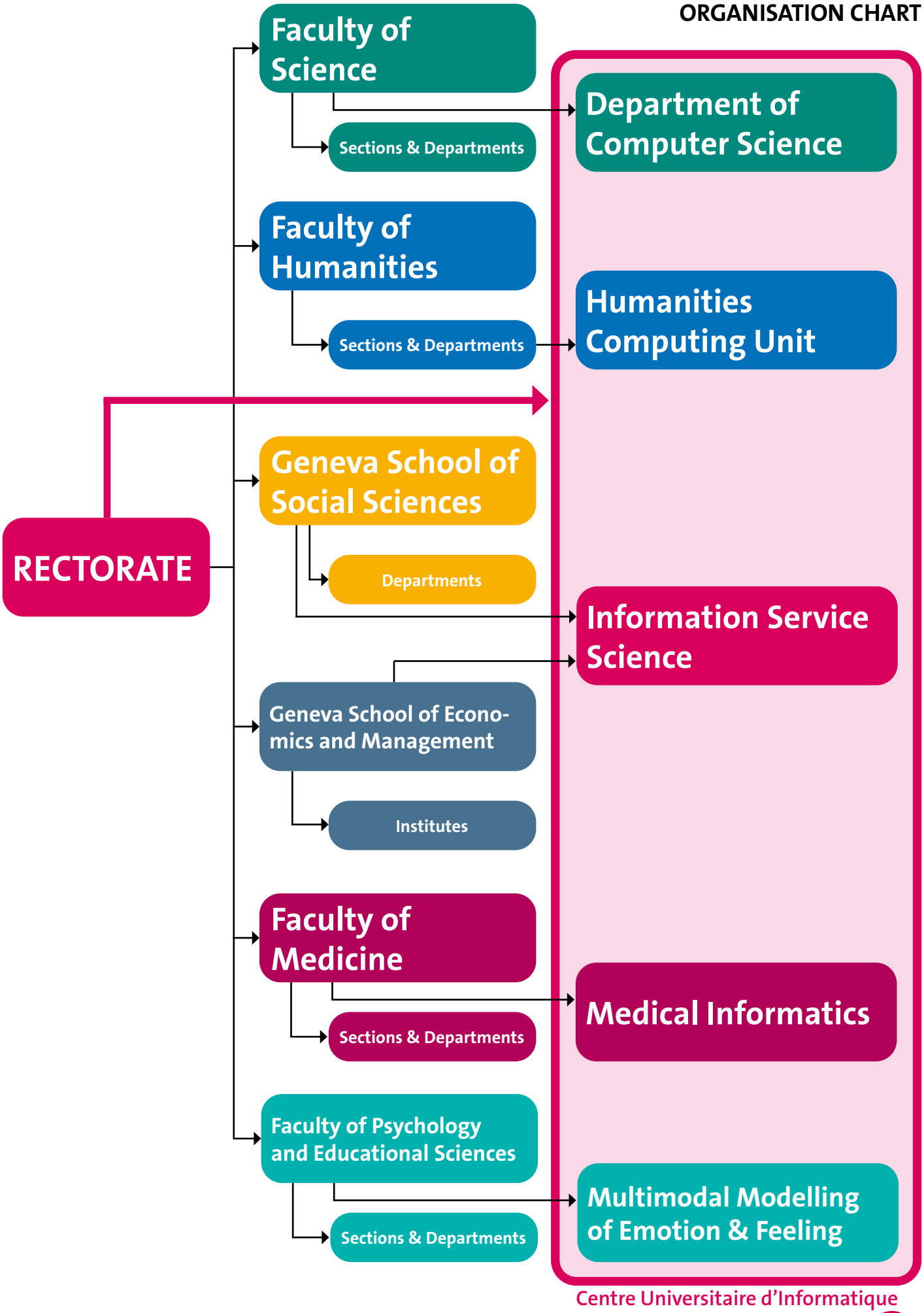
Director:
- **Dimitri Konstantas**

Medical Informatics

Director:
- **Antoine Geissbuhler**

Multimodal Modelling of Emotion & Feeling

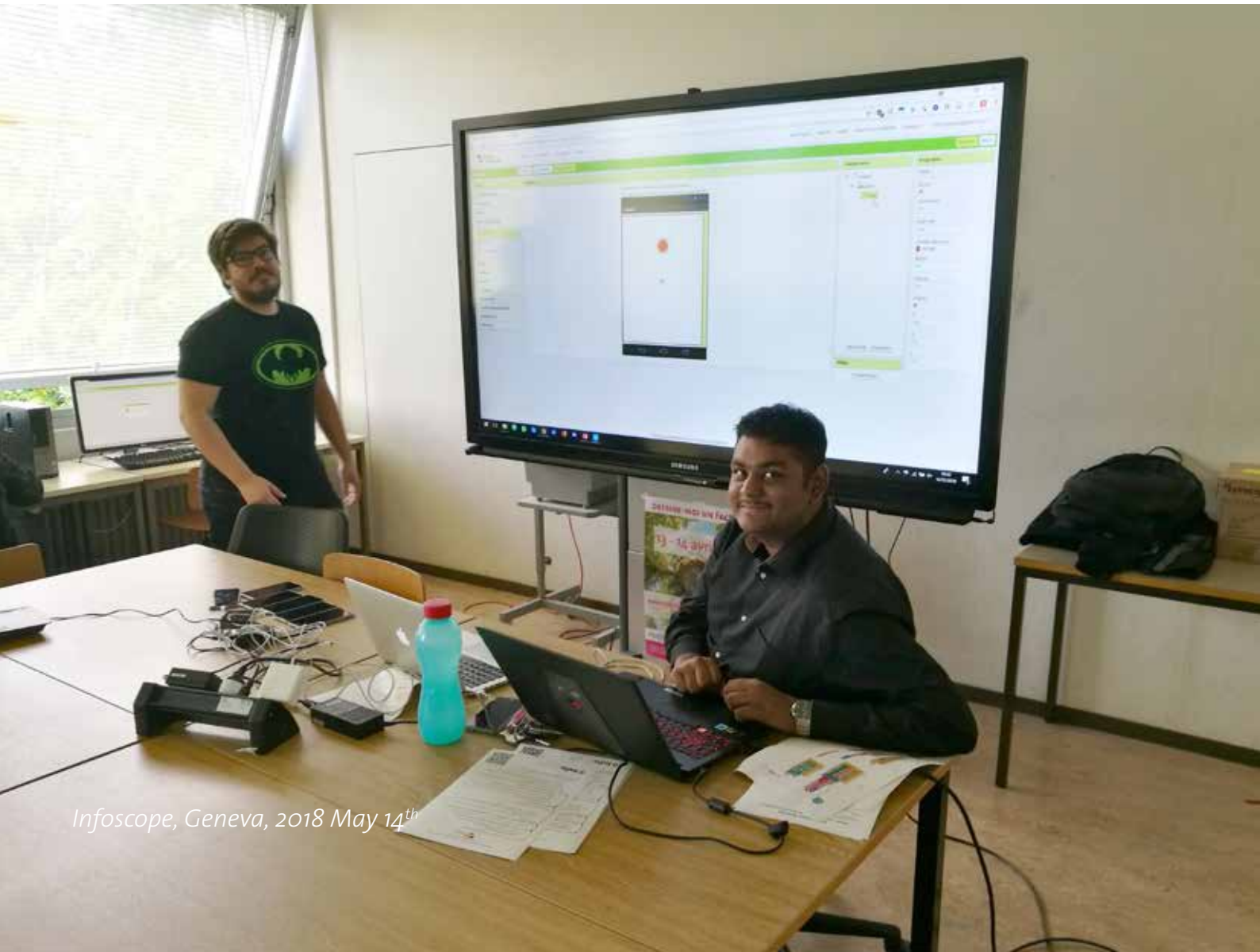
Director:
- **David Rudrauf**


Faculty of Science
Sections & Departments
Department of Computer Science
Faculty of Humanities
Sections & Departments
Humanities Computing Unit
RECTORATE
Geneva School of Social Sciences
Departments
Information Service Science
Geneva School of Economics and Management
Institutes
Faculty of Medicine
Sections & Departments
Medical Informatics
Faculty of Psychology and Educational Sciences
Sections & Departments
Multimodal Modelling of Emotion & Feeling
Centre Universitaire d'Informatique

www.citizencyberlab.org

CCC

Citizen Cyberscience Centre



Infoscope, Geneva, 2018 May 14th

Citizen Cyberscience Centre

Domain Activities

At Citizen Cyberlab, we are developing methods and studying motivations for new forms of public participation in research. We are researchers from a diversity of backgrounds – history, informatics, learning, linguistics, medicine, physics, psychology and more. Jointly, we initiate projects and organise events that encourage citizens and scientists to collaborate in new ways to solve big challenges. From online crowdsourcing to in-person hackathons, we are exploring and expanding the limits of citizen science and human computation.

Citizen Cyberlab is based on a partnership between the **European Particle Physics Laboratory, CERN**, the **UN Institute for Training and Research, UNITAR**, and the **University of Geneva**, where several teams in different faculties contribute to the lab's activity. In the following, we report activities, events and publications by or involving CUI members of the Cyberlab team.

Team

Director
François Grey
Associate professor
H-index: 35

Senior researchers
Prof. Bruno Strasser
Dr. Basile Zimmermann
Dr. Jose Luis Fernandez-Marquez
Dr. Thomas Maillart

Developers / Designers
Rosy Mondardini

Visiting researchers
Sara Barozzi (Politecnico di Milano)
Dr. Liesbet Jacobs (KU Leuven University)

Figure 1: League of Nations Archive
Crowdsourcing and AI to make the League of Nations archive accessible online

Figure 2: SDG Summer School
The SDG Summer School is all about team-based problem solving and hands-on prototype development.

List of publications

Refereed papers in international journals

[1] Geneviève, L., Ray, N., Chappuis, F., Alcoba, G., Mondardini, R., Bolon, I., and Ruiz de Castañeda R (2018) Participatory approaches and open data on venomous snakes: A neglected opportunity in the global snakebite crisis? PLoS Neglected Tropical Diseases, 12(3):e0006162.

[2] Bruno J. Strasser, Jérôme Baudry, Dana Mahr, Gabriela Sanchez, Elise Tancoigne. 'Citizen Science'? Rethinking Science and Public Participation, Science & Technology Studies, 32(2), 52-76 (2019)

[3] P. Yadav, I. Charalampidis, J. Cohen, J. Darlington and F. Grey, A Collaborative Citizen Science Platform for Real-Time Volunteer Computing and Games, IEEE Transactions on Computational Social Systems 5, 1, (2018)

Books and book chapters

[4] Jose Luis Fernandez-Marquez, Chiara Francalanci, Mohanty Sharada, Rosy Mondardini, Barbara Pernici, Gabriele Scalia. E2mC: Improving Rapid Mapping with Social Network Information. Organizing for the Digital World. Lecture Notes in Information Systems and Organisation. Springer. (2018)

[5] J. Novak, M. Becker, F. Grey and R. Mondardini, Citizen engagement and collective intelligence for participatory digital social innovation Citizen Science, Innovation in Open Science, Society and Policy, 124-45 eds. S. Hecker et al., UCL Press (2018)

Research and technical reports

[6] Bruno J. Strasser and Muki Haklay. Citizen Science: Expertise, Democracy, and Public Participation. Report to the Swiss Science Council, 2018.

[7] D. Bild, F. Grey, G. P. Irujo, H. Toivonen J. Serrano, J. P. Maestre, P. Bernaldo; T. H. Mboa Nkoudou (core authors) Open Science Hardware Roadmap 53pp. Alfred P. Sloan Foundation (2018) http://openhardware.science/global-open-science-hardware-roadmap/

Others

Press and media

- Snakebite resolution set for Health Assembly approval, SciDevNet, 11.05.2018
- AI has 'enormous' potential to transform health sector, SwissInfo, 16.05.2018
- Les morsures de serpents cartographiées, RTS, 13.07.2018
- UNIGE: une carte planétaire des morsures de serpent, SwissInfo.ch, 13.07.2018
- La lutte contre les serpents dangereux s'intensifie, Tribune de Genève, 13.07.2018
- Serpents, poison des zones rurales, Le Temps, 10.04.2018

Funded research projects

Participation to European projects

E2mC: Evolution of Emergency Copernicus services project
The E2mC Project is co-funded by the European commission / H2020 Programme
Grant Agreement No. 730082
Principal investigator: François Grey
Period: 2016 - 2019

DITOs: Doing It Together science
The DITOS Project is co-funded by the European commission / H2020 Programme
Grant Agreement No. 709443
Principal investigator: Bruno Strasser
Period: 2016 - 2019

Participation to National projects

The Rise of Citizen Science? Rethinking Science and Public Participation
The Project is an ERC/SNF Consolidator Grant funded by the SNF. BSCGIO_158887
Principal investigator: Bruno Strasser
Period: 2015 - 2020

SDG Solution Kit: enhancing bottom-up citizen science initiatives
The SDG Solution kit is co-funded by the Boninchi Foundation
Principal investigator: François Grey
Period: 2017 - 2019

Interactional expertise, forms and the Imitation Game : the integration of migrants in Beijing municipality
Funded by China Study Plan
Principal investigator: Basile Zimmermann
Period: 2015 - 2019

Omni-Navigation: an innovative navigation system for people with spatial mobility problems
The Omni-Navigation Project is co-funded by the PROVISU foundation
Principal investigator: Jose Luis Fernandez-Marquez
Period: 2017 - 2018

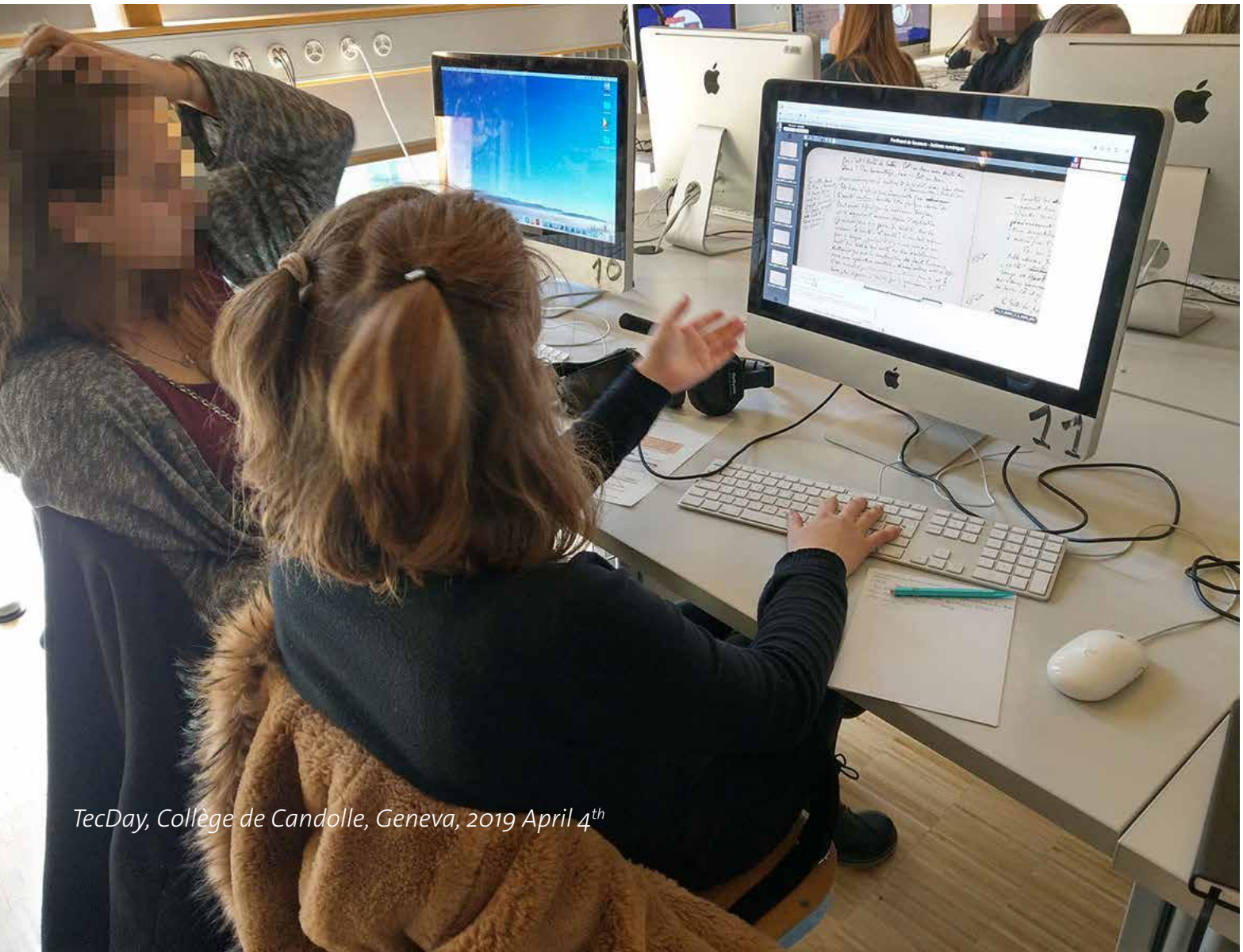
Teaching

- **Open Science**, Bachelor, autumn semester, (principal teacher: Francois Grey, participating teachers: , Jose Luis Fernandez Marquez, Rosy Mondardini, Thomas Maillart) 39 students
- **Sustainable Development and political agendas**, Master, autumn semester, (principal teacher: Jörg Balsiger, participating: Francois Grey, Jose Luis Fernandez Marquez, Rosy Mondardini, Thomas Maillart), 30 students
- **Science, Expertise and Sustainable Development**, Master, spring semester (principal teacher: Bruno Strasser, participating: Thomas Maillart and Francois Grey), 25 students
- **Citizen Science on the Web**, Master, spring semester, (principal teacher: Francois Grey, participating teachers: , Jose Luis Fernandez Marquez, Rosy Mondardini, Thomas Maillart), 6 students

clcl.unige.ch

CLCL

Computational Learning and Computational Linguistics



TecDay, Collège de Candolle, Geneva, 2019 April 4th

Computational Learning and Computational Linguistics

Domain activities

The Computational Linguistics and Computational Learning (CLCL) Research Group (http://clcl.unige.ch/) is an inter-faculty group that brings together academic staff and PhD students based in the Department of Linguistics in the Faculty of Humanities and the Department of Computer Science in the Faculty of Sciences.

The group is concerned with interdisciplinary research combining linguistic modelling with machine learning techniques. The scope of research includes fundamental issues in the statistical nature of language, fundamental issues in machine learning for structured prediction problems, and empirical evaluations that cross these two themes.

Today, machine learning is everywhere, and is one of the most sought-after skills by information technology employers. We apply it to language problems using very large amounts of multi-lingual data.

Our current research includes the development of adaptive data-driven systems for several parsing-based tasks, such as investigations of shallow levels of meaning representations and spoken-language understanding for dialogue systems, large-scale information extraction, and statistical machine translation. These systems span several languages (French, English, German, Italian, Spanish, Japanese, Arabic, Czech, Chinese, Catalan) and for some languages have reached state-of-the-art performance. These systems are based on our linguistic work on cross-lingual syntactic and semantic parallelism and on machine learning methods based on latent variable models, neural networks and graph-based learning.

Our current linguistic investigation address the problem of language universals, cross-lingual models of word embeddings and linguistic knowledge in current models of neural networks. Work from our group has identified or developed some strong universal quantitative tendencies across many languages on a large scale, such as a principle of minimal dependency length in noun phrases or the likelihood of external causer. It has also shown that current neural network models do not encode long-distance relations between words in the same way as humans.

Team

Directors
Paola Merlo
Associate professor
H-index: 21

James Henderson
CC (UNIGE)
Principal Scientist,
Idiap, Martigny
H-index: 24

Instructor (Chargée de cours)
Dr. Tanja Samardzic

Assistants (PhD students)
Francesco Ackermann
Kristina Gulordava
Alexandre Kabbach
Haozhou Wang

Administration
Eva Capitao

CLCL team in 2016

PhD Thesis

- Kristina Gulordava, Word order variation and dependency length minimisation: A cross-linguistic computational approach, Committee: Roger Levy, MIT; Joakim Nivre, Uppsala, Laura Rimmel, DeepMind, June 2018.

List of publications

Refereed papers in international journals

[1] Paola Merlo and Sarah Ouwayda (2018), ``Movement and structure effects on Universal 20 word order frequencies: A quantitative study", Glossa, 3(1), 84, 1-35.

[2] Tanja Samardzic and Paola Merlo (2018), ``Probability of external causation: an empirical account of cross-linguistic variation in lexical causatives", Linguistics, 56(5), 895-938.

[3] Paola Merlo (2018), ``Festina lente: A farewell from the editor", Computational Linguistics, 44 (2), 379-385.

[4] Xiao Pu, Nikolaos Pappas, James Henderson, and Andrei Popescu-Belis. Integrating Weakly Supervised Word Sense Disambiguation into Neural Machine Translation. Transactions of the Association for Computational Linguistics} (TACL), volume 6, pages 635-649. 2018

Full refereed papers in Conference Proceedings

[5] Paola Merlo and Francesco Ackermann, ``Vectorial semantic spaces do not encode human judgments of intervention similarity", Proceedings of the Conference on Natural Language Learning (CONLL'18), Brussels.

[6] Alexandre Kabbach, Corentin Ribeyre, Aurélie Herbelot. Butterfly Effects in Frame Semantic Parsing: impact of data processing on model ranking. Proceedings of COLING 2018, Santa Fe, NM.

[7] Lesly Miculicich, Dhananjay Ram, Nikolaos Pappas and James Henderson, Document-Level Neural Machine Translation with Hierarchical Attention Networks. Conference on Empirical Methods in Natural Language Processing (EMNLP 2018), 2947-2954, Oct, 2018.

[8] Nikolaos Pappas, Lesly Miculicich and James Henderson. Beyond Weight Tying: Learning Joint Input-Output Embeddings for Neural Machine Translation. Third Conference on Machine Translation (WMT 2018), pages 73-83, Oct 2018.

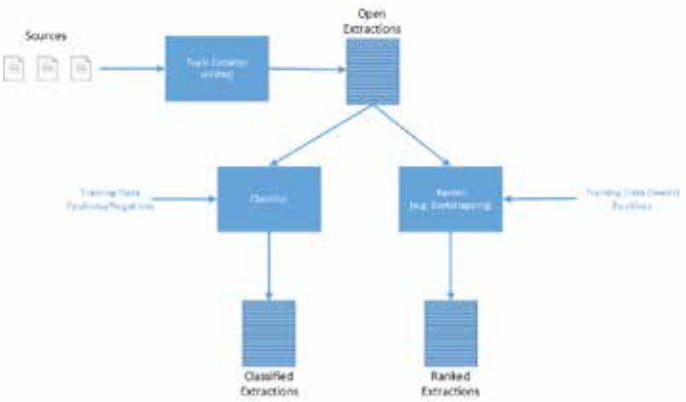


Figure 1: Architecture of information extraction system

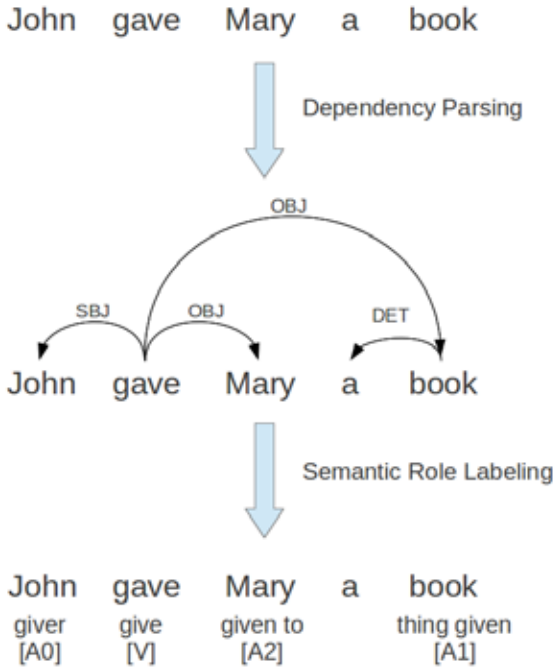


Figure 2: Data flow of syntactic-semantic parsing

International and national advisory committees

- Paola Merlo, Member of the Executive Board for the Association for Computational Linguistics.

International and national Research Programs Committees

- Paola Merlo, Panel member for ERC consolidator grants, SH4 The Human Mind and its complexity.

PhD Thesis Committees

- Eleanor Fournier-Tombs, Information systems, Geneva, DelibAnalysis: Understanding online deliberation through automated discourse quality analysis and topic modelling, June 2018.
- Xiao Pu, Computer Science, EPFL, Word Sense Consistency in Statistical and Neural Machine Translation, June 2018.
- Alexandra Miletic, Linguistics, Toulouse, Un treebank pour le serbe : constitution et exploitations, June 2018.

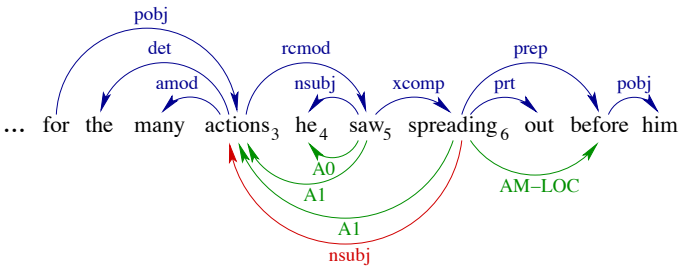


Figure 3: Syntactic and semantic analysis of sentences

Invited talks

- Paola Merlo, Keynote, Mechanisms of argument structure realisation across languages of the world: treebank data and computational modelling, Conference on the shaping of transitivity and argument structure: theoretical and empirical perspectives, Pavia, Italy, October 2018.

Others

- Kristina Gulordava, member of ERC grant AMORE, Prof. Gemma Boleda, Barcelona.
- Open software: https://github.com/akb89/pyfn

Funded research projects

Participation to National projects

LAOS (Learning Representations of Abstraction in Text)
SNF
Principal Investigator: James Henderson
Idiap Research Institute
Period: Oct. 2018 - Sept. 2022

INTREPID (Automated interpretation of political and economic policy documents: Machine learning using semantic and syntactic information)
SNF Sinergia
Idiap Research Institute, Graduate Institute of International and Development Studies
Principal Investigator: James Henderson
Idiap Research Institute
Period: Jan. 2019 - Dec. 2022

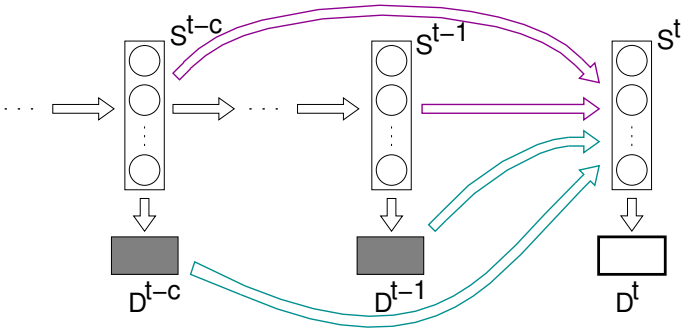


Figure 4: Neural network models for language

Others

Refeereeing

- James Henderson, Transactions of the Association for Computational Linguistics, Computational Linguistics.
- Paola Merlo, Journal of language modelling, Italian journal for computational linguistics.
- Alexandre Kabbach, Secondary reviewer for EMNLP 2018.

Editorial responsibilities

- Paola Merlo: Editor-in-chief of the journal Computational Linguistics, MIT Press.
- James Henderson, Associate editor, Transactions of the Association for Computational Linguistics.

Events organised in Geneva

- Journée des doctorants, Réseau langage et communication.
- A mini-workshop on linguistic issues in computational modelling.

Teaching

- **Développement Web**, Bachelor, 6 ECTS, 39 hours, 25 students
- **Algorithmique et programmation**, Bachelor, 6 ECTS, 65 hours, 15 students
- **Bases de données**, Bachelor, 6 ECTS, 22 hours (TP), 12 students
- **Structure de données et programmation orientée objets**, Bachelor, 6 ECTS, 56 hours, 7 students
- **Artificial Intelligence: Principles and methods**, Bachelor, 4 ECTS, 56 hours, 18 students
- **Traitement automatique du langage: approches linguistiques et approches statistiques**, Master, 6 ECTS, 56 hours, 21 students
- **Traitement automatique du langage: projet**, Master, 6 ECTS, 2 students
- **Empirical Methods in Natural Language Processing**, Master, 6 ECTS, 56 hours, 12 students
- **Nouvelles Technologies de l'Information et de la Communication**, Bachelor, 6 ECTS, 56 hours, 20 students

cvml.unige.ch

CVML

Computer Vision and Multimedia Laboratory

(R)amène ta science, C.O. Vuillonnex, Geneva, 2019 April 12th

Computer Vision and Multimedia Laboratory

Domain activities

The **Computer Vision and Multimedia Laboratory** (CVML, http://cvml.unige.ch), divided into three groups, carries out research in multimedia data processing, multimedia data management and security, as well as in multimodal human-machine interaction. Research applies to media such as text, audio tracks, sounds, images and videos, and to physiological signals.

Information Retrieval and Machine Learning group (Viper, Prof. S. Marchand-Maillet, Prof. A. Kalousis, http://viper.unige.ch): develops strategies for the efficient modeling, indexing, retrieval and exploration of large-scale datasets. The group studies fundamental machine learning strategies to provide efficient and accurate understanding and access to large-scale collections of complex data. Research themes include information retrieval, recommendation systems, data analytics and exploration, learning over sequential and temporal data, structured and kernel learning, regularization techniques for neural networks. Applications are considered in the fields of data visualization, forecasting, IoT, chemoinformatics, biomedicine.

Stochastic Information Processing group (SIP, Prof. S. Voloshynovskiy, http://sip.unige.ch): studies various aspects of information theory and statistical (stochastic) information analysis and processing. The applications mostly cover object identification and authentication based on unclonable object features in large nonstructured databases originating from various imaging techniques, mass-spectrometry and bioinformatics. Current research also concerns privacy preserving search, indexing and multiclass classification.

Multimodal Interaction group (MMI, Prof. T. Pun, Dr. G. Chanel, http://cvml.unige.ch/MMI): affective computing and multimodal interaction. Studies various forms of interaction between humans, computers, and environment. Used modalities: haptic, auditory, visual (e.g. facial expressions measured by a camera), eye-movements, and based on physiological signals such as EEGs (electroencephalograms),EMG (electromyograms), blood pressure, galvanic skin resistance (GSR) and skin temperature, breathing rate. Current developments concern: affective state determination and emotion recognition and their use for affective computing, multimodal interaction, brain-computer interfaces, the domain of entertainment, mobility aids for sight handicapped people and for the elderly. Member of the Swiss Center for Affective Sciences. Strong cooperation with faculties of psychology, literature and medicine.

The CVML has various specialized equipment and associated software:

- portable microscope with wireless communications for item identification and authentication;
- Computer cluster of 20 Dual Core 3GHz PCs each with 8 Gb RAM and 500Gb disk, inter-connected with GigaBit Ethernet.
- servers with high storage (overall 5Tb, Raid 5) and processing capabilities (1 Transtec Calleo (2 Xeon Dual Core, 12Gb RAM) and 2 SunFire X4150 (2 QuadCore, 32Gb RAM each), all 64bits architecture).
- Biosemi Active II EEG acquisition system (http://www.biosemi.com/) with 64+16 electrodes, with other sensors to record heart rate, GSR, skin temperature, breathing rate, blood pressure, and EMGs;
- Guger Technology gTec gMobilab+ mobile physiological signals recording system (http://www.gtec.at/);
- Eckel C14 audiometric research chamber (http://www.eckel.ca/) with electromagnetic insulation (Faraday cage), 2.16m x 1.80m x 2.37m;
- Eye-trackers: Tobii Pro TX300, Tobii nano, QuickGlance 2 (EyeTech Digital Systems);
- head-mounted display Emagin z800;
- stereo cameras: Videre Design STH-MDCS2, Bumblebee CCD BB2-03S2C-60;
- 3D time-of-flight camera SR4000 3D;
- combined 3D time-of-flight + luminance camera PMD CamCube 3.0 200x200 pixels;
- combined 3D + color camera Microsoft Kinect, Lytro, etc.;
- light field camera: Raytrix.
- Wearables: E4 wristband, Microsoftband, bitalino, seeeduino, ...

Team

Direction

Thierry Pun
Full professor
H-index: 52
(Honorary professor since August 2018)

Sviatoslav Voloshynovskiy
Associate professor
H-index: 32

Stéphane Marchand-Maillet
Associate professor
H-index: 24

Alexandros Kalousis
Full professor
University of Applied Studies, Geneva School of Business Administration
H-index: 27

Guillaume Chanel
Senior Lecturer and Researcher (also affiliated with the Swiss Center for Affective Science)
H-index: 21

Senior researchers

Dr. Guido Bologna (also affiliated with University of Applied Studies, Geneva)
Dr. Mohammad Soleymani
Dr. Taras Holotyak
Dr. Anna Aljanaki

Assistants (PhD students)

Lionel Blondé
François Bogacz
Etienne Brangbour
Sohrab Ferdowsi
Magda Gregorova
Dimche Kostadinov
Amina Mollaysa
Michal Muszinsky
Xavier Ouvrard
Dimitris Dardanis
Jason Ramapuram
Soheil Rayat-Doost
Pablo Strasser
Chen Wang
Olga Taran
Shideh Rezaeifar
Behrooz Razeghi
Denis Ullmann
Slavi Boney
Brandon Panos

Developers / Designers

Maurits Diephuis

Administration

Coralie Grossrieder

PhD Thesis

- Michal Muszynski December 2018: Recognizing film aesthetics, spectators' affect and aesthetic emotions from multimodal signals. Prof. Thierry Pun and Dr. Guillaume Chanel, Thesis No. 5298. Jury: Prof. Nadia Berthouze (Interaction Center, University college London, UK), Prof. Liming Chen (Ecole centrale de Lyon, Université de Lyon, France), Prof. Stéphane Marchand-Maillet (Computer Science Department, University of Geneva), Prof. Thierry Pun (Computer Science Department, University of Geneva, thesis director), Dr. Guillaume Chanel (Computer Science Department, University of Geneva, thesis director)
- Dimche Kostadinov, December 2018: Nonlinear Transform Learning: Model, Applications and Algorithms, Supervisor: Prof. S. Voloshynovskiy. Jury: Professor Karen Egiazarian (Institute of Signal Processing, Tampere University of Technology, Finland), Dr. Teddy Furon (INRIA, Rennes, France), Professor Sylvain Sardy (Section of Mathematics, University of Geneva), Professor Stephan Marchand-Maillet (Department of Computer Science, University of Geneva), Professor Sviatoslav Voloshynovskiy (Department of Computer Science, University of Geneva, thesis director).
- Sohrab Ferdowsi, December 2018: Learning to compress and search visual data in large-scale systems, Supervisor: Prof. S. Voloshynovskiy. Jury: Professor Karen Egiazarian (Institute of Signal Processing, Tampere University of Technology, Finland), Dr. Christine Guillemot (INRIA, Rennes, France), Dr. François Fleuret (IDIAP, Martigny), Professor Stephan Marchand-Maillet (Department of Computer Science, University of Geneva), Professor Thierry Pun (Department of Computer Science, University of Geneva), ProfessorSviatoslav Voloshynovskiy (Department of Computer Science, University of Geneva, thesis director).

List of publications

Refereed papers in international journals

[1] Wang, C., Pun, T., & Chanel, G. (2018). A Comparative Survey of Methods for Remote Heart Rate Detection From Frontal Face Videos. Frontiers in Bioengineering and Biotechnology, 6(33).

[2] Muszynski, M., Kostoulas, T., Lombardo, P., Pun, T., & Chanel, G. (2018). Aesthetic Highlight Detection in Movies Based on Synchronization of Spectators' Reactions. ACM Transactions on Multimedia Computing, Communications, and Applications, 14(3), 1-23.

[3] Soleymani, M., Riegler, M., & Halvorsen, P. (2018). Multimodal analysis of user behavior and browsed content under different image search intents. International Journal of Multimedia Information Retrieval.

[4] Muszynski, M., Tian, L., Lai, C., Moore, J., Kostoulas, T., Lombardo, P., Pun, T., et al. (2019). Recognizing Induced Emotions of Movie Audiences From Multimodal Information. IEEE Transactions on Affective Computing, to appear.

[5] B. Panos, L. Kleint, C. Huwyler, S. Krucker, M. Melchior, D. Ullmann, S. Voloshynovskiy, Identifying typical MG II flare spectra using machine learning. The astrophysical journal, Vol. 861, No1, July 2018.

[6] Prodromos Kolyvakis, Alexandros Kalousis, Barry Smith, Dimitris Kiritsis: Biomedical ontology alignment: an approach based on representation learning. J. Biomedical Semantics 9(1): 21:1-21:20 (2018)

Full refereed papers in Workshops Proceedings

[7] Wang, C., LOPES, P., Pun, T., & Chanel, G. (2018). Towards a Better Gold Standard: Denoising and Modelling Continuous Emotion Annotations Based on Feature Agglomeration and Outlier Regularisation. In AVEC'18 Proceedings of the 2018 on Audio/Visual Emotion Challenge and Workshop (pp. 73-81). ACM Press.

[8] S. Ferdowsi, S. Voloshynovskiy, D. Kostadinov, Vector compression for similarity search using multi-layer sparse ternary codes, IEEE Data Science Workshop, Lausanne, Switzerland, 4-6 June, 2018.

[9] O. Taran, S. Rezaeifar, and S. Voloshynovskiy, «Bridging machine learning and cryptography in defense against adversarial attacks,» in Proc. Workshop on Objectionable Content and Misinformation (WOCM), ECCV2018, Munich, Germany, 2018.

[10] D. Ullmann, S. Voloshynovskiy, C. Huwyler, M. Melchior, L. Klein, B. Panos, DCT-Tensor-Net for solar flares detection on IRIS data, 7th European Workshop on Visual Information Processing, Tampere, Finland, 26-28 November, 2018.

[11] D. Kostadinov, S. Voloshynovskiy, S. Ferdowsi, Learning Overcomplete and Sparsifying Transform with Exact and Approximate Closed Form Solutions, 7th European Workshop on Visual Information Processing, Tampere, Finland, 26-28 November, 2018 (Huawei Best paper award).

[12] M. Ferrari, O. Taran, T. Holotyak, K. Egiazarian, S. Voloshynovskiy, Injecting Image Priors into Learnable Compressive Subsamsampling, 2018 26th European Signal Processing Conference (EUSIPCO), Roma, Italy, 3-7 Sept. 2018.

[13] S. Rezaeifar, O. Taran, S. Voloshynovskiy, Classification by Re-Generation: Towards Classification Based on Variational Inference, 2018 26th European Signal Processing Conference (EUSIPCO), Roma, Italy, 3-7 Sept. 2018.

[14] B. Razeghi, S. Voloshynovskiy, S. Ferdowsi, D. Kostadinov, Privacy-Preserving Identification via Layered Sparse Code Design: Distributed Servers and Multiple Access Authorization, 2018 26th European Signal Processing Conference (EUSIPCO), Roma, Italy, 3-7 Sept. 2018.

[15] D. Kostadinov, S. Voloshynovsky, and S. Ferdowsi, Active Content Fingerprinting Using Latent Data Representation, Extractor and Reconstructor, 2018 26th European Signal Processing Conference (EUSIPCO), Roma, Italy, 3-7 Sept. 2018.

[16] B. Razeghi and S. Voloshynovskiy, «Privacy-Preserving Outsourced Media Search Using Secure Sparse Ternary Codes,» in Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Calgary, Alberta, Canada, 2018, pp. 1-5.

[17] Gregorová, M., Kalousis, A., & Marchand-Maillet, S. (2018). Structured Non-linear Variable Selection. In Conference on Uncertainty in Artificial Intelligence UAI2018, Monterey, CA.

[18] Gregorová, M., Ramapuram, J., Kalousis, A., & Marchand-Maillet, S. (2018). Large-scale Nonlinear Variable Selection via Kernel Random Features.. In ECML/PKDD 2018, Dublin, IE.
[19] Ouvrard, X., Goff, J. L., & Marchand-Maillet, S. (2018). On Adjacency and e-Adjacency in General Hypergraphs: Towards a New e-Adjacency Tensor. In IMA Conference on Theoretical and Computational Discrete Mathematics, Derby, UK.
[20] Ouvrard, X., Goff, J. L., & Marchand-Maillet, S. (2018). On {Hb}-graphs and their application to hypergraph e-adjacency tensor. In MCCCC 32 - Midwest Conference on Combinatorics and Combinatorial Computing, Duluth, USA.
[21] Prodromos Kolyvakis, Alexandros Kalousis, Dimitris Kiritsis: DeepAlignment: Unsupervised Ontology Matching with Refined Word Vectors. NAACL-HLT 2018: 787-798

Books and book chapters

[22] Marchand-Maillet, S., Silva, Y., & Chavez, E. (2018). Similarity Search and Applications - 11th International Conference, SISAP 2018. Springer.

Research and technical reports

[23] Chen Wang, T. Pun, G. Chanel, «A multimodal database for impression detection and prediction», Swiss Center of Affective Sciences, Annual research forum, February 7, 2018, Geneva, Switzerland (poster).
[24] Chen Wang. Detecting and managing impressions for a more engaging virtual agent. In The 6th International Workshop on Symbiotic Interaction. Eindhoven, the Netherlands. December 18-19, 2017.
[25] Gregorová, M., Kalousis, A., & Marchand-Maillet, S. (2018). Structured nonlinear variable selection CoRR abs/1805.06258.
[26] Gregorová, M., Ramapuram, J., Kalousis, A., & Marchand-Maillet, S. (2018). Large-scale Nonlinear Variable Selection via Kernel Random Features. CoRR abs/1804.07169.
[27] Ouvrard, X., Goff, J. L., & Marchand-Maillet, S. (2018). On Adjacency and e-Adjacency in General Hypergraphs: Towards a New e-Adjacency Tensor CoRR abs/1809.00162.
[28] Ouvrard, X., Goff, J. L., & Marchand-Maillet, S. (2018). Hypergraph Modeling and Visualisation of Complex Co-occurence Networks CoRR abs/1809.00164.
[29] Ouvrard, X., Goff, J. L., & Marchand-Maillet, S. (2018). Exchange-Based Diffusion in Hb-Graphs: Highlighting Complex Relationships CoRR abs/1809.00190.
[30] Morel, J. ((2018). Vivarium: vulgarisation des mécanismes de l'Intelligence Artificielle par l'exemple.). Unpublished Master's Dissertation.

International and national advisory committees

- S. Voloshynovskiy, Elected associate member of the IEEE Information Forensics and Security Technical Committee (March 2015 – present)
- S. Voloshynovskiy, Founding member and board member of EURASIP Special Area Teams (SATs) in Biometrics, Data Forensics and Security (Aug. 2015 - present).
- S. Voloshynovskiy, TrackML International Advisory Committee (CERN, 2018)
- T. Pun: Steering Committee of the Swiss Center for Affective Sciences
- T. Pun: elected member, Swiss Academy of Engineering Sciences

PhD Thesis Committees

Guillaume Chanel:

- University of New South Wales, Xuejie Liu, submitted 2018
- University of Geneva, Michal Muszynski, 2018

Sviatoslav Voloshynovskiy:

- Univ. of Geneva (Switzerland): O. Horlacher (2018)
- Univ. of Geneva (Switzerland): D. Kostadinov (2018) (Head of jury)
- Univ. of Geneva (Switzerland): S. Ferdowsi (2018) (Head of jury)
- INRIA(INRIA) (Rennes, France): Habilitation jury member for Dr. T. Furon (Oct., 2018)

Member of conference/workshop program committees

Guillaume Chanel:

- 13th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2018), Program committee, Xi'an, China, May 15-19, 2018

Stéphane Marchand-Maillet:

- PC Chair, 11th International Conference on Similarity Search and Applications (SISAP 2018), Lima, Peru, October 2018
- Senior PC Member 27th International Joint Conference on Artificial Intelligence (IJCAI 2018), Sweden, July 2018.
- PC member of several indexing and machine learning conferences.

Sviatoslav Voloshynovskiy:

- Workshop on Positive and Negative Adversaries in Multimedia, PANAMM 2018, held as a satellite event to ACM Multimedia 2018, Seoul, Korea
- 6th ACM Information Hiding and Multimedia Security Workshop, ACM IH&MMSec 2018, Innsbruck, Austria, June 20-22, 2018, (program committee).
- 14th International Conference on Modern Problems of Radio Engineering, Telecommunications and Computer Science, February 20-24, 2018, Lviv-Slavske, Ukraine, (program committee).
- WIFS2018, IEEE Workshop on Information Forensics and Security 2018, Hong Kong, (technical committee; co-organizer of a special session on Physical object security).

- EUSIPCO2018, 26th European Signal Processing Conference, Rome, Italy (co-organizer of a special session on Adversarial machine-learning for digital and analog world systems, chairman of session on Information forensics and security).
- EUVIP 2018, 7th European Workshop on Visual Information Processing, Tampere, Finland, November 26-28, 2018 (advisory committee member).

Refereeing

Guillaume Chanel:
- IEEE Transactions on Games
- IEEE Transactions on Visualization and Computer Graphics

Sviatoslav Voloshynovskiy:
- IEEE Trans. on Information Forensics and Security

Editorial Responsabilities

Thierry Pun:
- Section of Frontiers in ICT, Frontiers in Psychology and Frontiers in Digital Humanities (Nature Publishing Group).

Stéphane Marchand-Maillet:
- ACM Transaction on Information Systems (ACM-TOIS). Associate Editor (2016-present)

Sviatoslav Voloshynovskiy:
- IEEE Signal Processing Letters (since December 2015-) and Senior Associate Editor (2016 - 2018)
- Journal Series of Radio Electronics and Telecommunication (since March 2018 -)

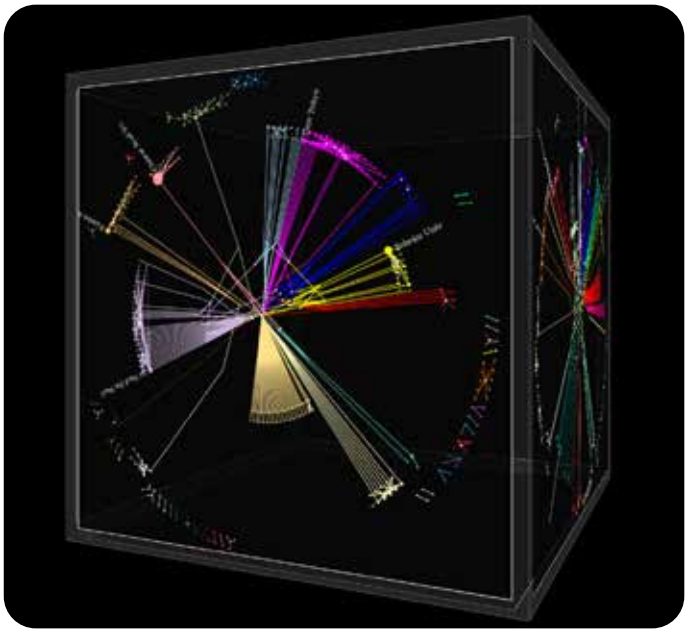


Figure 2: Visual Analytics for Big Data: Development of interfaces for visualising and manipulating complex data. Visualisation of hypergraphs (collaboration with CERN)

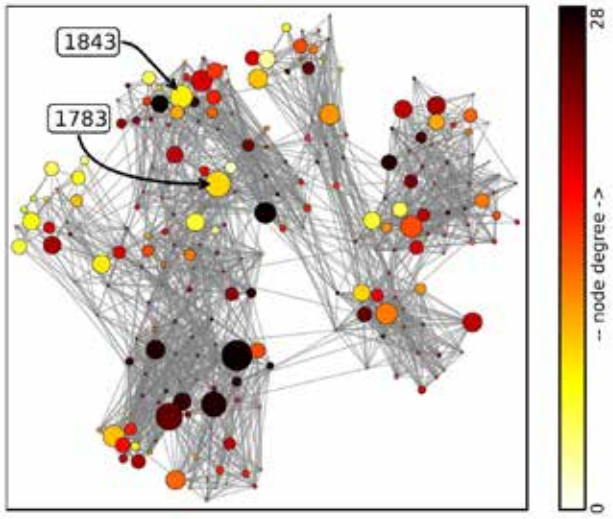


Figure 1: Social Network Analysis: characterization of influence. Study of the relationships and communication in a primary school playground

Invited talks

Guillaume Chanel:
- "Socio-affective computing and Neuroergonomics applications", keynote, journée CORTICO 2018, ISAE-SUPAERO, Toulouse

Stéphane Marchand-Maillet:
- Developing A.I. Literacy via Adapted Educational Programs. Invited talk, European Broadcasting Union (EBU). November 2018.

Sviatoslav Voloshynovskiy:
- Learnable encoding: from imaging to security, invited talk, CNRS, Rennes, France, October 30, 2018

Funded research projects

Participation to European projects

IMPRESSIONS

Seconds that matter: Managing first impressions for a more engaging virtual agent

Nr. 200021E-164326 / 1, Lead Agency Framework

Joint French - Swiss project

French principal investigator: Prof. C. Pélachaud, Télécom-ParisTec.

Swiss principal investigator: Prof. T. Pun, Dr. G. Chanel

Period: July 2016 - June 2019

Participation to National projects

FNRS-SNSF, Swiss National Science Foundation:

Impressions (Seconds that matter: Managing first impressions for a more engaging virtual agent)

SNF Nr. 200021E-164326 / 1, Lead Agency Framework, joint French-Swiss project.

French principal investigator: Prof. C. Pélachaud, Télécom-ParisTec. Swiss co-PI: Prof. T. Pun, Dr. G. Chanel.

Period: June 2016 - June 2020

Emotional and aesthetic highlights detection in movies
SNF 205121_153239
Leading House: University of Geneva, Prof. D. Sander
Principal investigator: Prof. T. Pun, Prof. Patrizia Lombardo, Dr. Guillaume Chanel, Michal Muszynski
Period: October 2014 - September 2018

Information-theoretic forensic physical object identification
SNF 200021-165672
Principal investigator: Prof. Sviatoslav Voloshynovskiy
Period: September 2016 - August 2018

Machine Learning based Analytics for Big Data in Astronomy
SNF NRP75 project (407540_167158)
Joint project between the University of Geneva and Fachhochschule Nordwestschweiz.
Principal investigator for the entire project: Prof. S. Voloshynovskiy, Computer Science Dpt., Univ. of Geneva
Period: May 2017 - April 2020

Identification for the Internet of Things
SNF project (20CH21_167543)
CHIST-ERA project with the Technical University of Eindhoven (PI of this project), the Netherlands, INRIA/IRISA-Rennes, France and the University of Geneva.
Principal investigator at the University of Geneva: Prof. S. Voloshynovskiy, Computer Science Dpt., Univ. of Geneva
Period: February 2017 - January 2020

Hasler Foundation

EEG artifact reduction using facial expression analysis and its applications to emotion recognition
Principal investigator: Dr. M. Soleymani, Univ. of Geneva.
Co-principal investigator: T. Pun
Period: January 2016 - December 2018

CVML team, 2016 Nov. 1st

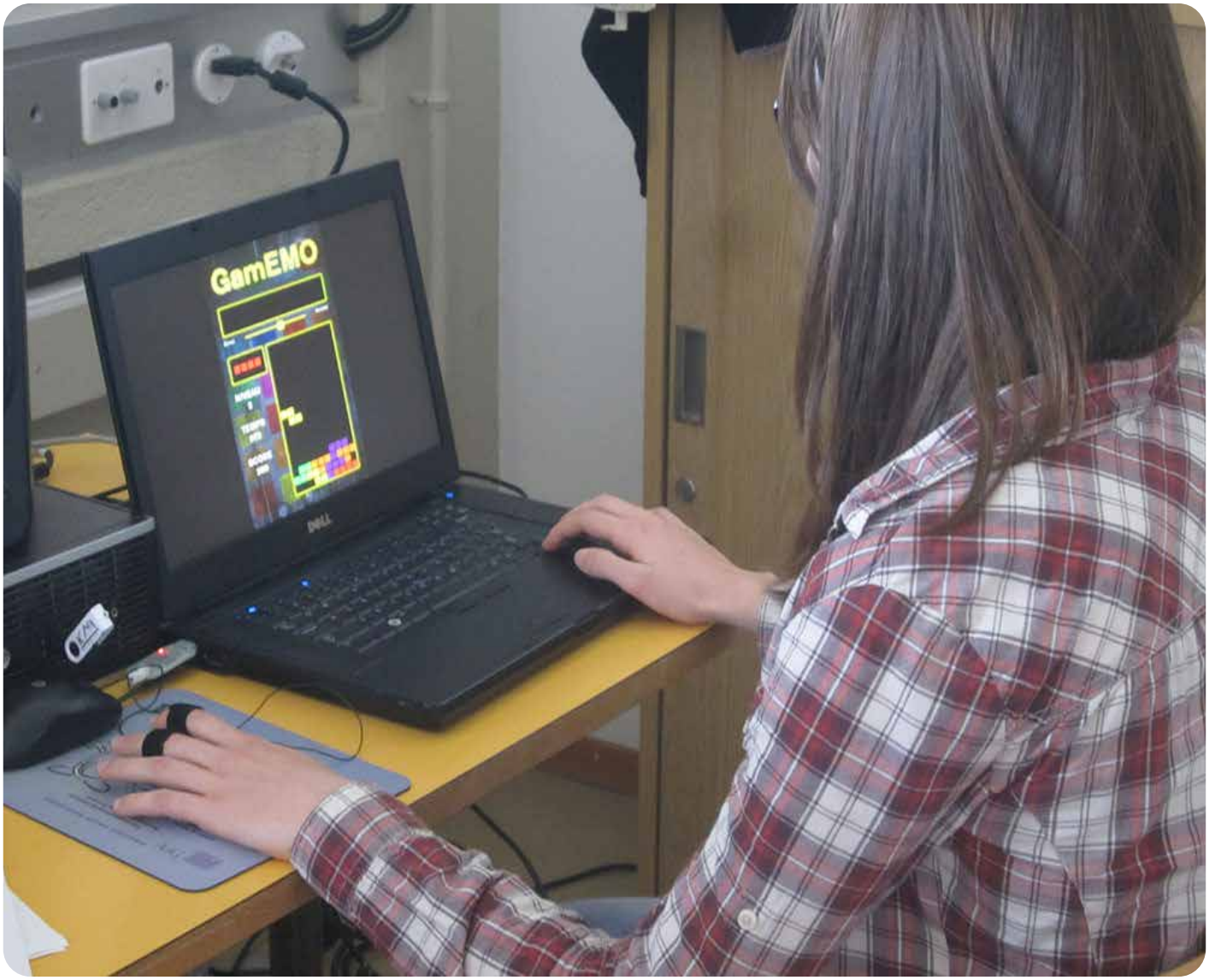
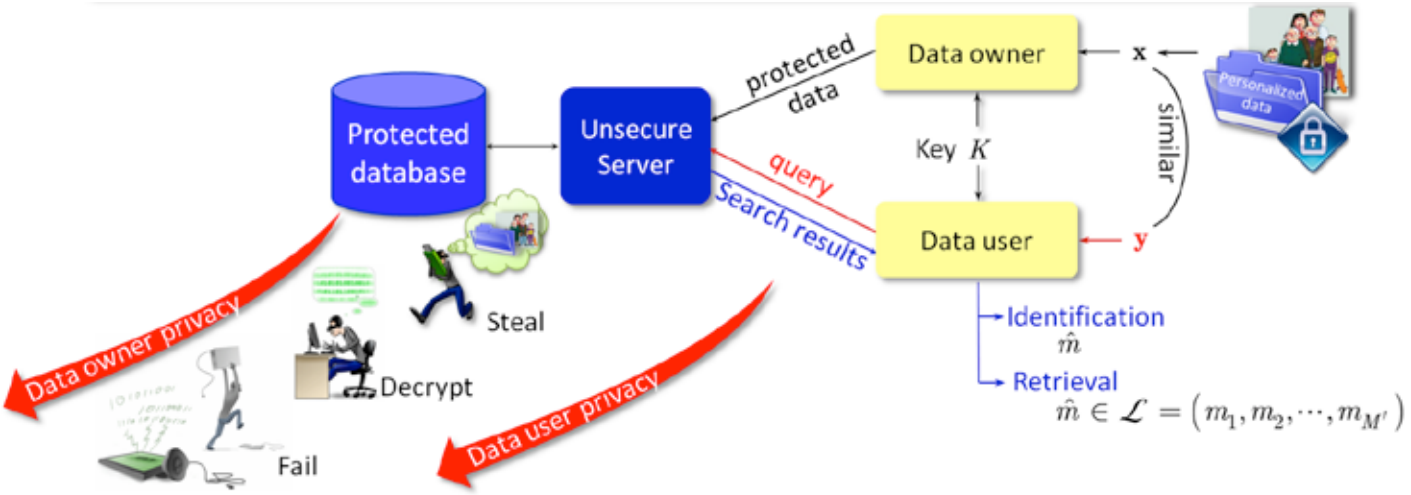


Figure 3: GameEmo is an example of affective game developped in our laboratory, where the speed of the falling bricks is varied according to the user's feelings. If the person is too stressed, the speed decreases, while it increases when the user gets bored, all this resulting in an increase in the sense of flow and pleasure. In the photograph, one sees that the player is equipped with a non-intrusive Galvanic Skin Resistance sensor on two of the left-hand fingers; these are used to provide a real-time estimate of the stress level. That game has also been developed into a real arcade game currently part of a year-long exhibition at the Muséum of Natural History, Neuchâtel (http:http://www.museum-neuchatel.ch/). Developing such affective, engaging games is one example of affective computing.

Figure 4: Privacy-preserving multimedia identification/retrieval architecture



Others

Content fingerprinting and object recognition
CRADA: University of Geneva, U-nica Systems
Principal investigator: Prof. Sviatoslav Voloshynovskiy
Period: August 2014 - December 2018

PubliMAPE: (PUBLic Information MAPped to Environmental events)
Joint project between University of Geneva and Luxembourg Institute of Science and Technology (LIST).
Principal investigator: Dr. Pierrick Bruneau (LIST).
Prof. Stéphane Marchand-Maillet
Period: September 2017 - August 2020

CollSpotting: Visualisation of Large-Scale Collaboration Networks
Joint project between University of Geneva and CERN
Principal investigator: Dr. J-M Le Goff (CERN).
Prof. Stéphane Marchand-Maillet
Period: September 2016 - August 2019

Technology transfer

- **Spin-off: Anteleon Imaging S.A.R.L.** (founded August 2003, http://www.anteleon.com/), specialized in multimedia documents protection and management, watermarking, authentication and tamper proofing as well as brands protection.
- **U-nica Sytems**, AG (Malans) (http://www.u-nica.com) according to Collaborative and Research Agreement between the University of Geneva and U-nica Systems in the domain of physical object protections against counterfeiting based on the University of Geneva patented technology.
- **GEDECE, S.A.R.L.** Geneva (http://www.gedece.org) technology licencing and collaboration in the domain of physical objects security and image processing.
- **Guillaume Chanel was mandated by Airbus**, Toulouse, France from June 2017 to December 2018 to work on ambulatory health monitoring.
- **Patent application**: S. Voloshynovskiy, M. Ferrari, O. Taran, T. Holotyak, K. Eigazarian, Signal sampling with joint training of learnable priors for sampling operator and decoder, August 28, 2018 (submitted).

Open software and databases

CSEM 25
Title of the service/product/process: CSEM-25
Type: dataset of object classes
External partners involved in the development (if any): CSEM
Client or End user(s) : Computer vision community
Brief description: Captured with a Raytrix R5 camera, CSEM-25 is a multipurpose dataset of 5 object classes to address several aspects of computer vision applications using light field with a lens-grid-based representation.
Website: http://csem.ch/csem-25-db

GIF interestingness database
- Title of the service/product/process: GIF interestingness database
- Type (software, educational program, database, etc.): dataset of GIFs
- External partners involved in the development (if any): ETH Zurich
- Client or End user(s) : Multimedia community
- brief description (1 line): It is a collection of GIFs with labels on emotions, aesthetics and interest.

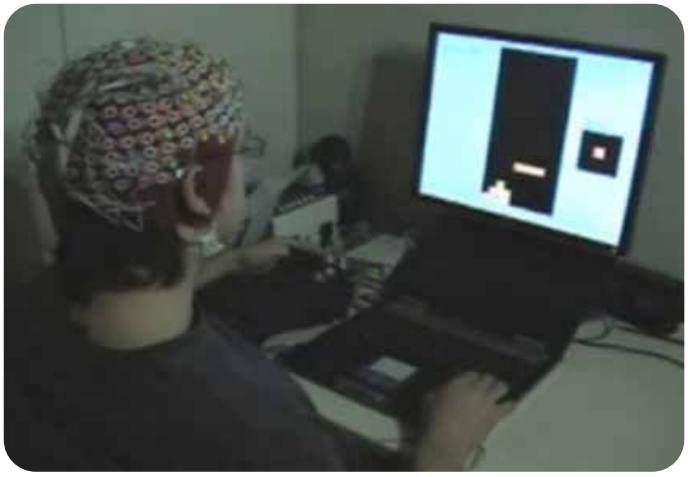


Figure 5: Assessment of users emotional states by using multimodal physiological signals

Figure 6: Movie affective characterization using physiological signals and content analysis

Image interestingness database
Title of the service/product/process: Image interestingness database
Type: dataset of 1005 images
External partners involved in the development (if any): none
Client or End user(s) : Computer vision and multimedia community
Brief description: It is a collection of photos with labels on emotion, aesthetics and interest.

Emotion in Music database
Title of the service/product/process: Emotion in Music database
Type: dataset of more than 2700 songs
External partners involved in the development (if any): Academia Sinica, Taiwan, Utrecht University, the Netherlands
Client or End user(s) : Music information retrieval community, psychologists
Brief description: It is a collection of songs with creative commons license with dynamic and static emotional annotations.

MAHNOB-HCI database
Title of the service/product/process: MAHNOB-HCI database
Type: database of emotional responses
External partners involved in the development (if any): Imperial College London, UK
Client or End user(s) : Researchers from affective computing, computer vision and psychology
Brief description: A database of emotional reactions to videos including, facial expressions, physiological signals and eye gaze.

DEAP
Title of the service/product/process: DEAP
Type: database of emotional responses
External partners involved in the development (if any): Queen Mary University of London, UK, University of Twente, Netherlands, EPFL
Client or End user(s) : Researchers fro maffective computing, computer vision and psychology
Brief description: A database of emotional reactions to music videos including, facial expressions and physiological signals

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TEAP
Title of the service/product/process: TEAP
Type: Toolbox (open source)
External partners involved in the development (if any): none
Client or End user(s) : Researchers from affective computing and physiological signal analysis
Brief description: A toolbox for extracting emotionally relevant features from physiological signals

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EATMINT
Title of the service/product/process: EATMINT database
Type: Database
External partners involved in the development (if any): none
Client or End user(s) : Researchers from affective computing and social signal processing
Brief description: A database for the analysis of collaboration from behaviors and physiological reactions

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PharmaPack
- Title of the service/product/process: PharmaPack database of pharmaceutical packages acquired by mobile phones
- Type (software, educational program, database, etc.): Database of 1000 packages enrolled from 54 positions in automatic mode and 16 hand-held recognition images.
- External partners involved in the development (if any): none

Others

- **Huawei Prize** for best student paper «Learning Overcomplete Sparsifying Transform with Approximate and Exact Closed Form Solutions» D. Kostadinov, S. Voloshynovskiy, S. Ferdowsi, presented at the IEEE European Workshop on Visual Information Processing, 25-28 Nov, 2018, Tampere, Finland.
- M. Ferrari supervised by S. Voloshynovskiy and O. Taran was awarded **Prix ARDITI 2018** in Computer Science for the Master work entitled "Learnable compressive subsampling".

Teaching

- **Human-computer interaction** (Affective computing and multimodal interaction part), Master, with Profs. G. Falquet et L. Moccozet. 56h practical work, approx. 10 students. 8 ECTS.
- **Digital image processing and synthesis**, Computer Science, 3rd year Bachelor, T. Pun, optional for Master and postgraduate students, 56h. course and 56h. practical work, approx. 15-20 students. 8 ECTS.
- **Introduction to algorithms**, Computer Science, 1st year Bachelor, 56h. course, 28h exercises and 56h. lab work, approx. 40-50 students, T. Pun
- **Avanced image processing**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 8 students.
- **Elements of information theory**, Computer Science, 2nd year Bachelor, Master, postgrades, 28h. course and 28h. practical work, approx. 25 students.
- **Data mining**, Computer Science, 3rd year, Master in statistics, 1st year, 28h. course and 28h. practical work, aprox. 20 students.
- **Artificial Intelligence**, Computer Science, 3rd year, 28h. course and 28h. practical work, aprox. 30 students. 4 ECTS.
- **Multimedia security and privacy**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 8 students.
- **Information Retrieval**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 15 students. 4 ECTS
- **Information Analysis and Processing**, Computer Science, Master, postgrades, 28h. course and 28h. practical work, approx. 25 students. 4 ECTS
- **Data Structures**, Computer Science, 1st year Bachelor, 56h. course and 56h. lab work, approx. 30 students. 7 ECTS
- **Hands-on Programming** (practical complement to Data Structures), 1st year Bachelor. 56h Practical work, 20 students.
- **Operating systems** (Systèmes informatiques), 2nd year Bachelor, 28h course, 28h exercices, 56h lab work, 15 students, Dr. J.-L. Falcone
- **Computer Science Project**, Computer science, 3rd year Bachelor, 28 hours course and 56 hours lab. Approximately 10 students.
- **Computer Science Applications**, 2nd year Bachelor, 40 hours of applied computer science with a real client, approx. 15 students
- **Industrial Internships**, Summer Semester (3 months supervision), 5 students.
- **Weekly Computer Vision and Multimedia seminars**, graduate students and senior researchers, 1h. per week, about 15 PhD students, post-docs, seniors, visitors.

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ISS

Institute of Information Service Science

Infoscope, Geneva, 2018

Institute of Information Service Science

Team

Senior Researchers
Dr, Grigorios Anagnostopoulos
Dr. Maher Ben Moussa
Dr. Antoine Burret
Dr. Giuseppe Cosenza
Dr. Michel Deriaz
Dr. Marios Fanourakis
Dr. Mattia Gustarini (till Feb. 2018)
Dr. Abdelaziz Khadraoui
Dr. Thomas Maillart
Dr. Dejan Munjin
Dr. Niels Nijdam
Dr. Mehdi Snene
Dr. Vedran Vlajki

Scientific Collaborators
Florentina Olivia Balu
Anastasija Collen
Christophe Jeannette
Michael Mesfin

Assistants / PhD Students
Hammoud Abbass
Oumaima Ajmi
Sahar Aljalbout
Evangelia Baka
Georges Bediang (external)
Houssem Ben Mahfoudh
Allan Berrocal Rojas
Vincenzo Daponte
Alexandre De Masi
Sami Ghadfi
Laëtitia Gosetto
Athanasios Kyritsis
Aman Sabrina Nwatchouck A Koul
Mohammad Parhizkar
Arianna Religi
Arbër Salihi
Simon Senecal
Camille Tardy
Yvain Tisserand
Christiana Tsiourti

Developpers / Designers (PAT)
Marlène Arevalo-Poizat
David Beni
Dr. Jonathan Bertaloccini
Nedjma Cadi-Yazli
Ashley Caselli
Mariem Jaouadi
Marios Karagiannis

Eleni Christodoulou
Invited professor
H-index: 17

Giovanna Di Marzo Serugendo
Full professor
H-index: 30

Gilles Falquet
Associate professor
H-index: 17

Dimitri Konstantas
Full professor
H-index: 28

Michel Léonard
Honorary professor
H-index: 21

Nadia Magnenat-Thalmann
Honorary professor
H-index: 85

Claudine Métral
MER

Laurent Moccozet
MER
H-index: 18

Jean-Henry Morin
Associate professor

Jolita Ralyté
MER
H-index: 21

Jean-Marc Seigneur
MER
H-index: 19

Katarzyna Wac
Invited professor
H-index: 21

Panagiotis Kostopoulos
Michaël Reolon
Vincent Ricard
Mathieu Tappolet

Fellowships
Sophie Pusterla

Visiting Academic Guests
Anne-Françoise Cutting-Decelle
Zang Fanglue
Jean-Pierre Hurni

Dr. Gerlinde Kristahn
Thang Le Dinh
Tang Min
Yanlong Tang
Ruofeng Tong
Tommaso Venturini

Administration
Marie-France Culebras
Coralie Grossrieder

Domain activities

Services represent the most growing sector of the economy in industrialized nations. Services science is arising from the rapid development of services across the industrial world and the need to analyze and study the organization, deployment, maintenance and operation of those related IT based and IT supported services. Services Science represents an interdisciplinary approach to the systematic innovation in service systems, integrating management, social, legal and engineering aspects.

ISS is an inter-faculty research laboratory of the Centre Universitaire d'Informatique of the University of Geneva (iss.unige.ch). As a team of 65 staff members, we are active in research, technology watch, creativity and teaching. We are currently participating in 29 research projects (EU/Cost/CTI/SNF/Private funding) representing a funding of 3.3M/year.
By its very mission, ISS targets research-led innovative services exploiting information and digital technology, such as services for mobile users, for seniors, or for specific industry needs. We developed a series of solutions specifically targeting the seven application domains:

- Smart and Sustainable Cities
- Digital Humanities
- Environment
- Health and Quality of Life
- Information Security
- Indoor positioning
- Processing data coming from smartphone or wearable sensors

Our major areas of research cover:

- Autonomous Adaptive Services, Pervasive Services
- Services for mobile users
- Multimedia services
- Digital Rights Management and Policies for Services
- Knowledge Engineering, Semantic Web, Ontology
- M-health, E-Health, Ambient Assisted Living
- Multimedia Services, Virtual Reality, Augmented Reality
- Modeling, Business Process Methods
- Trust and Online Reputation Management
- Augmented Human
- Smart City Digital Management
- Service Law Compliance
- Geographical Information Systems
- E-Learning
- Social Networks Analysis, Predictive analytics
- Indoor positioning
- Processing data coming from smartphone or wearable sensors
- Data visualization in 3D city models
- Quality of data and semantic queries in volunteer geographic information

We are also part of the Hub in Environmental Informatics of the University of Geneva aiming at developing research and teaching in this area.

Our additional strong involvement in interdisciplinary think groups places us at the forefront of the technology watch in Services Science in Switzerland. We regularly contribute to creativity and innovation hands-on experiments targeted at industry. We also participate to a full range of academic programs in Information Systems and Services Science (BSc, Msc, Executive Programs and PhD).

Our international network includes many academic institutions, public administrations, creativity and innovation consultants, think tanks and services providers across Europe, Asia, North America.

Gilles Falquet, Laurent Moccozet and Claudine Métral - Knowledge Engineering @ ISS

Knowledge Engineering @ ISS is a research laboratory of the Institute for Information Service Science (ISS) within the Center for Computing (CUI) at the University of Geneva. KE@ISS is conducting research on knowledge engineering: knowledge representation, knowledge-based information systems, and interfaces to access knowledge, with an emphasis on semantic digital libraries, semantic web, and space-related applications.

The main results obtained in 2018 relate to

- The contextualization of knowledge graphs: creation of a language to express contextualized ontologies and knowledge graphs, development of a complete contextual reasoning system for this language;
- The visualization of scientific knowledge: creation of an ontology of scientific knowledge objects and a visualization system to map knowledge entities to visual entities;
- The publication of geospatial data on the Semantic Web: definition of a technique to formally specify how geospatial data from several sources are integrated and mapped to linked-data entities.

Nadia Magnenat-Thalmann - MIRALab

MIRALab was founded in 1989 by Professor Nadia Magnenat-Thalmann and has brought together PhD students and researchers from different fields, such as computer science, 3D graphics, 3D simulation, social robotics, 3D fashion design, and cognitive science. This truly interdisciplinary group continues to work in the field of medical informatics, virtual worlds and virtual humans.

Since 1992, MIRALab has participated in more than 50 European Projects and contributes to the management of two International Conferences, CASA and CGI. Moreover, MIRALab produces 3D showcases for museums, galleries, such as fashion shows with virtual models and clothes. In 2018, MIRALab was working on the following projects: NOTRE and ViMM.

Jean-Marc Seigneur - Computational Trust & Augmented Human

For ages, humans have used the human notion of trust as a means to cope with uncertainty, to engage in an action in spite of the risk of a harmful outcome. More recently, computational models of this human notion of trust have been researched in order to be able to use trust in the digital world as well, between computers and/or digital accounts controlled by remote humans, from direct observations to recommendations and online reputation. Decentralized trust solutions such as blockchains are revolutionizing many business domains from banking to supply chain certification. In the near future, it is even envisioned that humans and computers merge together: Elon Musk has recently created a new venture for implants in the human brain with the aim to help human beings merge with software and keep pace with advancements in artificial intelligence. It seems that there is an increasing trend towards augmenting humans not only to retrieve their abilities after being disabled but also beyond their normal abilities. We have contributed to this trend with the organization since 2010 of the augmented human international conferences focusing on scientific contributions towards augmenting human capabilities through technology. We are researching how these augmented human technologies can improve computational trust assessment not only of machines but also of humans.

Giovanna Di Marzo Serugendo - Collective Adaptive Systems

Collective Adaptive Systems refer to a form of complex systems where a large number of heterogeneous entities interact without specific external or internal central control, adapt their behaviour to environmental settings in pursuit of an individual or collective goal. Actual behaviour arises as an emergent property through swarm or collective intelligence.

Examples include understanding emergence and social behaviour of natural life (e.g. bacteria self-organising to overcome shortage of food), engineering swarm robotics, developing socio-technical systems and more generally developing services for smart and sustainable cities. We lead and develop research in three main areas:

- Studying natural systems (e.g. biological, social, human ones) and identifying essential models, mechanisms and interactions at work at the heart of those systems, mostly through agent-based models, simulations and design patterns.
- Designing and developing artificial collective adaptive systems and different forms of emergent behaviour (e.g. swarm robotics, ecosystems of spatial services for smart cities, higher-order emergence)
- Verifying the reliability and trustworthiness of those systems prior to their deployment in real-life settings.

Michel Léonard - MATIS (Management and Technology of Information Services)

The Society/Company seems to become fully servitized. This trend induces huge fields of services to be immersed, and discovered. Consequently, a lot of human and collective activities will be interwoven with artificial activities, and one major concern about such a Society/Enterprise development depends on the quality of these interwoven activities.

So, following our research approach in information systems, we centre our research on information – and not on software, like Web services – to explore activities emerging or transformed in enterprises or e-government, and to discover actionable knowledge, relevant to these servitized situations. Thus, we explore appropriate:

- Company organisations taking into account initiatives, responsibility,
- Design methods taking into account adaptability, agility, composition, compliance with rules,
- Information base management systems (Ksterix),
- Transdisciplinary environments,
- Company evolution through IS evolution by means of services.

Thus, we work on the creation of Tiers-Lieux in the context of a new emerging kind of economy: the contributory economy. They will provide cognitive cross-pollination spaces for developing large services requiring multidisciplinary, multi-institutional, notably public and private, researchers and practitioners, in order to face the intricate situations, for instance with Big Data, Open Data, Smart Region. It is an interconnected grid of activities, platforms and methods aiming at accelerating exploration, development and market validation of new services. It will enable students and researchers to express, model and experiment specific requirements, and to be immerged in real situations.

Dimitri Konstantas - Mobile services

Mobile services and applications are today an indispensable part of our daily life. We are using our smartphones to access our mail, chat with friends and colleagues, take and store photographs and videos, obtain guidance and route information, play games, access the internet and even measure our daily activities and our physical performance and obtain highly personalized services and information. In other words, smartphones are today indispensable to all our daily activities. For the past few years we have been working in the development of mobile services and applications in different domains, including services for the elderly, services for civil engineers and security applications.

Since 2009 we have been applying the results of our research in the study and development of services for the aging society and for mobile services of elderly. In this context, in 2016 we have succeeded acquiring 4 European projects in the Ambient Assisted Living (AAL) program, 2 technology transfer projects (CTI), one FNRS project (memory condition of Eldrrly) and one H2020 (Security in IoT). Our work in the domain of ageing society concentrates in the study of lifestyle of senior persons (age 65 and more) and the creation of mobile services for monitoring the activities of the users and providing them proactive information regarding activities to do (realising the basic directive for senior persons : do not stay inactive), putting them in contact with other users with similar interests (socialisation), providing them the means for getting help from formal and informal care givers, and even advising them on diet and exercise. In this projects we collaborate with local (Geneva based) industrial partners that are offering services for seniors. The research results from the AAL and H2020 projects are then transfered, via the CTI technology transfer projects, towards commercial applications and services. Our research is carried out in four specialised Laboratories, the Conscious Analytics System Laboratory (CASlab), the Quality of Life Laboratory (QoL), the Travelling and Mobility Laboratory (TaM) and the Security Laboratory (SecLab).

Katarzyna Wac - Quality of Life Technologies

Quality of Life (QoL) technologies lab vision is to be a leading academic laboratory recognized for inter-disciplinary education, research and development aimed at improving Quality of Life of individuals throughout their lives.

The lab leverages behavioral markers to quantify and improve individuals' QoL in new ways – drawing on new emerging models from computer science incorporating examination, diagnosis and treatment of daily life as an "organ" – much like a cardiologist examines heart - and the resulting Quality of Life as a «vital sign» - routinely reported for patients and non-patients alike.

Jean-Henry Morin - Digital Rights & Policy

As our society and economy continues to move towards interwoven digital services and systems, blending the real and the artificial world, our research activities continue to investigate some of the complex challenges and issues towards a more sustainable and responsible digital society. Information Protection and Control (IPC) in general and the growing need for Data Protection have become recognized area where increased research is needed. We continue our work in those areas with a particular look at distributed ledger technologies (blockchain) as a mechanism to support new services and designs to support increasingly complex requirements. Major examples of these research issues we are currently working on include data marketplace ecosystems, dispute resolution and arbitration, data protection and digital rights and policy management.

From July 2016 to July 2017, Jean-Henry Morin is on sabbatical leave in South Korea where he is Invited Professor at Korea University Business School and Yonsei School of Business. During this time, he is also invited researcher at Fasoo.com where he investigates blockchain technologies in Information Security.

Jolita Ralyté - Digital Transformation

Digital transformation is not just the adoption of new information technologies and the computerization of human activities. It embraces much broader strategic ambitions and involves fundamental changes in the activities, structure and even culture of the organization, with the primary goal of innovating and creating value. Service Science plays a driving role in digital transformation by providing key concepts, such as information service and service system, that facilitate the integration of digital technologies, transformation of business models and business innovation. The approach for information service and system engineering must be necessarily exploratory, agile, and participatory, as the implementation of new services transforms the daily life of many people, and affects the organisation's activity and even its position in the ecosystem. Such transformation has to be understood, assessed and accepted by all parties. To be successful, it must be value-driven and ensure the involvement of all stakeholders by making them responsible co-creators. The transdisciplinary is another dimension to be considered in service co-creation as it allows to cross the borders of the conventional information system engineering and create new capabilities and new values. To make the approach holistic, we need to consider many other service-related aspects, such as ethics, accountability, compliance to the regulatory framework, and risks. The robustness and sustainability of services will depend not only on the quality but also on the situational-fitness of the approach. Indeed, the context and requirements of each organisation facing the digital transformation challenge is different, and therefore requires a situation-specific approach. We apply situational Method Engineering principles and techniques for developing our approach and defining contextual criteria for its configuration and application.

Michel Deriaz - TaM group

Welcome to TaM, the Travelling and Mobility R&D team from the University of Geneva. We are specialized on indoor positioning as well as on processing data coming from smartphone or wearable's sensors. Most of our innovative solutions are developed on Android phones. To understand the users' needs and deploy our solutions in the market, we benefit from strong links with industrial partners.

The TaM group is a member of the Institute of Services Science (ISS) and belongs to the Computer Science Centre (CUI, for Centre Universitaire d'Informatique) from the University of Geneva. Our team is today composed of PhD candidates, scientists and developers. Some of us are used to work in private companies. We have the know-how to cover the complete lifecycle of a R&D project, from its initial idea to a fully operational prototype. By using agile development methods, we combine the advantages of fast prototyping, early involvement of users, and high-quality products.

PhD Thesis

- Ajmi Oumaima, Organizational Knowledge Access: an Approach based on Ontology Networks, GSEM, Thesis 60, August 2018 (codirection Gilles Falquet and Claudine Métral)
- Arianna Religi, Ground UV Irradiance and 3D Rendering Techniques to Predict Anatomical Solar UV Exposure in Skin Cancer Research and Prevention, 24 Sept 2018
- Christiana Tsiourti, Artificial agents as social companions: design guidelines for emotional interactions, 2018/06/22, https://archive-ouverte.unige.ch/unige:110600
- Marios Aristogenis Fanourakis, On the feasibility and privacy benefits of on-device data mining for opportunistic crowd-sensing and service self-provisioning, 2018/11/01, https://archive-ouverte.unige.ch/unige:112869
- Abbass Hammoud, Indoor Occupancy Sensing with Ultrasounds, 2018-11-23, http://tam.unige.ch/news/we-are-pleased-announce-abbass-hammoud-successfully-defended-his-phd-thesis-indoor-occupancy-sensing-ultrasounds/
- Eleonore Fournier-Tombs, DelibAnalysis: Understanding online deliberation through automated discourse quality analysis and topic modeling, University of Geneva - June 2018
- Emmanuel Rousseaux - Modelisation and Information System Tools to Support the Discovery of Interactive Factors of Vulnerabilities in Life Courses – University of Geneva, December 2018
- Yvain Tisserand, Fast prototyping and deformation of virtual humans, February 19, 2018

List of publications

Refereed papers in international journals

Giovanna Di Marzo Serugendo and team:

[1] Mohammad Parhizkar, Giovanna Di Marzo Serugendo. Agent-based models for first- and second-order emergent collective behaviours of social amoeba Dictyostelium discoideum aggregation and migration phases, Artificial Life and Robotics 23 (4), 498-507, 2018

[2] Francesco Luca De Angelis, Giovanna Di Marzo Serugendo, Andrzej Szalas. Paraconsistent rule-based reasoning with graded truth values. Journal of Applied Logic 5 (1), 185-220, 2018

Nadia Magnenat-Thalmann and team:

[3] N. Jain, A. Wydra, W. Hai, N. Magnenat-Thalmann and D. Thalmann, Time scaled interactive object driven Multi-party VR, The Visual Computer, DOI: 10.1007/s00371-018-1539-1, Vol 34, Issue 6-8, pp. 887-897, May 04, 2018 (2nd Best Paper Award of CGI Conference 2018)

[4] J. Zhang, J. Zheng and N. Magnenat Thalmann, MCAEM: Mixed-Correlation-Analysis based Episodic Memory for Companion-User Interactions, The Visual Computer, DOI: 10.1007/s00371-018-1537-3, Vol 34, Issue 6-8, pp. 1129-1141, May 10, 2018

Jolita Ralyté and team:

[5] J. Horkoff, M. Jeusfeld, J. Ralyté, and D. Karagianis: Enterprise Modeling for Business Agility. Editorial. Business Information System Engineering, 60(1):1–2, Springer, 2018, https://doi.org/10.1007/s12599-017-0515-z.

[6] J. Horkoff, M. Jeusfeld and J. Ralyté: Interview with Anne Persson on "The Practice of Enterprise Modeling". Business Information System Engineering, 60(1):87–89, Springer, 2018, https://doi.org/10.1007/s12599-017-0508-y.

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Laurent Moccozet and team:

[7]Body Anatomical UV Protection Predicted by Shade Structures: a Modeling Study, A. Religi, C. Backes, L. Moccozet, L. Vuilleumier, D. Vernez, and J-L. Bulliard, Photochemistry and Photobiology, Wiley, 2018.

[8] Sun exposure to the eyes: Predicted UV protection effectiveness of various sunglasses, C. Backes, A. Religi, L. Moccozet, F. Behar-Cohen, L. Vuilleumier, J-L. Bulliard, and D. Vernez, Journal Of Exposure Science And Environmental Epidemiology, Springer Nature.

Katarzyna Wac and team:

[9] Grantcharov, P., Boillat, T., Elkabany, S., Wac, K., Rivas, H. (2018). «Acute Mental Stress and Surgical Performance», British Journal of Surgery (BJS OPEN), Wiley, August 2018. Impact Factor: 5.433

[10] Ciman, M., Wac, K., (2018). «Individuals' Stress Assessment Through Human-Smartphone Interaction Analysis», IEEE Transactions on Affective Computing (IEEE TAC), 9(1): 51-65, 2018 (online first 2016). Impact Factor: 3.149

Full refereed papers in Conference Proceedings

Michel Deriaz and team:

[11] Gait Recognition with Smart Devices Assisting Postoperative Rehabilitation in a Clinical Setting, Athanasios I. Kyritsis, Geoffrey Willems, Michel Deriaz, Dimitri Konstantas, in the First IEEE International Conference on Artificial Intelligence for Industries (ai4i 2018), Laguna Hills, California, 2018.

[12] Considerations for the Design of an Activity Recognition System Using Inertial Sensors, Athanasios I. Kyritsis, Michel Deriaz, Dimitri Konstantas, in the 20th IEEE International Conference on E-health Networking, Application & Services (IEEE HealthCom 2018), Ostrava, Czech Republic, 2018.

[13] Anomaly Detection Techniques in Mobile App Usage Data among Older Adults, Athanasios I. Kyritsis, Michel Deriaz, Dimitri Konstantas, in the 20th IEEE International Conference on E-health Networking, Application & Services (IEEE HealthCom 2018), Ostrava, Czech Republic, 2018.

[14] User Requirement Analysis for the Design of a Gamified Ambient Assisted Living Application, Athanasios I. Kyritsis, Julia Nuss, Lynnette Holding, Peter Rogers, Michael O'Connor, Panagiotis Kostopoulos, Mervyn Suffield, Michel Deriaz, Dimitri Konstantas, in the 16th International Conference on Computers Helping People with Special Needs (ICCHP 2018), Linz, Austria, 2018.

[15] Wandering Behaviors Detection for Dementia Patients: a Survey, Abbass Hammoud, Michel Deriaz, Dimitri Konstantas, in The 3rd International Conference on Smart and Sustainable Technologies (SPLITECH 2018), Split, Croatia, 2018.

[16] Adaptive power switching technique for ultrasonic motion sensors, Abbass Hammoud, Michel Deriaz, Dimitri Konstantas, in Journal of Ambient Intelligence and Humanized Computing, 2018.

[17] Enhance daily live and health of elderly people, Panagiotis Kostopoulos, Athanasios I. Kyritsis, Vincent Ricard, Michel Deriaz, Dimitri Konstantas, in The 8th International Symposium on Frontiers in Ambient and Mobile Systems (FAMS 2018), Porto, Portugal, 2018.

Giovanna Di Marzo Serugendo and team:

[18] Houssem Ben Mahfoudh, Giovanna Di Marzo Serugendo, Anthony Boulmier, Nabil Abdennadher. Coordination model with reinforcement learning for ensuring reliable on-demand services in collective adaptive systems. International Symposium on Leveraging Applications of Formal Methods (ISOLA 2018), 257-273, 2018

[19] Houssem Ben Mahfoudh, Giovanna Di Marzo Serugendo, Nabil Abdennadher, Andreas Rumsch, Andres Upegui. Spatial services for decentralised smart green energy management. IEEE International Energy Conference (ENERGYCON), 1-6, 2018

Gilles Falquet and Claudine Métral and team:

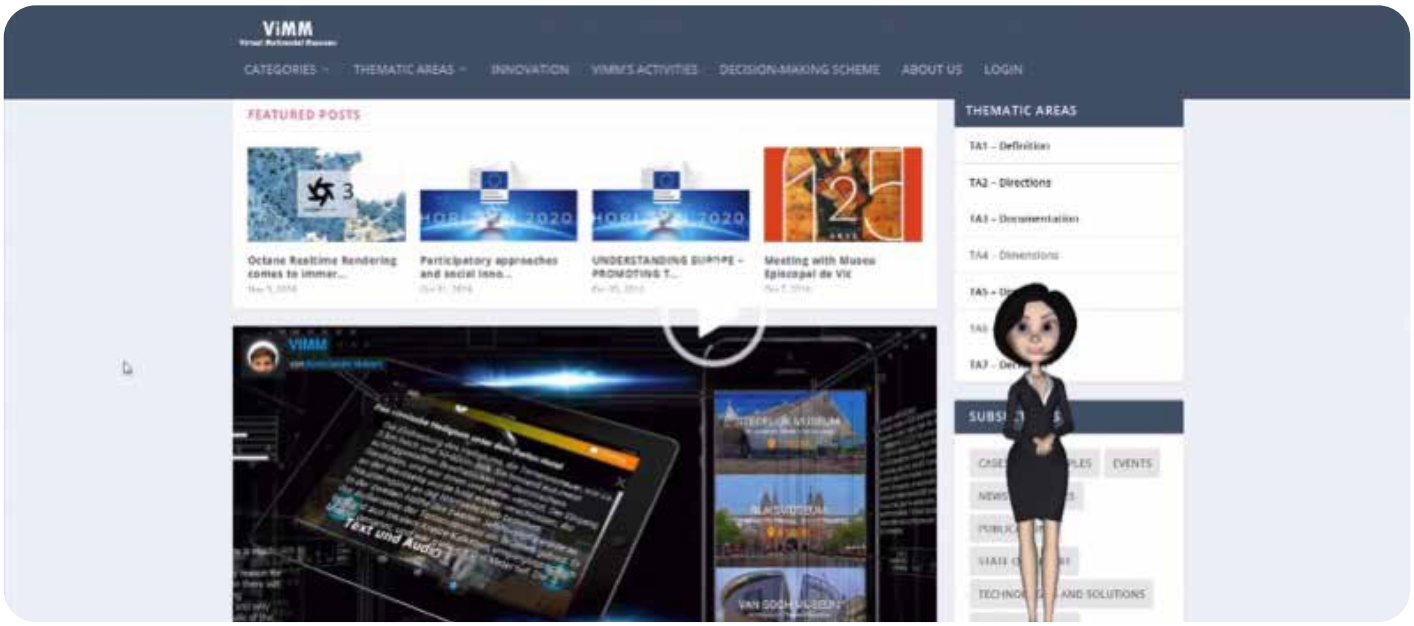

Figure 1: ViMM project – Dissemination and Communication platform © MIRALab

[20] Métral, C., Falquet, G. (2018) Extension And Contextualisation For Linked Semantic 3D Geodata. Proc. 3D GEOINFO Conf., Delft, Sept. 2018. In ISPRS Archives.
[21] Aljalbout, S., Buchs, D., Falquet, G. (2018) A Practical Implementation of Contextual Reasoning on the Semantic Web. In Proc. 10th International Conference on Knowledge Engineering and Ontology Development, Sevilla, September 2018. DOI: 10.5220/0006936802550262
[22] Falquet, G., Metral, C., Ozaine, S., Giuliani, G. (2018) An Abstract Specification Technique for the Publication of Linked Geospatial Data. Proc. AGILE 2019 Conf., Lund, June 2018.
[23] Daponte, V., Falquet, G. (2018) Une ontologie pour la formalisation et la visualisation des connaissances scientifiques. In Proc. 29es Journées francophones d'Ingénierie des Connaissances (IC 2018), Nantes, July 2018.

Dimitri Konstantas:

- No 2018 data received

Nadia Magnenat-Thalmann and team:

[24] S. Sénécal, N. Nijdam, N. Magnenat-Thalmann, Motion analysis and classification of salsa dance using music-related motion features, In ACM Motion in Games 2018, 11th annual ACM/SIGGRAPH conference on Motion, Interaction and Games (MIG 2018), Limassol, Cyprus, November 8-10, 2018
[25] M. Christofi, E. Baka, K. E. Stavroulia, D. Michael-Grigoriou, A. Lanitis, N. Magnenat-Thalmann, Studying Levels of Presence in a Virtual Environment Simulating Drug Use in Schools: Effect on Different Character Perspectives, 28th International Conference on Artificial Reality and Telexistence (ICAT 2018) and the 23rd Eurographics Symposium on Virtual Environments (EGVE 2018), Limassol, Cyprus, November 7-9, 2018
[26] E. Baka, M. Kentros, G. Papagiannakis, P. Trahanias, Virtual Reality Rehabilitation based on Neurologic Music Therapy: A qualitative preliminary clinical study, In proceedings of 20th International Conference on Human Computer Interaction, Springer, Las Vegas, USA, July 15-20, 2018
[27] K. E. Stavroulia, E. Baka, M. Christofi, D. Michael-Grigoriou, N. Magnenat-Thalmann, A. Lanitis, A virtual reality environment simulating drug use in schools: effect on emotions and mood states, In proceedings of International Conference on Information, Communication Technologies in Education, ICICTE 2018, Chania, Greece, July 5-7, 2018
[28] E. Baka, K. E. Stavroulia, N. Magnenat-Thalmann, A. Lanitis, An EEG-based evaluation for Comparing the sense of presence between Virtual and Physical Environments, In proceedings of Computer Graphics International 2018 (CGI 2018), ACM, New York, USA, 10 pages, June 11-14, 2018
[29] K. E. Stavroulia, E. Baka, A. Lanitis, N. Magnenat-Thalmann, Designing a virtual environment for teacher training: Enhancing presence and empathy, In proceedings of Computer Graphics International 2018 (CGI 2018), ACM, New York, NY, USA, 11, pages, June 11-14, 2018
[30] L. Tian, N. Magnenat Thalmann, D. Thalmann, J. Zheng, A methodology to model and simulate customized human robotic realistic hand, In proceedings of the 35th Computer Graphics International (CGI 2018), ACM, Nirwana Resort, Bintan, Indonesia, June 11-14, 2018
[31] Z. Fang, J. Yuan and N. Magnenat Thalmann, Understanding Human-Object Interaction in RGB-D videos for Human Robot Interaction, In proceedings of the 35th Computer Graphics International (CGI 2018), ACM, Nirwana Resort, Bintan, Indonesia, June 11-14, 2018
[32] S. Xu, Z. Yang, D. Chakraborty, Y. Tahir, T. Maszczyk, C.Y.H. Victoria, J. Dauwels, D. Thalmann, N. Magnenat-Thalmann, B.L. Tan, and J.L.C Keong, Automated Lexical Analysis of Interviews with Schizophrenic Patients, In proceedings of the 9th International Workshop on Spoken Dialogue Systems Technology (IWSDS 2018), HUONE Singapore, Singapore, May 14-16, 2018 (Best Paper Award Runner-up)

Laurent Moccozet and team:

[33] A versatile and flexible framework for e-assessment in Higher-Education, L. Moccozet, Omar Benkacem, Camille Tardy, Pierre-Yves Burgi, Elma Berisha, Riga Trigo Trindade, 17th International Conference on Information Technology Based Higher Education and Training (ITHET 2018), IEEE Xplore, 2018.
[34] Augmented Human-Workplace Interaction: Revisiting Email, T. Bertrand, L. Moccozet, J-H. Morin, 22 International Conference Information Visualisation (IV 2018), IEEE Xplore, 2018.

Jean-Henry Morin:

- No 2018 data received

Jolita Ralyté and team:

[35] X. Franch, J. Ralyté, A. Perini, A. Abelló, D. Ameller, J. Gorroñogoitia, S. Nadal, M. Oriol, N. Seyff, A. Siena, A., Susi: A Situational Approach for the Definition and Tailoring of a Data-Driven Software Evolution Method. In: J. Krogstie and H.A. Reijers (eds.) Advanced Information Systems Engineering, Proceedings of the 30th International Conference CAiSE 2018, LNCS 10816, Springer, pp. 603-618, 2018.
[36] J. Ralyte and X. Franch: Using Contextual Goal Models for Constructing Situational Methods. In: Trujillo, J.C. et al. (eds.) Conceptual Modeling, Proceedings of the 37th International Conference ER 2018, Springer, LNCS 11157, pp. 440-448, 2018.

Jean-Marc Seigneur and team:

[37] J.-M. Seigneur, T. Ahram and R. Taiar, A Survey on Trust in Augmented Human Technologies, International Conference on Human Systems Engineering and Design: Future Trends and Applications, 2018

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Katarzyna Wac and team:

[38] Wulfovich, S., Matabuena, P., Osuna, L.A.G., Wilhelm, D.A., Wac, K., Rivas, H., (2018). Scaling Access to Care in Rural Mexico via Digital Health, Telemedicine and Drones, American College of Surgeons Clinical Congress, Boston, MA, USA, October 2018. Acceptance Rate: 25%

[39] Laghouila, S., Manea, V., Estrada, V., Wac, K. (2018). Digital Health Tools for Chronic Illness and Dementia Risk Assessment in Older Adults, 39th Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine (SBM 2018), New Orleans, LA, April 2018. Acceptance Rate: 27%

Full refereed papers in Workshop Proceedings

Katarzyna Wac and team:

[40] Manea, V., Wac, K., (2018). mQoL: Mobile Quality of Life Lab: From Behavior Change to QoL, Mobile Human Contributions: Opportunities and Challenges (MHC) Workshop in conjunction with ACM UBICOMP, Singapore, October 2018.

[41] De Masi, A., Wac, K., (2018). You're Using This App For What? mQoL Living Lab Study, Mobile Human Contributions: Opportunities and Challenges (MHC) Workshop in conjunction with ACM UBICOMP, Singapore, October 2018.

[42] Berrocal, A., Wac, K., (2018). Peer-vasive Computing: Leveraging Peers to Enhance the Accuracy of Self-Reports in Mobile Human Studies, Mobile Human Contributions: Opportunities and Challenges (MHC) Workshop in conjunction with ACM UBICOMP, Singapore, October 2018.

[43] Berrocal, A., Wac, K., (2018). Peer-ceived Well-Being: Exploring the Value of Peers for Human Stress Assessment in-Situ, ACM UBICOMP/ISWC Doctoral Colloquium, Singapore, October 2018.

[44] Estrada, V., Wac, K., (2018). Visions and Challenges in Managing and Preserving Data to Measure Quality of Life, International Workshop on Data-driven Self-regulating Systems (DSS 2018) In conjunction with IEEE ICAC and IEEE SASO, Italy, September 2018.

[45] Manea, V., Estrada, V., Wac, K., (2018). Assessing Chronic Illness Risk in Older Adults via Personal Digital Health Tools, (poster) ACM Digital Health Conference (DH 2018), Lyon, France, April 2018.

[46] Manea, V., Estrada, V., Wac, K., (2018). mQoL: Mobile Quality of Life Lab, (poster and demo) ACM Digital Health Conference (DH 2018), Lyon, France, April 2018. Nominated to the Innovation Prize in the category of the «Best Data Driven Innovation».

[47] Berrocal, A., De Masi, A., Gustarini, M., Wac, K., (2018). mQoL-Peer: Assessing the Individual's State via the Just-in-Context Individual's Peers' Evaluations, (poster and demo) ACM Digital Health Conference (DH 2018), Lyon, France, April 2018.

Books and book chapters

Nadia Magnenat-Thalmann and team:

[48] M. Becker and N. Magnenat Thalmann, Muscle Tissue Labeling of Human Lower Limb in Multi-Channel mDixon MR Imaging: Concepts and Applications, IEEE/ACM Transactions on Computational Biology and Bioinformatics, IEEEpublisher, DOI: 10.1109/TCBB.2015.2459679, pp. 290-299, 2017

[49] N. Magnenat Thalmann, Les robots sociaux humanoïdes : une réalité imminente, Le Goût d'imaginer sa vie, Manitoba Editions, ISBN-13: 978-2376150541, pp. 237-247, Paris, France, 2018

Figure 2: Motion analysis and classification of salsa dance using music-related motion features © MIRALab

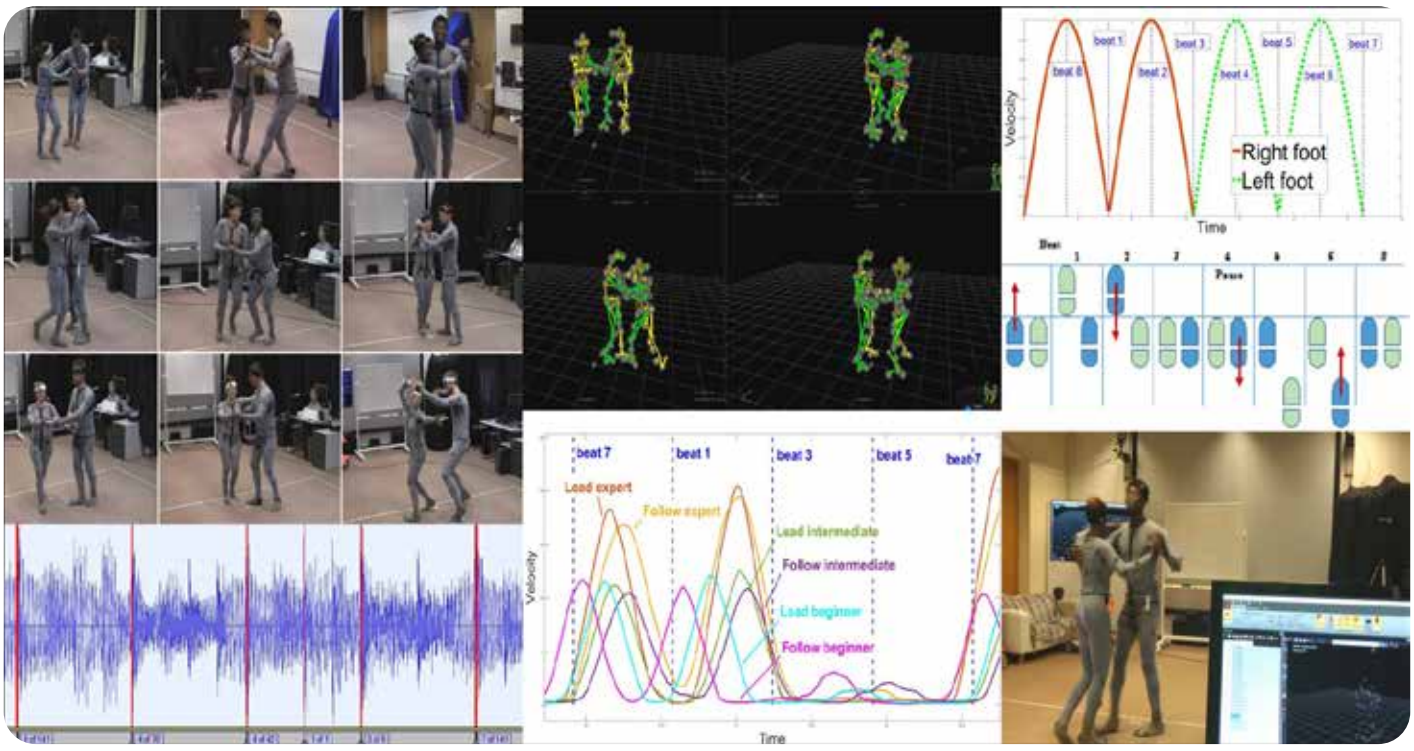

Figure 3: Robot Eva playing in the Roten Fabrik Theatre at Zürich © MIRALab

Jolita Ralyté and team:

[50] J. Ralyté and Y. Wautelet (Eds.): Proceedings of the Doctoral Consortium Papers presented at the 11th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modelling (PoEM 2018), Vienna, Austria, October 31 - November 2, 2018. CEUR-WS Vol. 2234, CEUR-WS.org 2018.

[51] Schmid, K., Spoletini, P., Ben Charrada, E., Chisik, Y., Dalpiaz, F., Ferrari, A., Forbrig, P., Franch, X., Kirikova, M., Madhavji, N.H., Palomares, C., Ralyté, J., Sabetzadeh, M., Sawyer, P., van der Linden, D., Zamansky, A. (Eds.): Joint Proceedings of REFSQ-2018 Workshops, Doctoral Symposium, Live Studies Track, and Poster Track co-located with the 24th International Conference on Requirements Engineering: Foundation for Software Quality (REFSQ 2018), Utrecht, The Netherlands, March 19, 2018. CEUR-WS Vol. 2075, CEUR-WS.org 2018.

Jean-Marc Seigneur and team:

[52] J.-M. Seigneur, G. J. Kim, W. Woo and J. Eune, Proceedings of the 9th Augmented Human International Conference, ACM ICPS, 2018

Katarzyna Wac and team:

[53] Rivas, H. and Wac, K. (Eds.) (2018). Digital Health: Scaling Healthcare to the World, Series: Health Informatics, Springer Nature, Dordrecht, the Netherlands

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[55] Wac, K. (2018). From Quantified Self to Quality of Life, chapter in: Digital Health: Scaling Healthcare to the World, Series: Health Informatics, Springer Nature, Dordrecht, the Netherlands.

[56] Boillat, T., Rivas, H., Wac, K. (2018). Healthcare on a Wrist': Increasing Diet Program Compliance Through Checklists on Wearables in Obesity (Self-)Management Programs, chapter in: Digital Health: Scaling Healthcare to the World, Series: Health Informatics, Springer Nature, Dordrecht, the Netherlands.

Research and technical reports

Nadia Magnenat-Thalmann and team:

[57] Several technical reports for the following projects: NOTRE and ViMM.

International and national advisory committees

Giovanna Di Marzo Serugendo:

- Member (2018-2020) – Advisory Board ICT Programme, Association Realise
- Member (2016-2017) – Geneva Canton Committee for the "SmartCanton" project
- Committee Member (2014-2018) – Commission Consultative en matière de protection des données, transparence et archives publiques (CCPDTA)
- Committee Member (2014-2019) – Conseil académique HEPIA

Nadia Magnenat-Thalmann:

- 1994-Present: President of the Computer Graphics Association (CGS)
- 2007-Present: Member of the Strategic Advisory Board Committee, City University, and Hong Kong, China
- 2013-2018: Expert on the advanced grant panel in Computer Science, European Research Council (ERC)
- 2016-2019: Member of the IAB Committee of the Computer Science Dpt of Technical University of Vienna

Jean-Marc Seigneur:

- Since 2013: Expert for European Network and Information Security Agency (ENISA)
- Since 2014: Academic Member, ITU Working Groups on Trust, Digital Currency including Digital Fiat Currency and Distributed Ledger Technology

Katarzyna Wac:

- Katarzyna Wac, Member of the Board of Directors of the International Society for Quality-of-Life Studies (ISQOLS), USA

International and national research programs committees

Giovanna Di Marzo Serugendo:

- NWO Complexity – Programmable Self-Organisation, The Netherlands – Assessment Committee - November 2017-April 2018
- Projects funded by Austrian Science Fund (FWF) (2019)
- Swiss Alliance for Data-Intensive Services, InnoSuisse – Board Management member (2016-2019)

Dimitri Konstantas:

- Since 2004 : Expert Evaluator for the Commission of the European Union
- Since 2005 : Expert evaluator for the Canadian National research foundation
- Since 2009: Expert evaluator for the Greek Ministry of Education
- Since 2002: Expert evaluator for the Dutch National research foundation
- Since 2002: Member of the eMobility ETP

Jean-Marc Seigneur:

- Since 2017: Member of the College of Expert Reviewers, European Science Foundation

Katarzyna Wac:

- Evaluator of research projects submitted to the Academy of Finland, Finland
- Evaluator of research projects submitted to the Research Promotion Foundation, Cyprus

PhD Thesis committees

Giovanna Di Marzo Serugendo:

- Anne-Claude Steiner Mellot. Communication de crise : Enjeux stratégiques, politiques et communicationnels. Université de Genève, Jury President, 2018
- Kenji Tsuchiya. Les évolutions des entreprises de presse traditionnelle face au numérique – études de trajectoires britanniques, françaises et suisses autour de l'exploitation de la donnée. Université de Genève, Jury President, 2018
- Nicolas Nova. Figures mobiles – une anthropologie du smartphone. Université de Genève, Jury President, 2018

Gilles Falquet:

- Abbass Hammoud, Président, UNIGE, Genève
- Eleonore Fournier, Jury member, UNIGE, Genève
- Christina Tsiourti, Président, UNIGE, Genève
- Quoc Bao Dang, Rapporteur, Université de La Rochelle, La Rochelle

Abdelaziz Khadraoui

- Amina Cherouana, Application des techniques du CPI / BPR pour la normalisation du processus de travail gouvernemental, USTHB, Algiers, External examiner, February 2018.

Nadia Magnenat-Thalmann:

- Yvain Tisserand, Supervisor, University of Geneva, Switzerland

Katarzyna Wac:

- Arianna Religi, University of Geneva, Switzerland, External examiner
- Simon Klakegg, University of Oulu, Finland, External examiner, Sept. 2018

Conference organization as chair or co-chair

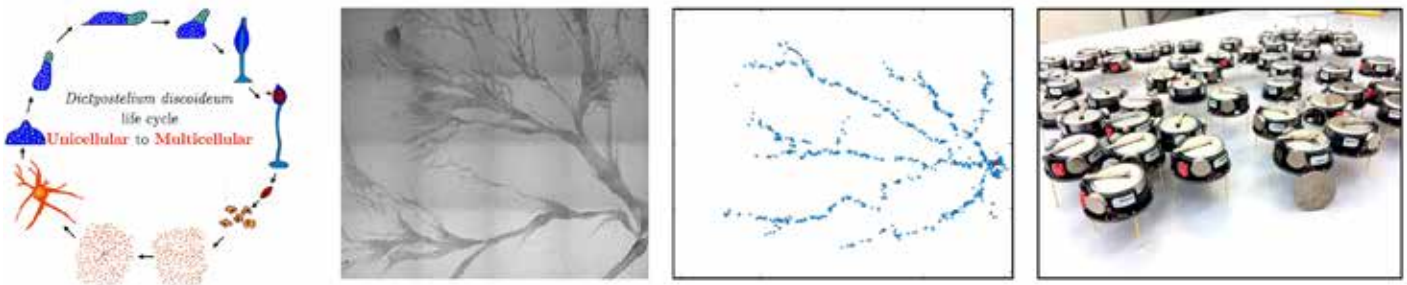
Giovanna Di Marzo Serugendo:

- PC Chair – 20th IFIP WG 6.1 International Conference on Coordination Models and Languages (Coordination 2018) – Madrid, June 2018

Nadia Magnenat-Thalmann:

- Conference Chair, 35th International Conference on Computer Animation and Social Agents (CGI 2018), Bintan, Indonesia, June 2018
- Conference Co-Chairs, 31st International Conference on Computer Animation and Social Agents (CASA 2018), Beijing, China, May 2018

Figure x: From D. discoideum life cycle to agent-based models, biological validation and implementation of behaviour into kilobots



Jolita Ralyté:

- Doctoral Consortium Chair at PoEM 2018 – 11th IFIP WG8.1 Working Conference on Practice of Enterprise Modelling, Vienna, Austria, October 31- November 2, 2018.
- Doctoral Consortium Chair at REFSQ 2018 – 24th International Working Conference on Requirements Engineering: Foundation for Software Quality, Utrecht, The Netherlands, March 19-22, 2018.
- Track Co-Chair at AMCIS 2018 – 24th Americas Conference on Information Systems, New Orleans, LA, USA, August 16-18, 2018. Track: Organisational Transformation & Information Systems, Minitrack 6: Digital Transformation with Smart Services.
- Track Co-Chair at ECIS 2018 – 25th European Conference of Information Systems, Portsmouth, UK, June 23-28, 2018. Track on Knowledge-Intensive Smart Services and Their Applications.

Jean-Marc Seigneur:

- Program Co-Chair, 9th Augmented Human International Conference, Seoul, South Korea, 2018

Katarzyna Wac:

- International Workshop on "Mobile Human Contributions: Opportunities and Challenges" (MHC18) at the ACM Conference on Pervasive and Ubiquitous Computing (UBICOMP 2018), Oct. 2018
- "Clinical Outcome Assessments Embedded in Mobile and Wearable Information Technologies" Workshop at the 25th Conference of the International Society for Quality of Life Research (ISOQOL), Oct. 2018
- 9th "Open Living Lab Days" by European Network of Living Labs (ENoLL), Dr. Wac's 'mQoL Living Lab' is an official co-organizer of the event, Aug. 2018
- 12th International Conference on Pervasive Computing Technologies for Healthcare (PervasiveHealth), Dr. Wac is also a TPC Chair and a Session Chair, May 2018
- "Perspectives On Effective Digital Health Training In Behavioral Medicine" Panel at the 39th Annual Meeting And Scientific Session Of The Society Of Behavioral Medicine (SBM), April 11-18, 2018, New Orleans, LA, USA, co-organizers: Goldstein CM, Alshurafa N, Harwell Myers V, Spruijt-Metz D, Thomas JG, Goldstein SP, Jake-Schoffman DE, & Wac K, March 2018

Member of conference/workshop program committees

Michel Deriaz:

- Member program committee for http://where-camp2018.geoit.org/programcommittee/, 8th GeoIT Wherecamp Conference 2018, October 24th, 2018, Berlin

Gilles Falquet:

- Ingénierie des connaissances (IC 2018)
- Extraction et gestion des connaissances (EGC 2018)

Abdelaziz Khadraoui:

- Workschop « The Model and Data Engineering for Social Good » Workshop in Conjunction with The 8th International Conference on Model and Data Engineering (MEDI 2018), 24 - 26 October 2018, Marrakesh, Morocco.
- AIAP 2018: Artificial Intelligence and Its Applications, El-Oued, El-Oued, Algeria, December 4-5, 2018.
- International Conference on Mutimedia Information Processing (CITIM2018), Mascara, Algeria, October 9-10, 2018.

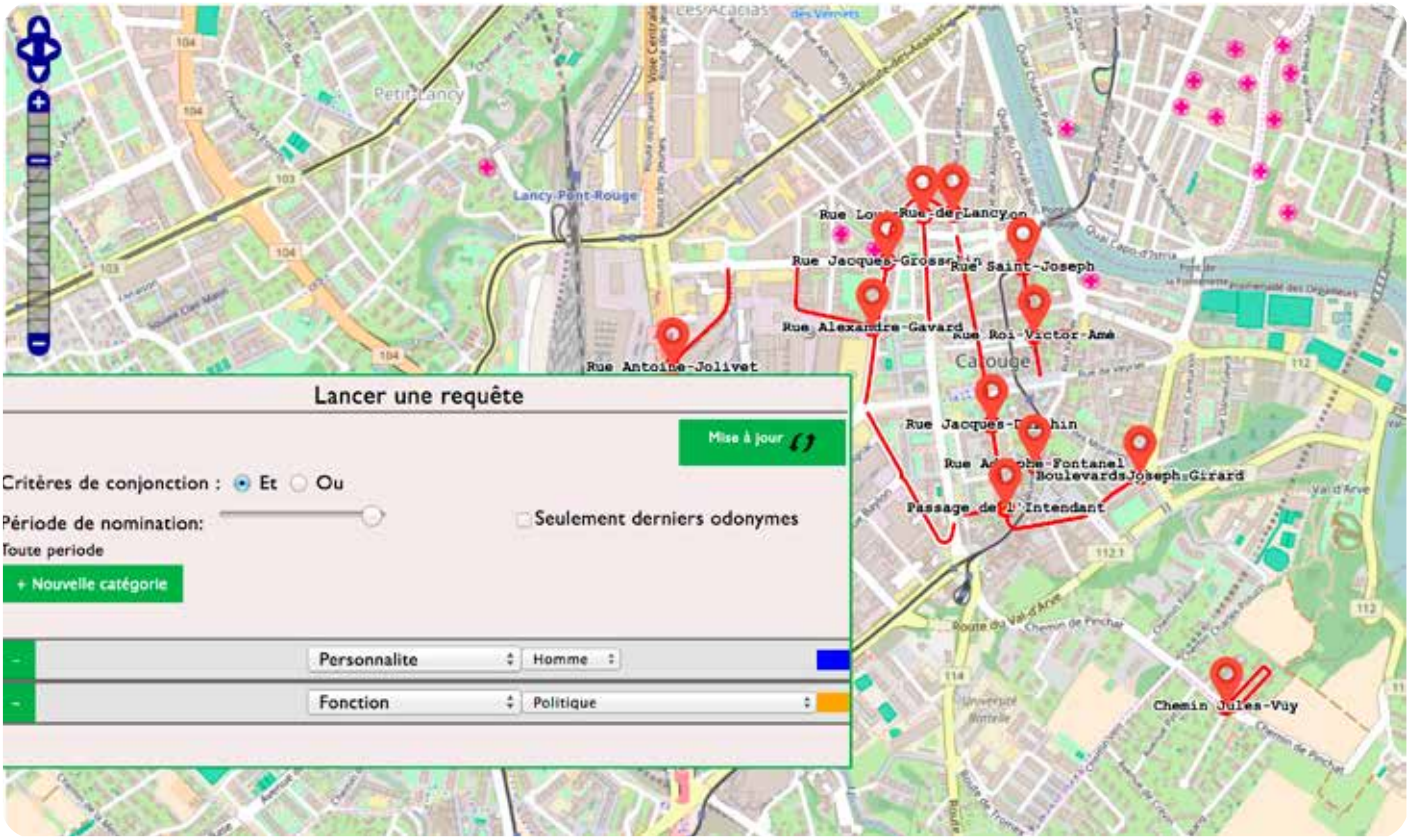


Figure 4: Visualisation of dynamical and toponymical challenges for the Swiss City of Carouge

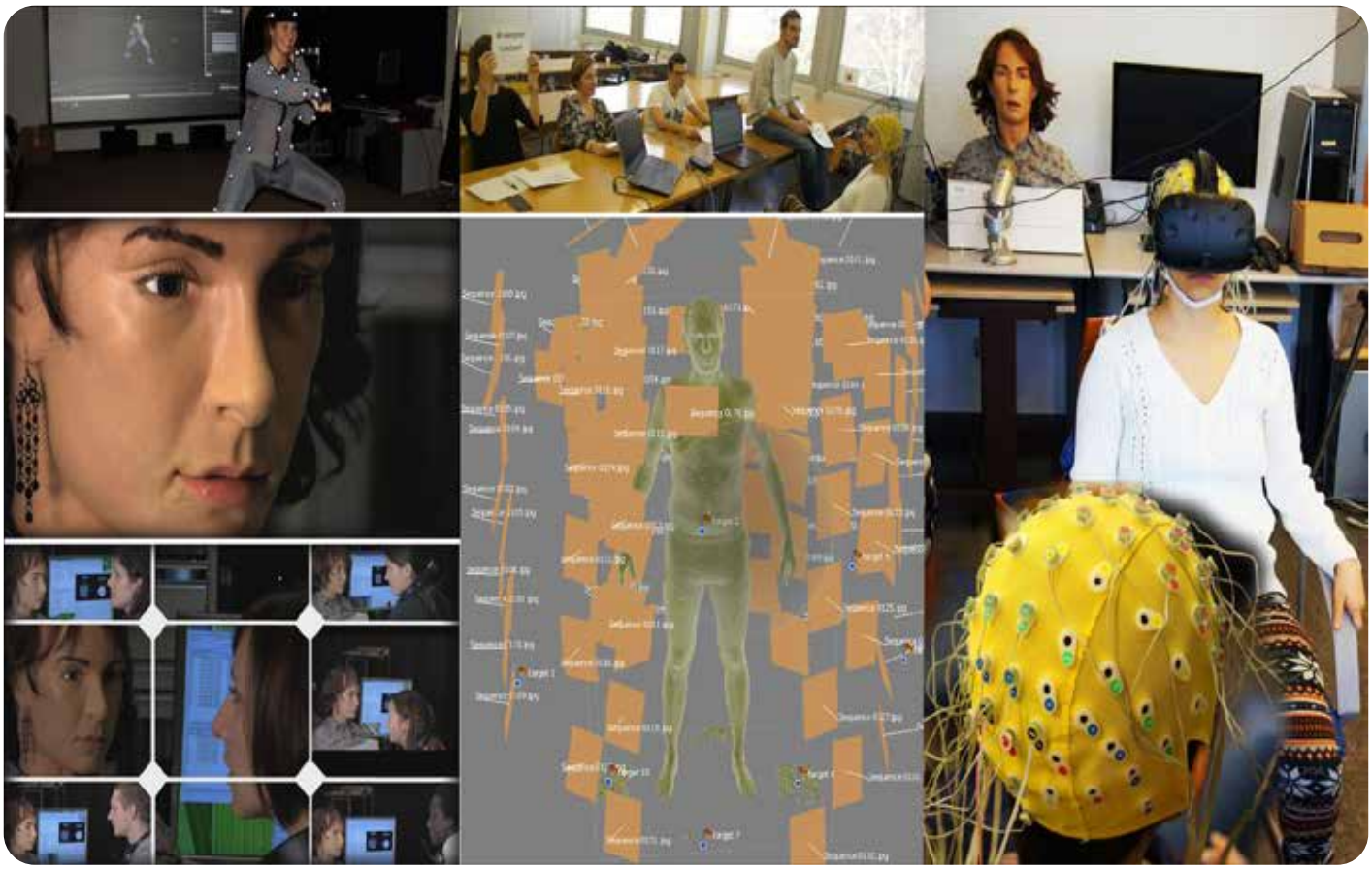


Figure 5: Designing a virtual environment for teacher training: Enhancing presence and empathy © MIRALab

- 26th European Conference on Information Systems (ECIS2018), Track : Knowledge-Intensive Smart Services and Their Applications, UK, June 23rd – 28th 2018 / Portsmouth, UK
- IEEE 12th International Conference on Research Challenges in Information Science, 29-31 May 2018, Nantes, France.
- International Symposium on Programming and Systems (ISPS) ISPS Algiers, April 2018, USTHB, Algiers.
- International Conference on Exploring Service Science 2018, IESS 2018 (subreviewer), Karlsruhe, Germany, 19-21 september 2018.

Claudine Métral:

- 3D GeoInfo Conference (3D GeoInfo 2018)

Laurent Moccozet:

- Member of the scientific committee for the International, Conference on Education and New Developments, since 2013
- Member of the program committee of the International workshop on Interactive Environments and Emerging Technologies for e-Learning since 2015
- Reviewer for the ISPRS International Journal of Geo-Information
- Reviewer for the International Journal of Educational
- Technology in Higher Education

Jolita Ralyté:

- CAiSE 2018 – 30th International Conference on Advanced Information Systems Engineering, Tallinn, Estonia, June 11-15, 2018, Program Board Member (meta-reviewer)
- RCIS 2018 – 12th IEEE International Conference on Research Challenges in Information Science, Nantes, France, May 29-31, 2018, Program Board Member (meta-reviewer)
- ER 2018 – 37th International Conference on Conceptual Modeling, Xi'an, China, October 22-25, 2018, Program Committee Member
- REFSQ 2018 – 24th Working Conference on Requirements Engineering: Foundation for Software Quality, Utrecht, The Netherlands, March 19-22, 2018, Program Committee Member
- EMMSAD 2018 – International Conference on Exploring Modeling Methods in Systems Analysis and Design, 11-12 June 2018, Tallinn, Estonia, Program Committee Member
- PoEM 2018 – 11th IFIP WG8.1 Working Conference on Practice of Enterprise Modelling, Vienna, Austria, October 31- November 2, 2018, Program Committee Member
- CBI 2018, 20th IEEE Conference on Business Informatics, Vienna, Austria, July 11-14, 2018, Program Committee Member
- IESS 2018 – International Conference on Exploring Services Science, Karlsruhe, Germany, September 19-21, 2018, Program Committee Member
- CooPIS 2018 – 26th International Conference on Cooperative Information Systems, Valletta, Malta, October 24-26 2018, Program Committee Member
- APCCM 2018 – 14th Asia-Pacific Conference on Conceptual Modelling, Brisbane, Australia, January 29-February 2, 2018, Program Committee Member

- SoEA4EE 2018 – 10th International Workshop on Service-oriented Enterprise Architecture for Enterprise Engineering, in conjunction with EDOC, Stockholm, Sweden, October 16, 2018, Program Committee Member
- MReBA 2018 – 5th International Workshop on Conceptual Modeling in Requirements and Business Analysis, co-located with ER 2018, Xi'an, China, October 22-25, 2018, Program Committee Member
- QMMQ 2018 – 5th International Workshop on Quality of Models and Models of Quality, co-located with ER 2018, Xi'an, China, October 22-25, 2018, Program Committee Member
- ASDENCA 2018 – 4th International Workshop on Advances in Services DEsign based on the Notion of Capability, co-located with CAiSE 2018, Tallinn, Estonia, June 11, 2018, Program Committee Member

Katarzyna Wac:
- ACM CHI (reviewer)
- IEEE EMBC (Associate Editor)
- EAI PervasiveHealth (TCP Chair)
- IQ2S workshop at IEEE PERCOM
- ISOQOL

Refereeing

Giovanna Di Marzo Serugendo:
- ACM Transactions on Autonomous Adaptive Systems
- International Journal on Software and Systems Modeling (October 2018)

Gilles Falquet:
- International Journal of Geographic Information (IJGI)
- Journal of Data Semantics (JODS)
- Theoretical Computer Science (TCS)

Nadia Magnenat-Thalmann:
- Jury of Ph.D. thesis for New Zealand, France, Sweden, Switzerland and Germany
- European Union, FP7 Projects, Brussels
- Research Grants Council of Singapore
- Natural Sciences and Engineering Research Council of Canada
- National Science Foundation USA
- Swiss National Research Foundation
- Austrian Research Foundation
- ACM SIGGRAPH
- IEEE Transactions on Visualization and Computer Graphics
- IEEE Computer Graphics and Applications
- IEEE Computer
- Communications of ACM
- The Visual Computer
- Computer Graphics Forum
- Computer Vision
- Graphics and Image Processing
- Presence
- International Journal of Human-Computer Studies, Computers and Graphics
- cyberworlds conference
- ICAART (International Conference on Agents and Artificial Intelligence)
- Enactive conference
- Multimedia Modelling conference
- International Conference on Entertainment Computing (ICEC)
- International Conference on Signal Processing
- Image Processing and Pattern Recognition
- GRAPP ("International Conference on Computer Graphics Theory and Applications)
- Conference on Affective Computing and Intelligent Interaction (ACII 2010)
- EG Workshop on 3D Object Retrieval
- IEEE Virtual Reality Conference 2010
- Computer Graphics International
- CASA conference
- SIGGRAPH/EUROGRAPHICS Symposium on Computer Animation, etc.

Jolita Ralyté:
- JSS – Journal of Systems and Software
- JSEP – Journal of Software: Evolution and Process
- ODEE – Organizational Design and Enterprise Engineering
- BISE – Business & Information Systems Engineering
- SOSYM – Software and Systems Modeling
- CAIS – Communications of the Association for Information Systems
- REEN – Requirements Engineering Journal
- IJIIT – International Journal of Intelligent Information Technologies
- IJISMD – International Journal of Information Systems Modeling and Design
- IJISSS – International Journal of Information Systems in the Service Sector

Jean-Marc Seigneur:
- Augmented Human Research (Springer Journal)

Katarzyna Wac:
- IEEE Transactions on Mobile Computing,
- Personal and Ubiquitous Computing (Springer),
- IEEE Journal of Biomedical and Health Informatics
- Journal of Medical Internet Research (JMIR Publications Inc)

Figure x: Slugs merging behaviour with kilobots

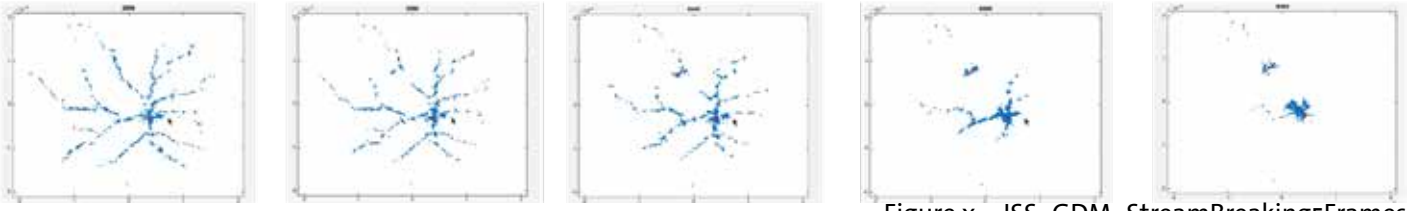


Figure x: _ISS_GDM_StreamBreaking5Frames

Editorial responsabilities

Nadia Magnenat-Thalmann:

- Since 2014: Associate Editor, Frontiers in Robotics, Nature Publisher
- Since 2010: Editorial Adviser of the journal of Graphical Models published by Elsevier
- Since 2000: Editor-in-Chief of the Journal The Visual Computer published by Springer Verlag, Germany
- Since 2000: Editor of the Journal of Computational Geometry published by Elsevier, Holland
- Since 1990: Co-founder and Co-editor-in-chief, Computer Animation and Virtual Worlds, John Wiley and Sons.

Laurent Moccozet:

- Member of the scientific committee for the International Conference on Education and New Developments since 2013
- Member of the program committee of the International workshop on Interactive Environments and Emerging Technologies for e-Learning
- Member of the program committee of the Augmented Human International Conference since 2016
- Reviewer for the ISPRS International Journal of Geo-Information
- Reviewer for the International Journal of Educational Technology in Higher Education

Jean-Henry Morin:

- Associate Editor of the Asia Pacific Journal of Information Systems (APJIS), ISSN 2288-5404, Since 2014.
- Editorial board member of the Journal of Service Science Research (JoSS), ISSN: 2093-0720, Springer, Journal no. 12927, since 2009.
- Editorial board member of the International Journal On Advances in Systems and Measurements, ISSN: 1942-261x, IARIA, since 2008.

Jolita Ralyté:

- Guest Editor in Business & Information Systems Engineering (BISE) for a special issue on "The Enterprise Modeling for Business Agility", Vol. 60(1), Springer, 2018.
- Editorial Board Member for IJISMD – International Journal of Information Systems Modeling and Design
- Editorial Board Member for IJISSS – International Journal of Information Systems in the Service Sector

Jean-Marc Seigneur:

- Co-Editor in Chief, Springer Journal "Augmented Human Research"

Katarzyna Wac:

- IEEE Communications Mag. (COMMAG), Associate Technical Editor, Impact Factor: 10.435, since 2017
- International Journal of Human-Computer Studies, Special Issue on 'Human Accuracy in Mobile Data Collection' (with MSc. N. van Berkel, Dr. S. Hosio, Dr. J. Goncalves, Prof. V. Kostakos and Prof. A. Cox), Impact Factor: 2.3

Working groups / Standard Bodies participation

Giovanna Di Marzo Serugendo:

- ERCIM SERENE Working Group – Member

Jean-Henry Morin:

- Co-founder and President-Elect of the Association for Information Systems (AIS) Swiss chapter, Since June 2013.
- Membre du Conseil Scientifique de La Muse, Fondation pour la Créativité Entrepreneuriale (FCE), Genève.
- Membre commission d'experts, VigiSwiss, Swiss Data Center Association, since Feb 2016.
- Membre du comité d'organisation du Forum Economie Numérique du Canton de Genève.
- Co-founder and President of ThinkServices, Think(do) Tank on Services Science and Innovation, Geneva, Since 2010. Leader of the ThinkGroup on Data, Society and Transparency, initiator of ThinkData (http://thinkdata.ch/)
- Member of the Researchers cooperative cooperation Social-IN3
- Swiss Representative to the IFIP TC14 on Entertainment Computing
- ThinkGroup ThinkServices sur Cloud Societal Responsibility. http://tg-csr.org/

Jean-Marc Seigneur:

- Expert Member for the ITU Study Groups on Blockchain, Distributed Ledger Technologies and Digital Currencies

Katarzyna Wac:

- Dr Wac is an Associate Expert of the International Telecommunication Union (ITU) European Regional Initiative for mHealth (since 2012).
- Associate Expert of the International Telecommunication Union (ITU), ITU Academy on Quality of Service Training Program (QoSTP), ITU, Geneva, Switzerland
- Standardization Activities: Since 2018, IEEE P1752 "Open Mobile Health" Working Group: "Sleep Schema" subgroup and the IEEE 1847 Working Group - "Recommended Practice for Common Framework of Location Services for Healthcare"
- Consultancy/Advisory to Industry: Since 2017, Consultancy to Novartis Pharma AG, Switzerland on "Digital Health & Future of Medical Education"

Events

Giovanna Di Marzo Serugendo:

- Projet Geofab – Troisième appel à projet – January 2018 (Assises Européennes de la Transition Ecologique)
- Projet Geofab – Quatrième appel à projet – September 2018 (Forum Affaires Franco-Suisse)
- Projet Geofab – Remise prix quatrième appel à projet – March 2019 – Centre Universitaire d'Informatique.

Nadia Magnenat-Thalmann:

- Nuit de la Science MIRALab – UNIGE, In the framework of the EU project NOTRE, Parc de la Perle du Lac, Geneva, Switzerland, July 7-8, 2018

Katarzyna Wac:

- 9th "Open Living Lab Days" by European Network of Living Labs (ENoLL), Dr. Wac's 'mQoL Living Lab' is an official co-organizer of the event

Invited talks

Giovanna Di Marzo Serugendo:

- Drones for Good – Invited Panelist – University of Geneva, December 2018
- Geofab Project – Gemeinsam 4.0 – HES Rapperswill, Oct 2018
- Geofab Project – Bern, August 2018
- CERNOpenLab –Technical workshop – Smart Services for Urban Environments - Jan 2018

Gilles Falquet:

- United Nations WSIS Forum (World Summit on the Information Society), Challenges and Perspectives in Knowledge Representation for e-Science, Geneva, 22 March, 2018
- Aterlier RISE de la conférence Conférence Recherche d'Information et Intelligence Artificielle, Bilan de la construction et utilisation des ressources sémantique, Rennes

Nadia Magnenat-Thalmann:

- Invited talk at The ICAT-EGVE 2018 conference, «Mixed populated realities", Limassol, Cyprus, November 07-09, 2018 (http://icat-egve2018.rise.org.cy/professor-nadia-magnenat-thalmann/)
- Invited talk at The 2018 World Conference on VR Industry (2018 WCVRI), «VR-MR-AR: Past, Present and Future Experiences", Nanchang, China, October 19-21, 2018 (http://sist.shanghaitech.edu.cn/sist_en/2018/1030/c3863a35086/page.htm)
- Invited talk at The 7th Moscow International Forum, «Human and Robotic Interaction", Skolkovo Innovation Center, Moscow, Russia, October 15-17, 2018 (https://openinnovations.ru/en/speakers/115) (https://openinnovations.ru/en/video)

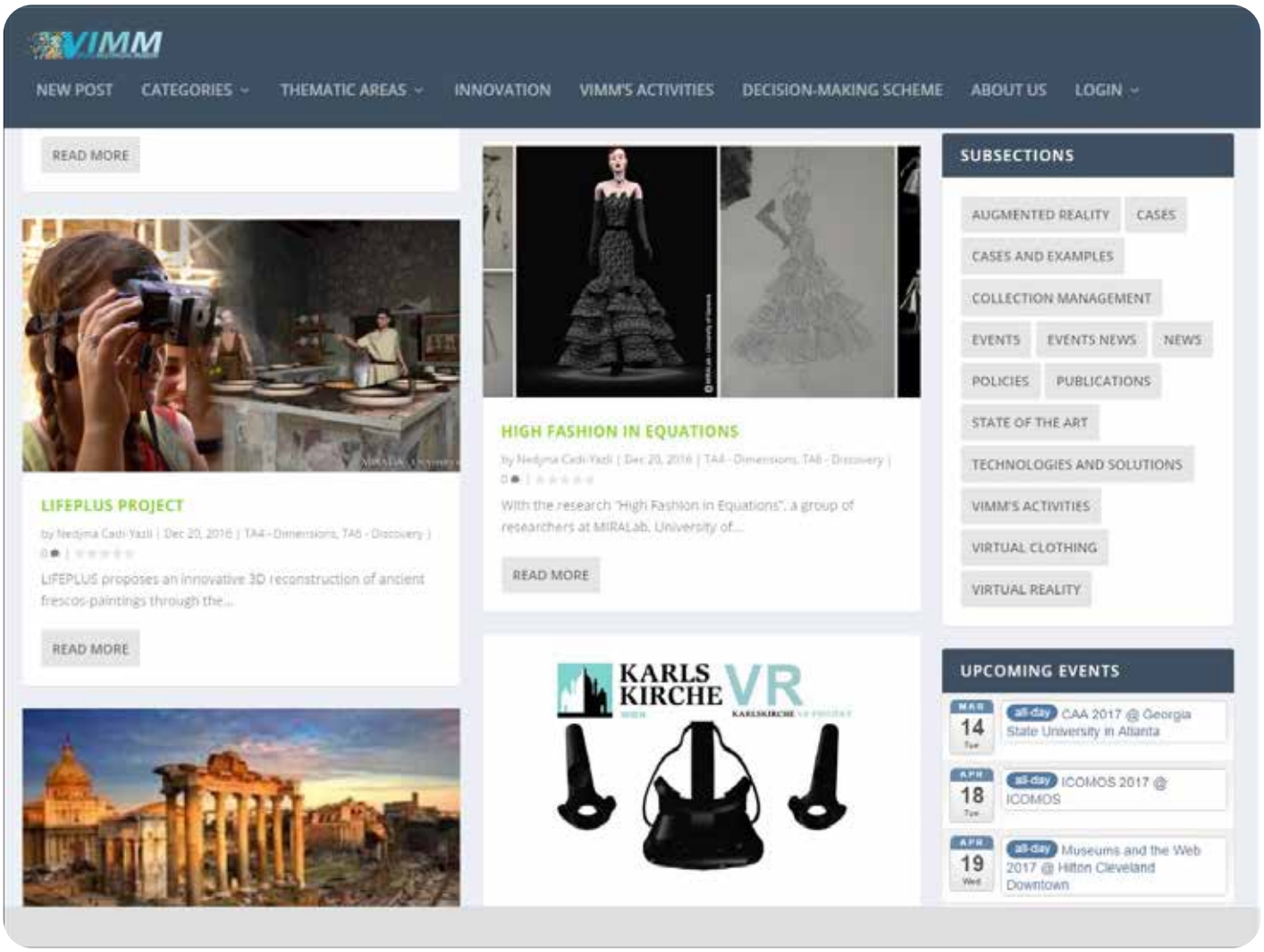


Figure 6: ViMM project – Dissemination and Communication platform © MIRALab

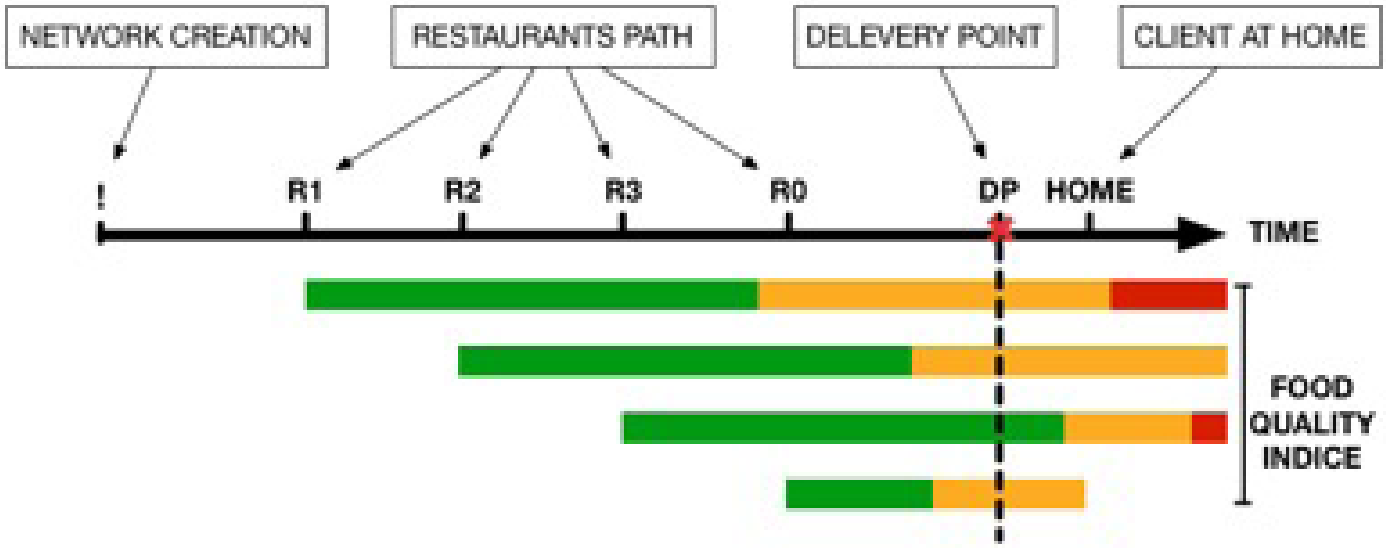


Figure 7: Modelling of food quality index in a multi-restaurant delivery (ISS TaM)

- Invited talk at Slush 2018, «Morality in Robots", Zepp@ BIGBOX, Singapore, September 14, 2018 (http://singapore.slush.org/why-attend/speakers/)
- Invited talk at The fifth annual Milken Institute Asia Summit 2018, «Artificial Intelligence, Real Impact", Four Seasons, Singapore, September 13-14, 2018 (https://www.milkeninstitute.org/events/conferences/summit/asia-summit-2018/speaker-detail/32303)
- Invited talk at The L'Échappée Volée, «The humanoid robot creator", À la Seine Musicale, France, July 4-5, 2018 (https://www.lechappeevolee.com/)
- Invited talk at The 2018 CAUX Forum - Leadership éthique dans le business 2018, «Favoriser l'innovation et la résilience dans le monde des entreprises et la société", The Caux Palace: Conference and Seminar Center, Switzerland, June 28 – July 1, 2018 (https://www.caux.ch/fr/elb-2018-intervenant-e-s)
- Invited talk at Deutsche Bank - 9th Annual dbAccess Asia Conference, «Which professions will be affected by Artificial Intelligence (AI) in the near future? And what will happen in the long run once Artificial Intelligences (AIs) are smarter than humans?", Marina Bay Sands, Singapore, May 14-18, 2018 (https://www.conferences-db.com/asiapacific/accessasia18/welcome)
- Invited talk at Credit Suisse Global Megatrends Conference 2018, «Session One: Technology At The Service Of Humans – What Does It Mean For Investors", Fairmont Singapore, Singapore, April 22, 2018 (https://experts.credit-suisse.com/en/megatrends/2018-conference/detail-video/session-one)
- Invited talk at Dentsu Aegis Network Conference 2018, «Embracing Disruption", Marina Bay Sands, Singapore, March 22, 2018 (https://www.corporatenetwork.com/events/singapore-asia-pacifics-digital-disruption-the-next-set-ofwaves/)
- Invited talk at The 7th Congreso del Futuro 2018, «Conversatorio: Un mundo cyborg", Santiago, Chile, January 15-18, 2018 (http://www.congresofuturo.cl/category/expositores/#charla17110)

Jean-Marc Seigneur:

- Blockchain Leadership Summit in Basel, Panel on blockchain and education, Basel, November 2018
- Alumni meeting of the Institute for Studies on Finance and Banking, Panel on blockchain, Lausanne, November 2018
- Meeting of the Asian delegates of the Ministry of Digital Economy of Thailand and International Telecommunication Union (ITU), Blockchain and distributed ledger technologies (DLT) seminar, Bangkok, September 2018
- Geneva Assises du Tourisme , Vision of smart tourism for Geneva, Geneva, May 2018

Katarzyna Wac:

- 11.2018, Keynote: "Quality of Life Technologies: From Cure to Care", Société Suisse des Pharmaciens Hospitaliers (GSASA), Switzerland.
- 11.2018, "Pocket-Size Life Quality: Are We Ready for a Call?", Mobile Health Systems Seminar, ETH Zurich, Switzerland.
- 4.2018, Panel: "The Digital Health Council & ETCD Present Perspectives on Effective Digital Health Training in Behavioral Medicine", Scientific Papers Session at: 39th Annual Meeting and Scientific Sessions of the Society of Behavioral Medicine (SBM 2018), New Orleans, LA, US.

Participation in TV and radio programs

Giovanna Di Marzo Serugendo:

- RTS – Smart Cities: nos villes toujours plus intelligentes? - Matinale du samedi 6h-9h December 8th 2018 - https://avisdexperts.ch/experts/giovanna_di_marzo_serugendo

Press release

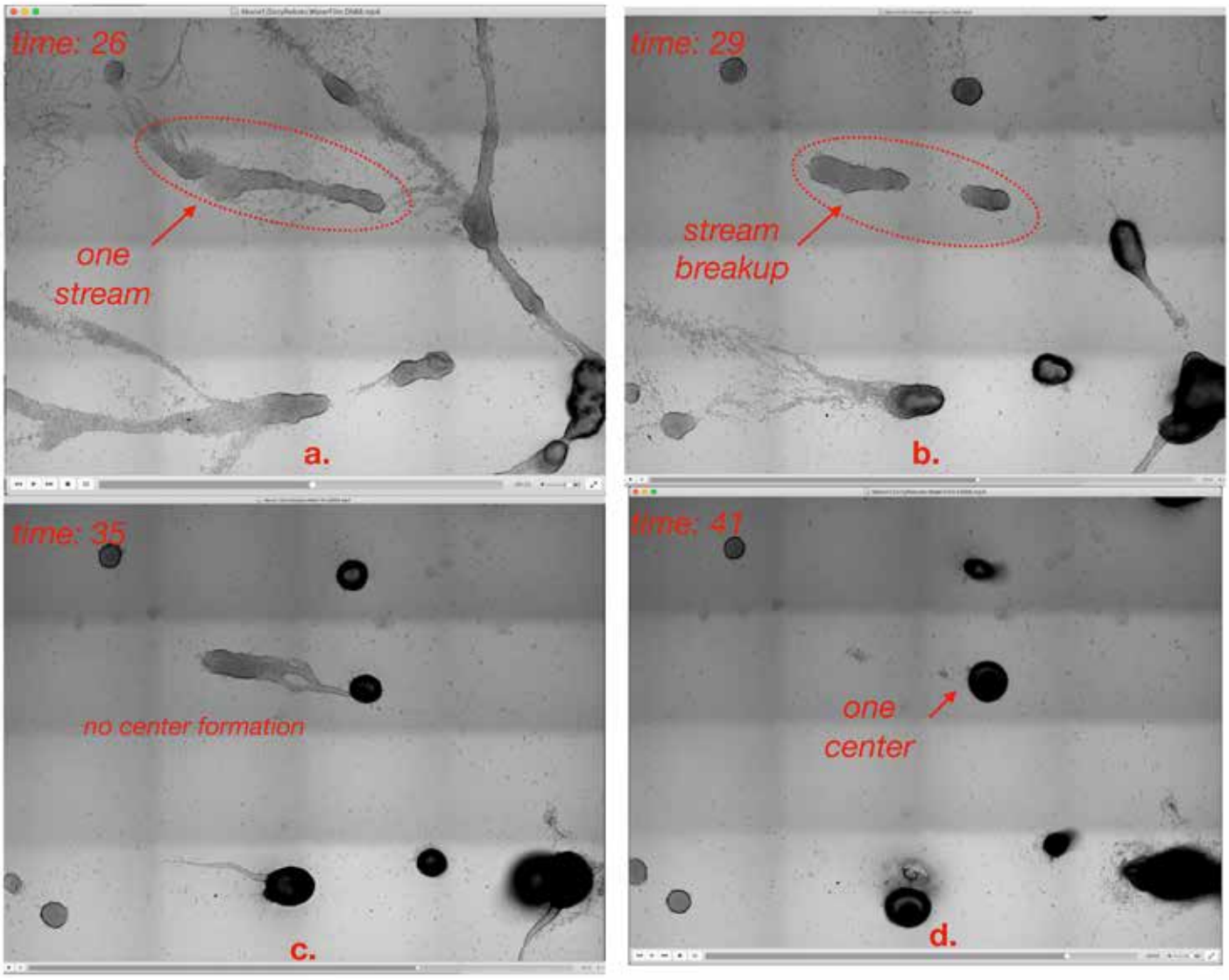
Nadia Magnenat-Thalmann:

- Nadine a socially intelligent human looking robot.,
- stumagz, 04 June 2018
- Asia of cooperation will shape this century, says PM Modi in Singapore, India Today, 02 June 2018
- NTU strengthens partnerships in India during Modi visit, Channel NewsAsia Singapore, 01 June 2018
- 21st century for Asians, PM Modi in Singapore, DailyHunt, 01 June 2018
- Day 2 of PM Modi's visit to Singapore, Connected to India, 01 June 2018
- El futuro ya está aquí, en la región de O'Higgins, El Tipógrafo, 25 May 2018, Spanish
- Nadia Magnenat y los avances de la robótica en Singapur, Biblioteca del Congreso Nacional de Chile (BCN), 15 February 2018, Spanish
- Nadia Thalmann: «En un plazo de diez o 20 años más, todo el mundo tendrá un robot social», AméricaEconomía, 19 January 2018, Spanish
- Congreso Futuro: Desde la automatización y el transhumanismo al mundo cyborg, El Mostrador, 16 January 2018, Spanish
- Una nueva revolución de la IA: Robots inteligentes y emocionales, el nuevo componente social, El Mostrador, 10 January 2018, Spanish
- La "toma de conciencia" es el tema principal del Congreso del Futuro 2018, Innovación.cl, 01 January 2018, Spanish

Katarzyna Wac:

- "Surgeons make more mistakes on patients if they are stressed or 'distracted by beeping machines and side conversations'", Daily Mail UK covering the BJS OPEN 2018 article. Online article. One of the total of 5 online articles covering this journal publication, Dec. 2018
  - https://datascience.columbia.edu/surgeons-under-stress-make-more-mistakes-in-operating-room
  - https://www.hcanews.com/news/smart-shirt-real-world-data-shine-light-on-surgeon-stress
  - https://www.ecnmag.com/article/2018/12/new-study-finds-surgeons-under-stress-make-more-mistakes-operating-room#.XBp1I-W6wKM.twitter
  - https://www.studyfinds.org/study-surgeons-make-significantly-more-mistakes-when-under-stress/
  - https://www.dailymail.co.uk/health/article-6535141/Surgeons-make-mistakes-patients-stressed.html
  - https://www.ecnmag.com/news/2018/12/new-study-finds-surgeons-under-stress-make-more-mistakes-operating-room?cmpid=horizontalcontent

Figure x: _ISS_GDM_StreamBreakup02



Honours and scientific awards

Giovanna Di Marzo Serugendo:

- Nominated among the 100 Digital Shapers in Switzerland, 2018 (https://www.bilanz.ch/digital-shapers-2018#)

Nadia Magnenat-Thalmann:

- 2018 Second Best Paper Award for Time scaled interactive object driven Multi-party VR, The 35th Computer Graphics International (CGI) 2018, Nirwana Resort Hotel, Bintan, Indonesia, June 11- 14, 2018 (with N. Jain, A. Wydra, W. Hai, N. Magnenat-Thalmann and D. Thalmann) (http://www.cgs-network.org/cgi18/#about)
- 2018 Best Paper Award Runner-up for Automated Lexical Analysis of Interviews with Schizophrenic Patients, The 9th International Workshop on Spoken Dialogue Systems Technology (IWSDS 2018), HUONE Singapore, Singapore, May 14-16, 2018 (with S. Xu, Z. Yang, D. Chakraborty, Y. Tahir, T. Maszczyk, C.Y.H. Victoria, J. Dauwels, D. Thalmann, N. Magnenat-Thalmann, B.L. Tan, and J.L.C Keong) (https://www.dropbox.com/s/fkhayd1979v0047/IWSDS_Award_XSH.pdf?dl=0)

Katarzyna Wac:

- 2018 – 2020: IEEE Distinguished Visitor and Invited Speaker for the IEEE Region 8
- 2018: European Science Foundation - COST Academy Leadership Participant
- 2017 – 2018 Society of Behavioral Medicine Leadership Institute Participant, USA
- Since 2015: Mentor, Mentoring Program for female academics, University of Lugano, Switzerland

Others

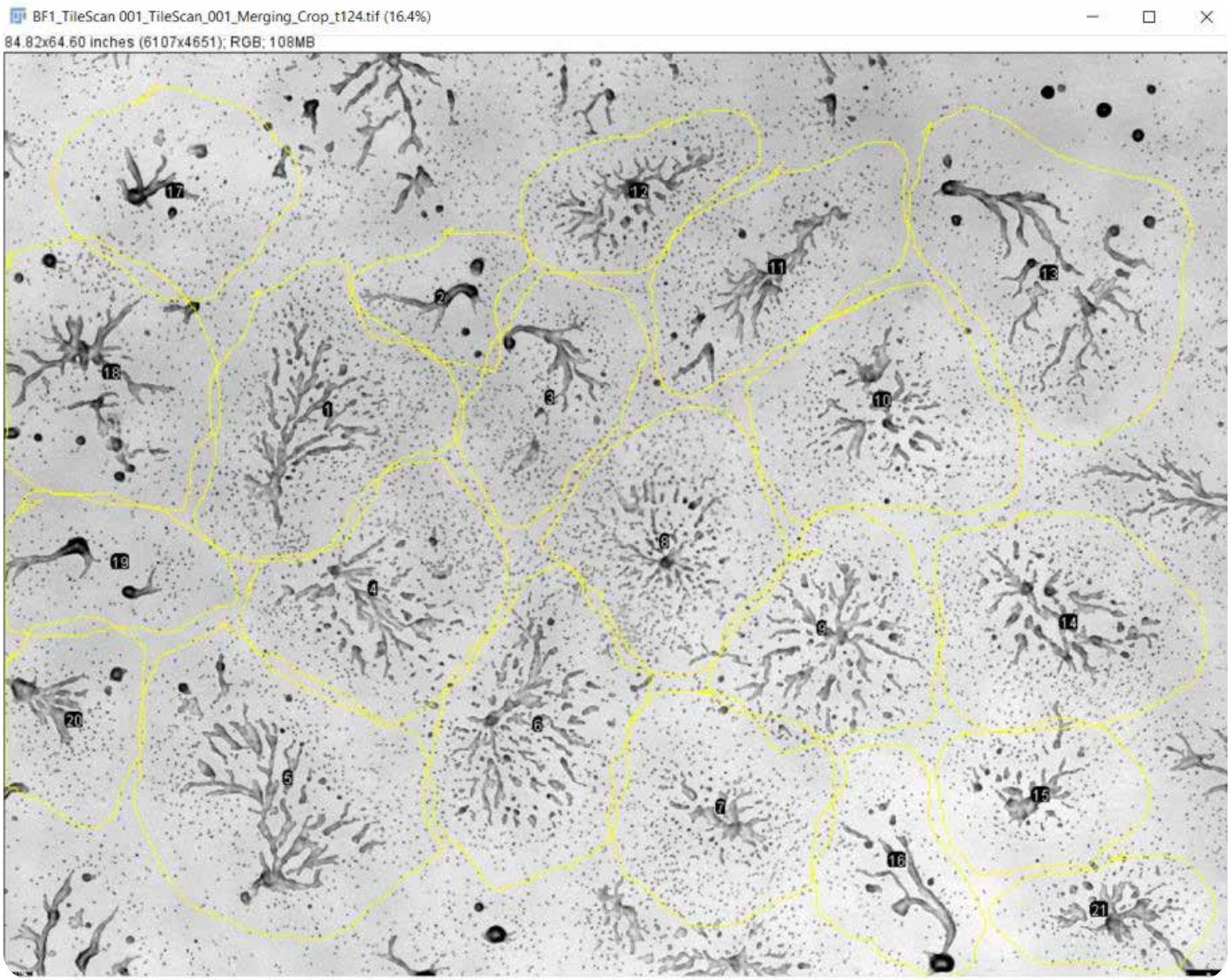
Giovanna Di Marzo Serugendo:

- Cité des Métiers (November 2018)
- Robotics week, La Praille (May 2018)

Jolita Ralyté:

- Research seminar on "IS Evolution Steering: Defining the Responsibility Space". University of Paris 1 Pantheon-Sorbonne. Paris, France, February 9, 2018.
- Steering Committee Member of CAiSE – International Conference on Advances Information Systems Engineering, since 2012.

Figure x: Aggregation territories (biological validation)



- Steering Committee Member of PoEM – IFIP WG8.1 Working Conference on Practice of Enterprise Modelling, since 2015.
- Steering Committee Member of INFORSID – Congrès Francophone d'INFormatique des ORganisation et Systèmes d'Information et de Décision, since 2014.
- Steering Committee Member of RCIS – IEEE International Conference on Research Challenges in Information Science, since 2017.
- Chair of the IFIP WG 8.1: Design and Evaluation of Information Systems, 2016 - 2021

Jean-Marc Seigneur:

- Habilitation à Diriger des Recherches (HDR), University of Reims-Champagne Ardenne, October 2018

Katarzyna Wac:

- Since Nov. 2018, Visiting Professor, Stanford University and Stanford University Medical Center, Department of Surgery, group lead by Prof. W. Conception (MD)
- ONLINE VIDEO https://youtu.be/s6CKNbWS7J4

Figure 8: Runner dish validation to inform how delivery has been completed (ISS TaM)

Funded research projects

Participation to European projects

CardioRNA

Catalysing Transcriptomics Research in Cardiovascular Disease
EU COST Action CA171129
Period: 2018 - 2022
Web site: https://www.cost.eu/actions/CA17129/

CoME

European Ambient Assisted Living project «Caregivers and Me"
AAL-CoME AAL-2014-127
Partners: HI iberia (Spain), IRBLLeida (Spain), University of Geneva (Switzerland) (Katarzyna Wac), Vigisense (Switzerland), ConnectedCare (Netherland), Pannon Business Network (Hungary)
Period: 2015 – 2018
Web site: http://come-aal.eu/

ECoWeB

Assessing and Enhancing Emotional Competence for Well-Being in the Young
H2020 project 754657
Period: 2018 - 2021
Web site: http://www.ecowebproject.eu/

EDLAH2

AAL project
Partners: karisgroup (England), Université du Luxembourg (Luxembourg), Université de Genève (Switzerland), EverdreamSoft (Switzerland), terzStiftung (Switzerland)
Period: June 2016 - 2018
Web site: http://edlah2.eu

GeoFab du Grand Genève

InterReg project
Principal Investigator: Giovanna Di Marzo Serugendo
Period: July 2016 - December 2019
Web site: https://www.geofab-grandgeneve.org/

GrowMeUp

EU H2020 project
Partners: Artificial Perception Team (Portugal), University of Cyprus (Cyprus), University of Geneva (Switzerland), ProbaYes (France), PAL Robotics (Spain), CiTARD Services Ltd (Cyprus), Caritas Ciocesana de Coimbra (Portugal), Zuyderland (Netherland)
Period: February 2015 - January 2018
Web site: http://www.growmeup.eu/

Many-Me
Social Interactive Care System to support the wellbeing of people living with dementia
AAL Project (AAL/Call2016/1/2017)
Partners: Drimpy, CPX, UNIGE, EKKOTEK, ASM, terzStiftung, EURAG, MOB, Materia Group
Period: March 2017 - February 2020
Web site: http://many-me.eu/

NOTRE
Network for Social Computing Research
EU FP7 project
Partners: Cyprus University of Technology (CUT) – Cyprus, Foundation For Research and Technology Hellas (FORTH-ICS) – Greece, IMDEA Networks Institute (IMDEA) – Spain, MIRALab, University of Geneva (UNIGE) – Switzerland, University of Dusseldorf (UDUS) – Germany
Period: January 2016 - December 2018
Web site: http://notre.socialcomputing.eu

SmartHeat
AAL project
Partners: Université de Genève (Switzerland), Modosmart S.L. (Spain), MX-SI S.L. (Spain), Sensor ID s.n.c. (Italy), terzStiftung (Switzerland), Eurag (Austria), Gluk Advice B.V. (Netherland), Teamnet International (Romania)
Period: 2015 - 2018
Web site: http://www.smartheat-aal.eu

SPIRIT
Security and PrIvacy foR the Internet of Things
CHIST-ERA European project, R
EPSRC Reference EP/P015956/1
Partners: University of Kent - School of Engineering and Digital Arts, University of La Rochelle - L3i Laboratory, University of Essex - School of Computer Science and Electronic Engineering, University of Geneva - Centre for Computer Science (CUI)
Period: January 2017 - December 2019
Web site: http://cui.unige.ch/spirit

Suicide Prevention through Outreach Program at Stanford
Smartphone Data Identification of Suicidality in Young Men with Bipolar Disorder
Stanford PI Dr. A. Gershon and Prof. S. Miller group
Period: 2017 - 2018
Web site:http://med.stanford.edu/mchri/awards/spot-awards.html

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ViMM
Virtual Multimodal Museum
EU H2020 project
Partners: Cyprus University of Technology (CUT) – Cyprus, Foundation For Research and Technology Hellas (FORTH-ICS) – Greece, 7Reasons Medien Gmbh - Germany, MIRALab, University of Geneva (UNIGE) – Switzerland, Stifung Preussischer Kulturesizt – Germany, Universidad Pompeu Fabra – Spain, 7scenes – Netherlands
Period: October 2016 - March 2019
Web site: http://vi-mm.eu/

Vizier
The Elderly Friendly Interface to Modern Online Services and Internet of Things Appliances
AAL project
Partners: University of Geneva (Project coordinator), Dublin City University, Myhomecare, NetUnion sàrl, Verhaert New Products & Services NV, Acapela Group S.A., Familiehulp vzw, VIVA Association, Salaso Health Solutions Ltd.
Period: 2016 - 2018
Web site: http://aalvizier.eu

WellCO
Wellbeing and Health Virtual Coach
H2020 project 769765
Period: 2018 - 2021
Web site: http://wellco-project.eu/

Figure 9: TaM team in 2018

Participation to National projects

Concertation
Observation, analyse et modélisation des comportements et des processus de decision collective à partir de situations de concertation dans le domaine de l'urbanisme dans le canton de Genève
Geneva Canton
Period: 2018

Dicty
Social Amoeba Dictyostelium discoideum as an Inspiration for Higher-Order Emergence in Collective Adaptive Systems
SNF
Period: 2018 - 2020

FoxyFoodDelivery
Period: February 2017 - July 2018
Web site: https://yumy.app/fr/

IDDASS
Interests detection during a shopping session
CTI Project
Period: 2016 - 2017
Web site: http://tam.unige.ch/projects/iddass.html

Learning basics of IT by "doing virtually"
Hasler Foundation
Period: April 2018 - December 2018

MIQmodel
Context-aware Mobile Internet Quality Model
SNSF-157003
Period: 2015 - 2019
Web site: http://p3.snf.ch/Project-157003

PRedict Solar Uv Exposure (PuRSUE)
Ground UV irradiance and 3D rendering techniques to predict anatomical solar UV exposure in Skin cancer research and prevention
SNF project 152803
Institute for Work and Health, Lausanne University Hospital, MeteoSwiss
Period: August 2014 - January 2018
Web site: http://p3.snf.ch/Project-152803

Recover@home
A monitoring solution to be used at home by people who undergo lower body orthopaedic surgery
CTI Project
Period: 2016 - 2018
Web site: http://tam.unige.ch/projects/recoverathome.html

Swiss Alliance for Data-Intensive Services
KTI NTN Project
Management Board Member: Giovanna Di Marzo Serugendo
Period: 2017 - 2019
Web site: http://www.data-service-alliance.ch/

ThinkDesign
Developing Design Thinking as an academic skillset
University of Geneva – Yonsei University co-fund
Period: September 2015 - August 2018

Open software and databases

Giovanna Di Marzo Serugendo:

- **SAPERE** : Coordination Middleware
- **SAPERE-Android** : Coordination Middleware for Android
- **TheOneSAPERE Model** : Prototyping Platform from TheOne simulator and Sapere middleware
- **LogicFragment Model** : Logic-Based Coordination Middleware
- **Learning-based coordination model** : Learning-based Coordination Middleware
- https://www.unige.ch/cui/cas/publications/projects-output/

Gilles Falquet:

- ***SKOO***
  Title of the service/product/process: SKOO: an ontology of Scientific Knowledge Objects
  Brief description: A high level formal ontology (in OWL) that describes the entities used in scientific research: hypothesis, results, theorems, proofs, observations, methods, formal expressions, equations, etc.

Teaching

Giovanna Di Marzo Serugendo:

- **Self-organising Mechanisms and Design Patterns for Engineering Self-Organising Applications – A Smart Environment Application**, ISS, Master University Lyon (France)
- **Bases de données**, ISS, Bachelor course, 6 ECTS, 14 hours, 30 students
- **Contextualisation, qualité des services et mashup**, ISS, Bachelor course, 3 ECTS, 28 hours, 15 students
- **Design Science Research**, ISS, Master course, 3 ECTS, 84 hours, 20 students
- **Problèmes des sociétés contemporaines: économie et société numériques** , ISS, Bachelor course, 6 ECTS, 84 hours, 200 students
- **Projets transverses I, II**
- **Digital participation – platforms and issues** (CAS)
- **Self-adaptive systems**, ISS, Master course, 4 ECTS, 42 Hours, 6 students
- **Outils collaboratifs d'environnements logiciels**, ISS, Bachelor
- **Requirements Analysis**, ISS, Bachelor
- **Evidence-Based Policy-Making**, Master in Innovation, Human Development and Sustainability with Tsinghua University

Abdelaziz Khadraoui:

- **CAS MATIS-DASI**, Développement à l'aide des services informationnels, Continuing education, 13 students
- **CAS MATIS-DASI**, Développement à l'aide des services informationnels, Continuing education, 13 students
- **CAS - Gouvernance de l'Information en Organisation – GIO**, Continuing education, 10 students

Dimitri Konstantas:

- **Réseaux de communication**, ISS, Bachelor, 48 hours, 12 students
- **Mobile Systems and Services**, ISS, Master, 48 hours, 10 students
- **Design of Multimedia Services**, ISS, Master, 48 hours, 12 students
- **Technologies for Services**, ISS, Master, 48 hours, 11 students
- **InfoSec (program director)**, ISS, Continuing education, 24 hours, 30 students
- **Systèmes d'information et sciences des services**, ISS, Master 2 Gestion d'entreprise / Continuing education, 24 hours, 20 students
- **MAS SCN (program director)**, Continuing education, 6 students

Laurent Moccozet:

- **Service Innovation Lab**, ISS, Master, 3 ECTS, 28 hours, 8 students
- **Introduction à la programmation**, ISS, Bachelor, 6 ECTS, 56 hours, 20 students
- **Services et technologies multimédia**, ISS, Bachelor, 6 ECTS, 56 hours, 60 students
- **Introduction à la sience des services**, ISS, Bachelor, 6 ECTS, 56 hours, 300 students
- **Interaction multimodale et affective**, CUI, Master, 6 ECTS, 56 hours

Jean-Henry Morin:

- **Introduction à la Sécurité, Ethique et Règlementation des Services**, ISS, Bachelor course, 3 ECTS, 28 hours, 50 students
- **Design Science**, ISS, Bachelor course, 6 ECTS, 56 hours, 14 students (2016: Giovanna Di Marzo Serugendo)
- **Systèmes d'Information d'Entreprise**, ISS, Bachelor course, 6 ECTS, 56 hours, 10 students
- **Informatique et Systèmes d'Information I, Public Management**, ISS, Master course, 3 ECTS, 28 hours, 20 students
- **Selected Topics, Advanced Seminar on Industrial & Emerging issues**, ISS, Master course, 3 ECTS, 28 hours, 16 students
- **Service Innovation Lab**, ISS (shared with Laurent Moccozet), 3 ECTS, 28 hours, 9 students
- **Design Science & Design Thinking**, CUSO Doctoral Program in Computer Science, in cooperation with Prof. Yves Pigneur, University of Lausanne, 5 days program, 35 hours, 12 students
- **Introduction to Management Information Systems** (English), Undergraduate Level, Credit Hours 3(3), 80 students, Korea University Business School
- **Internet Business and Electronic Commerce** (English), Undergraduate Level, Credit Hours 3(3), 53 students, Korea University Business School
- **Design Thinking for Innovation**, Undergraduate Level, co-teaching with Prof. Kil-Soo Suh, Credit Hours 3(3), 40 students, Yonsei School of Business
- **Emerging Trends & Development in Global IT Industry** (English), Graduate Level, TRENDS & DEVELOPMENT IN GLOBAL IT INDUSTRY (English), GMBA, Module 2, 41 students, Korea University Business School

Jolita Ralyté:

- **Analyse des objectifs**, ISS, Bachelor, 3 ETCS, 28h, 25 students
- **Gestion de projet**, ISS, Bachelor, 3 ETCS, 28h, 25 students
- **CAS MATIS-GPSI**, Gestion de projets des systèmes d'information et des services, Continuing education, 10 ECTS, 96h, 11 students
- **CAS MATIS-DASI**, Développement à l'aide des services informationnels, Continuing education, 15 ECTS, 144h, 11 students
- **CAS/DAS/MAS MATIS** – Management and Technology of Information Systems, Program Director

Jean-Marc Seigneur:

- **CAS Blockchain**, Lifelong learning, 12 ECTS
- **e-Réputation, e-Marketing and Data Analytics - Courses and Tutorials**, Master, 6 ECTS, 52 hours, 25 students

Gilles Falquet and Claudine Métral:

- **Semantic Web technologies**, ISS, Master, 4 ECTS, 56 hours, 15 students
- With Giovanna Di Marzo: **Environnements collaboratifs de développement logiciel**, ISS, Bachelor, 3 ECTS, 28 hours

Gilles Falquet:

- **Algorithmique appliquée**, ISS, Bachelor, 6 ECTS, 28 hours, 30 students
- With Patrick Roth: **Interfaces personnes-machines**, ISS, Bachelor, 6 ECTS, 28 hours, 20 students
- With Didier Buchs: **Fondements formels des systèmes d'information**, Computer Science, Bachelor, 6 ECTS, 28 hours, 40 students
- **Algorithmics and Data Management**, ISS, Master in Business Analytics, 6 ECTS, 56 hours, 30 students
- With Giovanna Di Marzo, Jolita Ralyté, Dimitri Konstantas: **Projet transverse I**, ISS, Bachelor, 3 ECTS, 14 hours, 20 students
- With Giovanna Di Marzo, Jolita Ralyté, Dimitri Konstantas: **Projet transverse II**, ISS, Bachelor, 3 ECTS, 14 hours, 20 students
- With Thierry Pun, Patrick Roth, Laurent Moccozet: **Interfaces multimodales et affectives**, Computer Science, Master, 4 ECTS, 28 hours

Claudine Métral:

- **GEOTOOLS-DB: Modélisation des bases de données spatiales,** Master en développement territorial et Certificat complémentaire en géomatique, 3 ECTS, 28 hours, 36 students
- **Space-City: Modèles urbains 3D,** Master en développement territorial et Certificat complémentaire en géomatique, 3 ECTS, 28 hours, 18 students

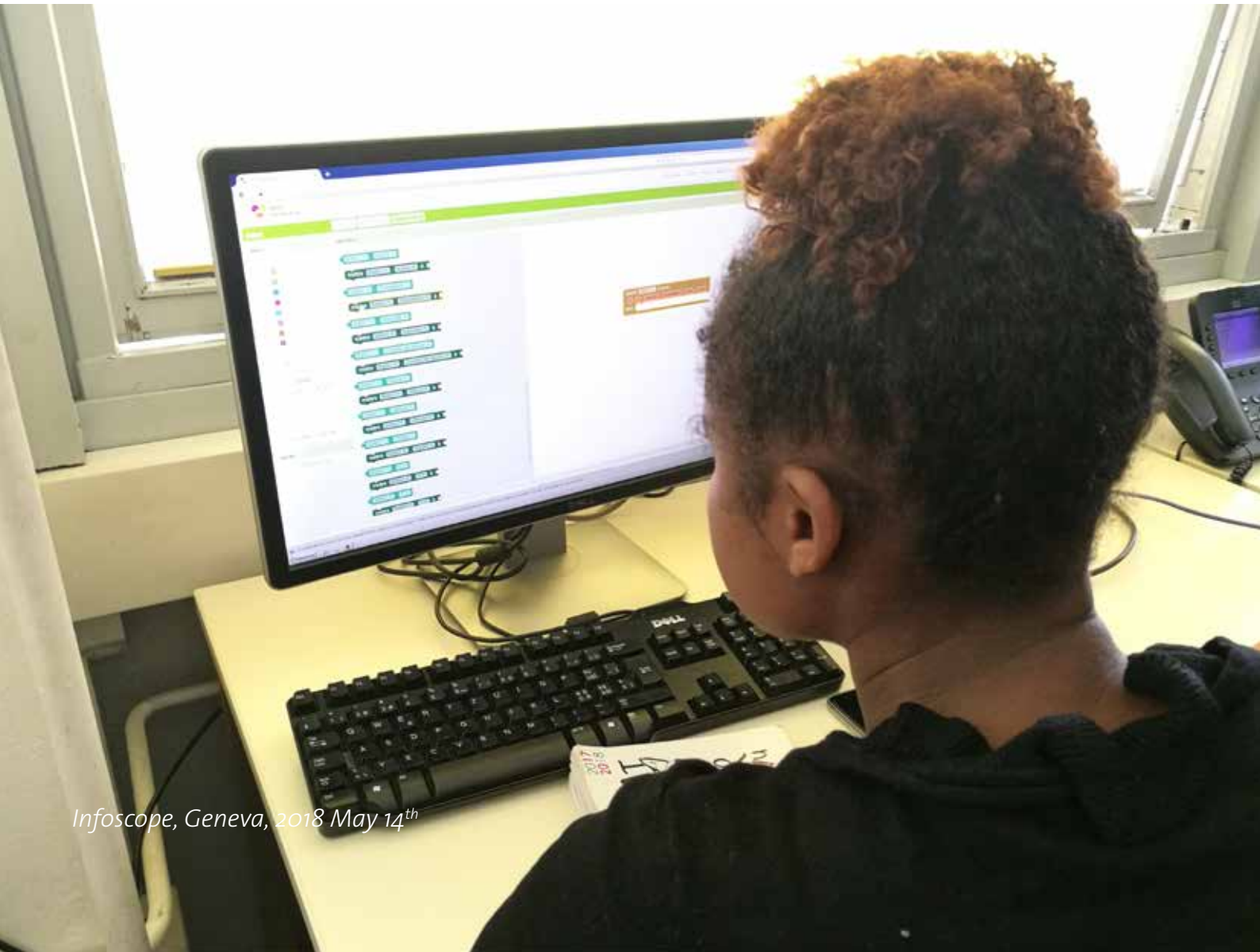
Katarzyna Wac:

- A guest lecturer at 'Medical Informatics' Advanced Studies (Continuous Education), University of Geneva Hospitals, Switzerland. Lecture titled: «**Digital Health Innovations and Patient Care: Hype or Hope?** (medical tricorder)»

latl.unige.ch

LATL

Laboratory for the Analysis and Technology of Language



Infoscope, Geneva, 2018 May 14th

Laboratory for the Analysis and Technology of Language

Domain activities

LATL (http://www.latl.unige.ch) has been active in the field of natural language processing since the early 1990's. Its main research focus is the development of a multilingual syntactic parsing model (the Fips parser), as well as the development of large lexicons and dictionaries.

The Fips parser is currently available for several of the main European languages (English, French, German, Italian and Spanish), with several other languages at various stages of development (Romanian, Greek, Japanese). In 2017 the LATL continued the development of the parsers for the above languages with a special stress on Greek. It is based on a grammatical model inspired by Chomsky's generative grammar and on an object-oriented design for its implementation. The parser and its rich lexical database (Figure 1) are used in a number of applications, including machine translation (Figure 4), terminology extraction, speech-to-speech translation, and computer-assisted language learning.

In 2018, the LATL participated in the second edition of the Parseme Shared task on automatic identification of verbal multiword expression, co-located with COLING 2018 at Santa Fe (NM). The Milos system developed by the LATL performed well, as it was ranked first both in the open track and in the overall results for English.

In collaboration with the Knowledge Engineering group, the LATL works on a project of digital edition of Ferdinand de Saussure's manuscripts. A system for visualizing, annotating and transcribing Saussure's manuscripts is already completed.

From 2016-2018, LATL participated in the the MiCMaC research project (Multiontological Categorizer for Medical Coding) led by Prof. Christian Lovis (Faculty of Medicine) on the automatic processing of medical language, in the framework of the multi-faculty project Language and Communication.

The LATL was also involved in many Digital Humanities through advanced student's NTIC projects in collaboration with the Department of antique sciences.

Team

Directors
Eric Wehrli
Honorary professor
H-index: 23

Luka Nerima
Senior researcher

Senior researchers
Dr. Vasiliki Foufi
Jean-Philippe Goldman

Assistants (PhD students)
Asheesh Gulati
Maria Ivanova
Lorenza Russo

Administration
Coralie Grossrieder
Eva Capitao

Figure 1: Translation of Word in Context (TWiC) is a reading aid system for readers of materiel in foreign languages. Here in use on the Tages Anzeiger newspaper Website

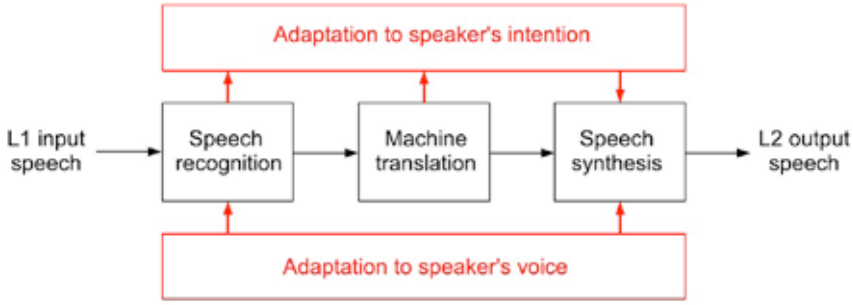


Figure 2: General concept of speech-to-speech machine translation, with SIWIS adaptations in red.

Figure 3: VoiceÄpp Interface for dialect prediction based on automatic speech recognition.

List of publications

Full refereed papers in Conference Proceedings

[1] Jean-Philippe Goldman, Sandra Schwab - MIAPARLE: Online training to improve discrimination of stress contrasts (2018). In proceedings of LREC Conference, Miyazaki (Japan), May 2018.

[2] Jean-Philippe Goldman, Sandra Schwab - MIAPARLE: Online training for the discrimination and production of stress contrasts (2018). Speech Prosody Conference, 2018.

Refereed papers in Workshop Proceedings

[3] Gaudet-Blavignac, C., Foufi, V., Wehrli, E., & Lovis, C. (2018). Automatic Annotation of French Medical Narratives with SNOMED CT Concepts. Studies in health technology and informatics, 247, 710-714.

[4] Gaudet-Blavignac, C., Foufi, V., Wehrli, E., & Lovis, C. (2018). Automatic annotation of French medical narratives with SNOMED CT concepts. Swiss Med Informatics. 2018;34:w00418 ("Best Contribution Award")

Books and book chapters

[5] Eric Wehrli & Luka Nerima (2018). Anaphora resolution, collocations and translation, In Multiwords Units in Machine Translation, Ruslan Mitkov, Johanna Monti, Gloria Corpas Pastor and Violeta Seretan (eds.), Current Issues in Linguistic Theory, Series IV, Vol 341, John Benjamins, Amsterdam, 2018

Member of conference/workshop program committees

- Jean-Philippe Goldman in the program committee of the WG3&WG5 COST meeting, EnetCollect, Leiden, Netherlands, October 24, 2018.

Editorial Responsabilities

- Les manuscrits de Saussure, parmi d'autres. Problèmes, stratégies et solutions d'édition pour les archives numériques, Summaries Booklet (2018). Giuzeppe Cosenza, Giuseppe D'Ottavi et Luka Nerima, Eds.

Events organised in Geneva

- Luka Nerima, co-organiser of the Journée de la Faculté des lettres, Les humanités et le tournant numérique, Université de Genève, 9 mai 2018.

Invited Talks

- Jean-Philippe Goldman & Sandra Schwab - MIAPARLE: A set of computer-based tools for the acquisition of prosody in a second language : prosodic aspects, COST meeting, EnetCollect, Leiden, Netherlands, October 24, 2018.

Funded research projects

Participation to European projects

MIAPARLE : Méthode interactive d'aide à la prononciation pour l'apprentissage d'une langue étrangère
INNOGAP – UNITEC

Participation to National projects

Knowledge engineering models and tools for the digital scholarly publishing of manuscripts
Swiss NSF interdisciplinary project
Principal Investigator: Gilles Falquet (CUI - UNIGE)
Partners: Claire Forel (FTI - UNIGE), Luka Nerima (CUI – UNIGE)
Period: April 2015 – February 2018
Website: http://fds.unige.ch/

Technology transfer

LATL.ch is a technology start-up specialized in the development of linguistic software components. Closely associated with LATL laboratory, LATL.ch develops and commercializes products based on fundamental research conducted in the university lab. Two companies use its POS-Tagger: Acapela Group, a European Speech synthesis company, and ShareWizMe, a French innovative company specialized in real time analysis of contributions (ideas, feedback, comments).

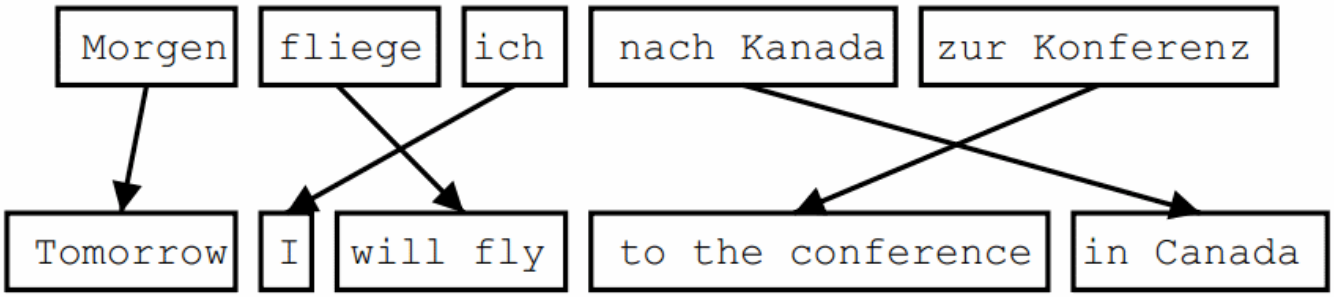


Figure 4: Word alignment in a bilingual parallel corpora

Others

Poster Presentations

- Luka Nerima, Gilles Falquet, Claire Forel, Giuseppe Cosenza, Sahar Aljalbout, Massimo Brero, Jérémy Morel, Maria Andueza Rodriguez (2018). Une infrastructure numérique pour étudier les anciens manuscrits scientifiques : un cas d'utilisation appliqué aux manuscrits de Saussure, Journée de la Faculté des lettres, Genève, May 9, 2018.
- Jean-Philippe Goldman, Sandra Schwab, MIAPARLE: Méthode Interactive d'Aide à la Prononciation pour l'Apprentissage d'une Langue Étrangère, Journée de la Faculté des lettres, Genève, May 9, 2018.
- Gaudet-Blavignac, C., Foufi, V., Wehrli, E., & Lovis, C. Translating patient-related narratives into SNOMED-CT to enable interoperability of healthcare data. Poster presentation in Geneva Health Forum 2018, April 10-14.
- Jean-Philippe Goldman, Sandra Schwab - MIAPARLE: A set of computer-based tools for the acquisition of prosody in a second language, Swiss Linguistics Day, in Bern, October 12, 2018.
- Jean-Philippe Goldman, Sandra Schwab, MIAPARLE : Méthode Interactive d'Aide à la Prononciation pour l'Apprentissage d'une Langue Étrangère. Journée Université de Genève : les RDV de l'enseignement, Genève, October 18, 2018.

Shared Task Participation

- Participation of the Milos system at the PARSEME shared task on automatic identification of verbal multiword expressions - edition 1.1, co-located with the COLING 2018 Conference, Santa Fe (NM), United States, August 2018 - http://multiword.sourceforge.net/lawmwecxg2018/ > Shared task results

From left to right: Luka Nerima, Jean-Philippe Goldman, Vasiliki Foufi, Eric Wehrli - March 2019

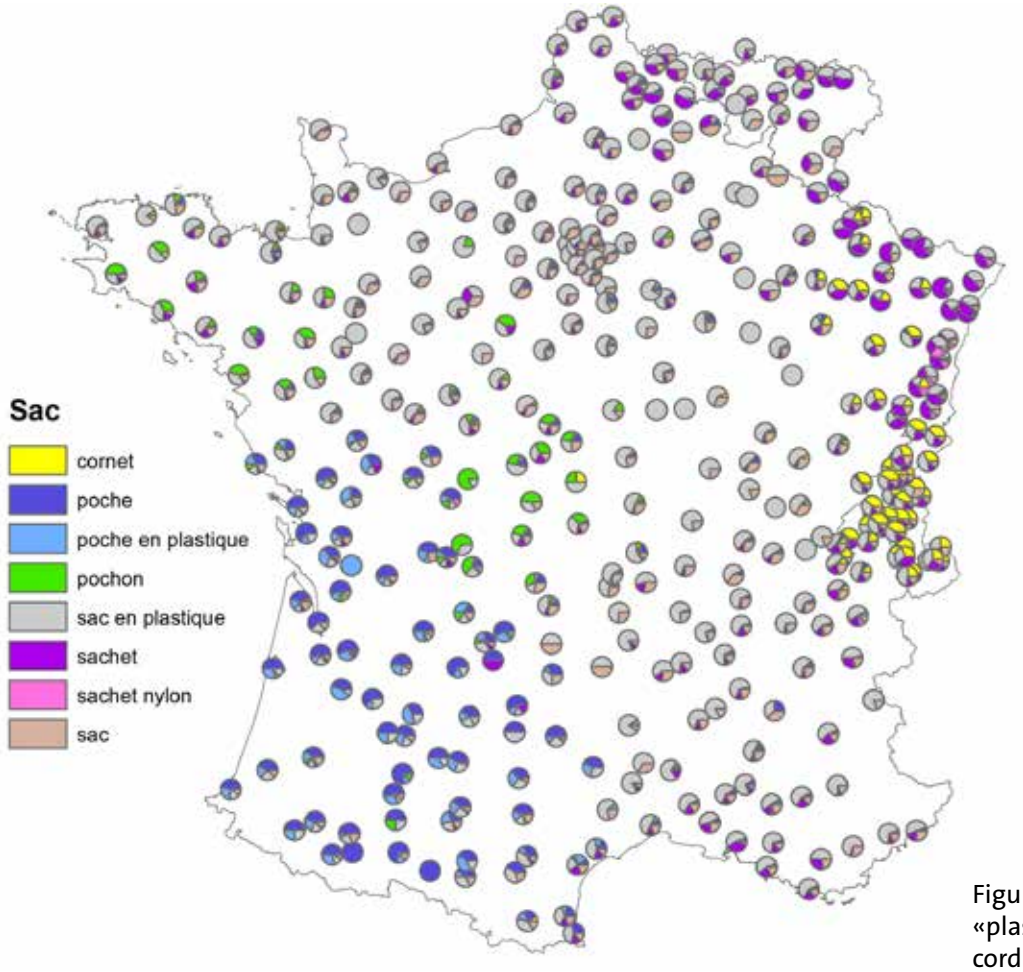


Figure 5: The denominations of the «plastic bag» in regional French, according to the results of [6]

Teaching

Luka Nerima:

- **Databases**, Computer Science for the Humanities, Bachelor, 3 ECTS, 28 hours, 12 students
- **Information Systems and Service Modeling**, Computer Science for the Humanities, Bachelor, 3 ECTS, 28 hours, 80 students
- **Information Systems and Service Modeling - Laboratory sessions**, Computer Science for the Humanities, Bachelor, 3 ECTS, 28 hours, 12 students
- **Informatics II - Data Struxture Course**, Computer Science for the Humanities, Bachelor, 2 ECTS, 28 hours, 6 students
- **Informatics II - Data Struxture Course - Laboratory sessions**, Computer Science for the Humanities, Bachelor, 2 ECTS, 28 hours, 6 students
- **Informatics II - Java seminar**, Computer Science for the Humanities, Bachelor, 2 ECTS, 28 hours, 6 students
- **Informatics II - Object Oriented Project**, Computer Science for the Humanities, Bachelor, 6 ECTS, 56 hours, 5 students
- **Empirical Methods in Natural language Processing Project**, Master, 6 ECTS, 56 hours, 1 student
- **Information and Communication Technology**, Computer Science for the Humanities, Bachelor, & Master, 12 ECTS, 112 hours, 20 students

Asheesh Gulati:

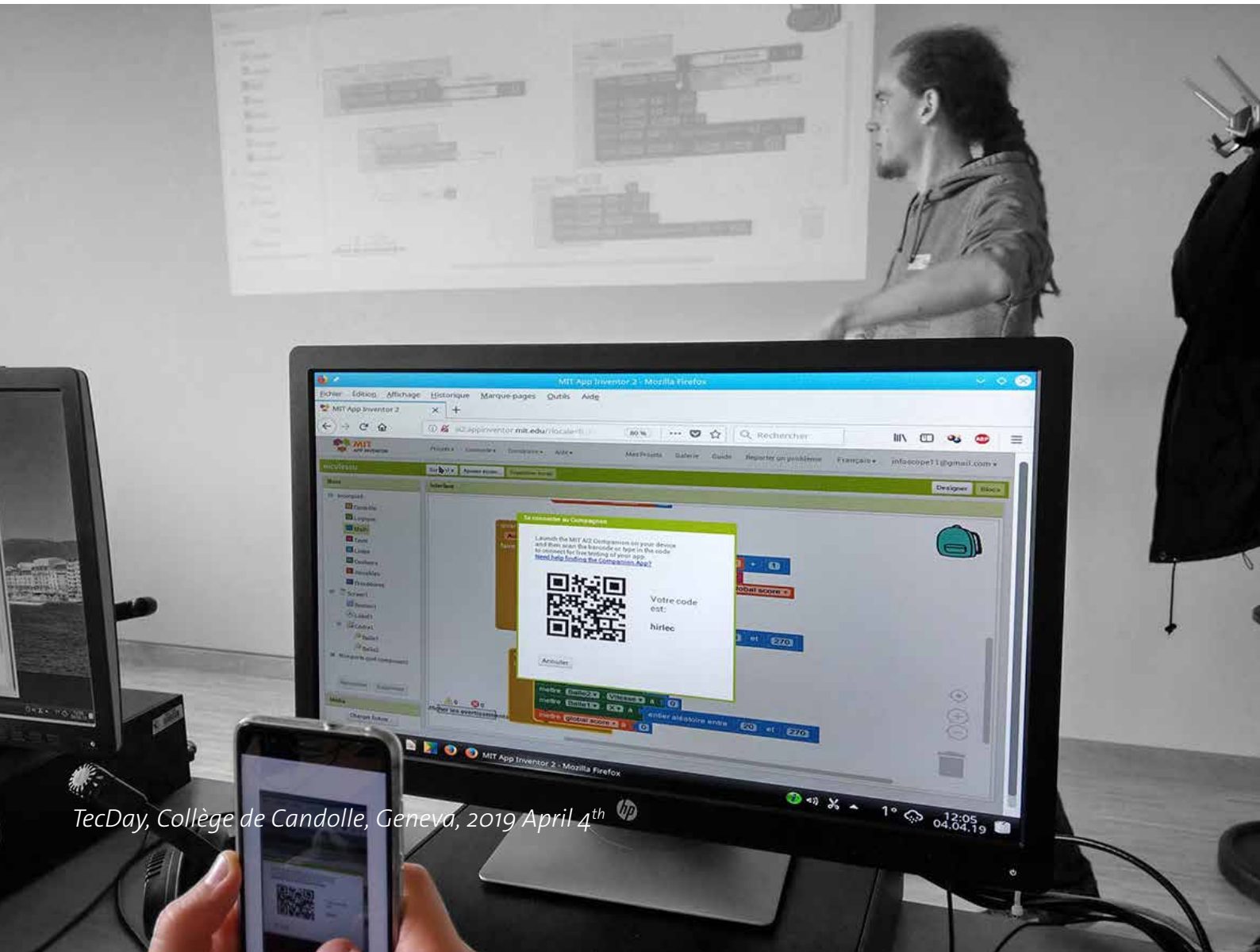
- **Informatics I: Web programming**, Computer Science for the Humanities, Bachelor, 3 ECTS, 28 hours, 46 students
- **Natural language processing, linguistic and empirical approaches**, Master, 3 ECTS, 28 hours, 15 students

www.sib.swiss

CUI UNI GE

PIG

Proteome Informatics Group



TecDay, Collège de Candolle, Geneva, 2019 April 4th

Proteome Informatics Group

Domain activities

The Proteome Informatics Group (PIG) is involved in bioinformatics. Bioinformatics is a recently created discipline in which computer technology is applied to the understanding and effective use of biological data (see http://www.sib.swiss/bioinformatics-for-all/what-is-bioinformatics). At PIG, we concentrate on the study of proteins that are the active molecules of the cell. Extracting and studying proteins from a cell or a tissue requires the use of sophisticated experimental methods which generate large datasets. The analysis of this experimental data entails the identification and quantification of proteins, the determination of their cellular location, modifications, interactions and, ultimately, their function. This information is crucial to decipher cellular processes. This strongly motivates our group to develop software and databases that support data analysis and knowledge discovery in cooperation with Life scientists. These resources are made available through the ExPASy server (http://www.expasy.org). Our software tools mainly support experimental mass spectrometry data analysis, focused on the detection of posttranslational modifications. Our databases store knowledge of carbohydrates attached to proteins as well as protein-carbohydrate interactions.

Team

Director
Frédérique Lisacek
MER
H-index: 30

Senior researchers
Dr. Alessandra Gastaldello (until September)
Dr. Josefina Lascano-Maillard (from October)
Dr. Oliver Horlacher (From September to December)

Assistants (PhD students)
Davide Alocci
Emma Ricart
Thibault Robin
Thomas Stricker (co-direction)
François Bonnardel (co-tutelle with University Grenoble-Alpes)

Developers / Designers
Julien Mariethoz

Internship Fellow
Elena Barletta (UNIGE)
Damaris Stevens (UNIGE)

PIG team in 2016

PhD Thesis

- Davide Alocci, An interactive and Integrative view of Glycobiology, September 28th
- Oliver Horlacher, Developing algorithms to automate the identification of posttranslational modification in LC-MS/MS data, February 27th

List of publications

Refereed papers in international journals

[1] Alocci D, Suchankova P, Costa R, Hory N, Mariethoz J, Svobodova R, Toukach P, Lisacek F (2018) SugarSketcher: quick and intuitive online glycan drawing, Special Issue "Advances in Carbohydrate Chemistry", Molecules 23(12): E3206

[2] Clerc O, Mariethoz J, Rivet A, Lisacek F, Perez S, Ricard-Blum S (2018) Extracellular glycobioinformatics/ A pipeline to translate oligosaccharide sequences of glycosaminoglycans into 3D models, Glycobiology 29(1):36-44.

[3] Robin T, Bairoch A, Lisacek F, Lane L (2018) Large-scale reanalysis of proteomics data - An application to the HeLa cell line, J Prot Research 17 (12): 4160–4170.

[4] Mariethoz J, Alocci D, Gastaldello A, Horlacher O, Gasteiger E, Rojas-Macias MA, Karlsson NG, Packer NH, Lisacek F (2018) Glycomics@ExPASy: Bridging the gap, Mol Cell Proteomics 17: 2164–2176

[5] Alocci D, Ghraichy M, Barletta E, Gastaldello A, Mariethoz J, Lisacek F (2018) Understanding the glycome: an interactive view of glycosylation from glycocompositions to glycoepitopes, Glycobiology 28(6):349–362

Books and book chapters

[6] Lisacek F (2018) Proteome Informatics, Encyclopedia of Bioinformatics and Computational Biology, volume 2, pp60-75, Elsevier, ISBN 9780128096338

[7] Bilbao A, Lisacek F (2018) Bioinformatics Support for Farm Animal Proteomics, Proteomics in Domestic Animals: from farm to Systems Biology, pp361-386, eds: AM de Almeida, D Eckersall, I Miller, Springer, ISBN 978-3-319-69681-2

International and national advisory committees

- F. Lisacek member of Scientific Council of Interdisciplinary Sciences & Health Doctoral School (http://ediss.universite-lyon.fr)
- F. Lisacek member of the Advisory Board of the MIRAGE project, http://www.beilstein-institut.de/en/projects/mirage, Beilstein Institute, Frankfurt, Germany
- F. Lisacek member of the Advisory Board of IMforFUTURE (Innovative Training in Methods for Future Data) (H2020-MSCA-ITN-2016-721815)

International and national Research Programs Committees

- F. Lisacek grant submission reviewer, Research Foundation Flanders - FWO (www.fwo.be), Brussels, Belgium, March to June 2018
- F. Lisacek grant submission reviewer, Agence Nationale de la Recherche – ANR (www.agencerecherche.fr), France, May 2018
- F. Lisacek grant submission reviewer, Fonds De La Recherche Scientifique – FNRS (www.fnrs.be), Brussels, Belgium, September 2018

PhD Thesis Committees

- Isabelle Stevant, Member of jury (F. Lisacek), University of Geneva
- Felipe Aristides Simao Neto, Member of jury (F. Lisacek), University of Geneva

Member of conference/workshop program committees

- F. Lisacek in Program committee of NETTAB 2018 (International Workshop NETTAB 2018 «Building a FAIR Bioinformatics environment»), http://www.igst.it/nettab/2018/, Genoa, Italy, October 22th-24th
- F. Lisacek in Program committee of the Joint ICML and IJCAI 2018 Workshop on Computational Biology, https://sites.google.com/view/wcb2018/home, Stockholm, Sweden, July 10th-15th

Refereeing

- F. Lisacek regular reviewer for Journal of Proteome Research (JPR), PROTEOMICS, Journal of Proteomics, Nucleic Acid Research, Bioinformatics, Molecular&Cellular Proteomics, Analytical Chemistry

Editorial Responsabilities

F. Lisacek Editorial Board Member of:

- Glycobiology (Oxford Press)
- PLOS One
- Peer J
- Biochimica et Biophysica Acta (BBA): Proteins and Proteomics (Elsevier)
- Clinical Applications in Proteomics (Wiley)

Invited talks

- EuBIC (European Bioinformatics Community) Developer's Meeting, Ghent, Belgium, January 7-12
- International Life Science Integration Workshop, Tokyo, Japan, March 3-8,
- International Symposium on Glycovirology, Schoental, Germany, May 2-4,
- FEBS (Federation of European Biochemical Societies) Annual Congress, Prague, Czech Republic July 7-11
- International Carbohydrate Symposium, Lisbon, Portugal, July 15-19
- VIIth Warren Workshop, Boston, USA, August 15-18
- GlycoBiotechnology 2018, Manchester UK, September 2-4
- SFEAP (French Society for Electrophoresis and Proteomics Analysis) Annual Meeting, Albi, France, October 9-12
- VIB Conference Series, 29th Joint Glycobiology meeting, Ghent, Belgium, October 21-23

Funded research projects

Participation to European projects

GastricGlycoExplorer: Systems glycobiology of gastric cancer
Partner of ITN (FP7-PEOPLE-2012-ITN)
(coordinator NG Karlsson, Uni. Gothenburg, Sweden)
Period: May 2013 - May 2018

Une étude bioinformatique des lectines, classification et identification dans les génomes
Co-PI with A. Imberty (CNRS-CERMAV) of PhD grant of the Glyco@Alps programme (Initiative d'Excellence, Grenoble Alpes University)
Period: October 2017 - October 2020

CarboMet: Metrology of Carbohydrates for Enabling European Bioindustries
Work Package co-chair of Coordination and Support Action (H2020-FETOPEN-2-2016) coordinated by S. Flitsch (Uni. Manchester, UK).
Period: February 2017 - February 2021

Participation to National projects

Glycomics@ExPASy
Funded by SERI for bioinformatics services via the Swiss Institute of Bioinformatics.
Period: January 2013 - December 2018

NRPomics
Germaine de Staël funding programme of the Swiss Academy of Engineering Sciences (SATW) in collaboration with G. Hopfgartner (Uni. Geneva) and V. Leclère (Uni. Lille, France)
Period: January 2018 – December 2019

Sweet-Home
Glyco-driven modelling of homeostasis in the human gut microbiome
SNSF grant (31003A_179249)
Period: November 2018 - October 2021

The visual dictionary of bacterial glycans
UNIGE-UZH Co-funds in collaboration with T. Hennet (UZH)
Period: September 2018 - September 2019

Approche intégrative pour les glycosciences
UNIGE Co-funds "Alliance Campus Rhodanien" in collaboration with A. Imberty (Uni. Grenoble Alpes) and S. Ricard-Blum (Uni. Lyon 1)
Period: June 2018 - June 2020

Open software and databases

Glycomics@ExPASy
Title of the service/product/process: Glycomics@ExPASy, Bioinformatics services on ExPASy server fully hosted at SIB
Type: Databases + data analysis and search tools
External partners involved in the development (if any): CSEM
External partners involved in the development: University of Gothenburg, Sweden + University of Macquarie, NSW, Australia
Client or End user(s) : Life Science community
Brief description: The Glycomics@ExPASy backend is built on top of three databases (Host-pathogen interactions, Experimental mass spectrometry data of glycans and Glycoproteins). Tools are developed around the databases. They are either dedicated to solve a specific question (information extraction) or can be used in several applications and across the databases (data mining).
Website: http://www.expasy.org/glycomics

Teaching

- **Protein expression and interaction**, Master Biology, 42h, 4 ECTS
- **Introduction to Systems Biology** , Master Biology, 40h, 3 ECTS
- **Elements of bioinformatics**, Master Biology, 42h, 5 ECTS
- **Bioinformatics**, Bachelor Biology, 28h, 2 ECTS
- **Introduction à la programmation des algorithmes**, Bachelor, 28h, 7 ECTS
- Co-organiser of and contributor to the **Master Class in GlycoInformatics** tutorial at the International Carbohydrate Symposium (Lisbon, Portugal), July 15th
- **Principes de fonctionnement des ordinateurs**, 14h, 4 ECTS (Thibault Robin, tutor)
- **Modélisation et simulation de phénomènes naturels**, 14h, 4 ECTS (Thibault Robin, tutor)

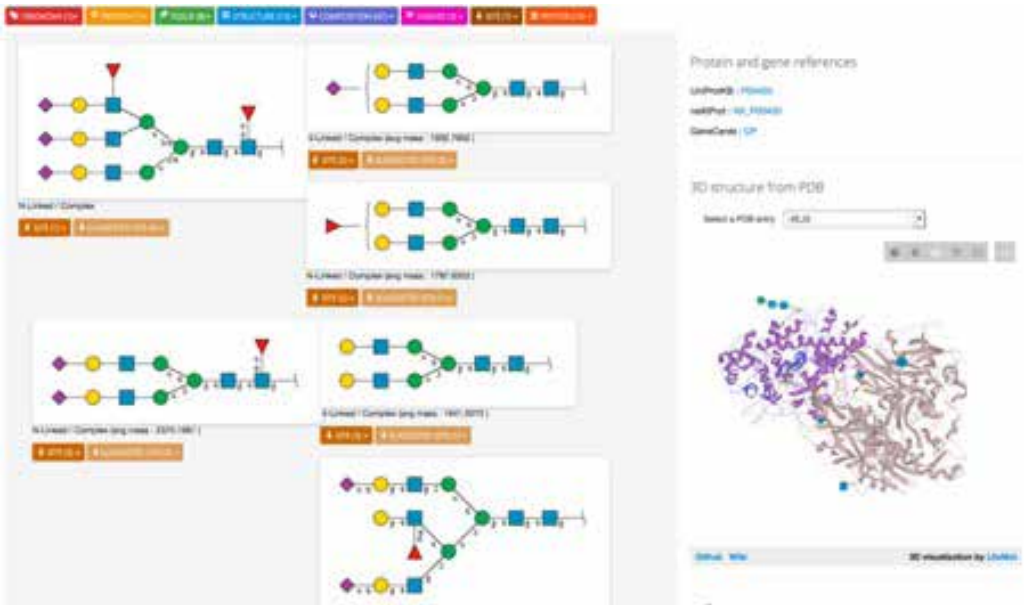


Figure 1: Example record of glycoprotein in our GlyConnect platform with fully interactive interface

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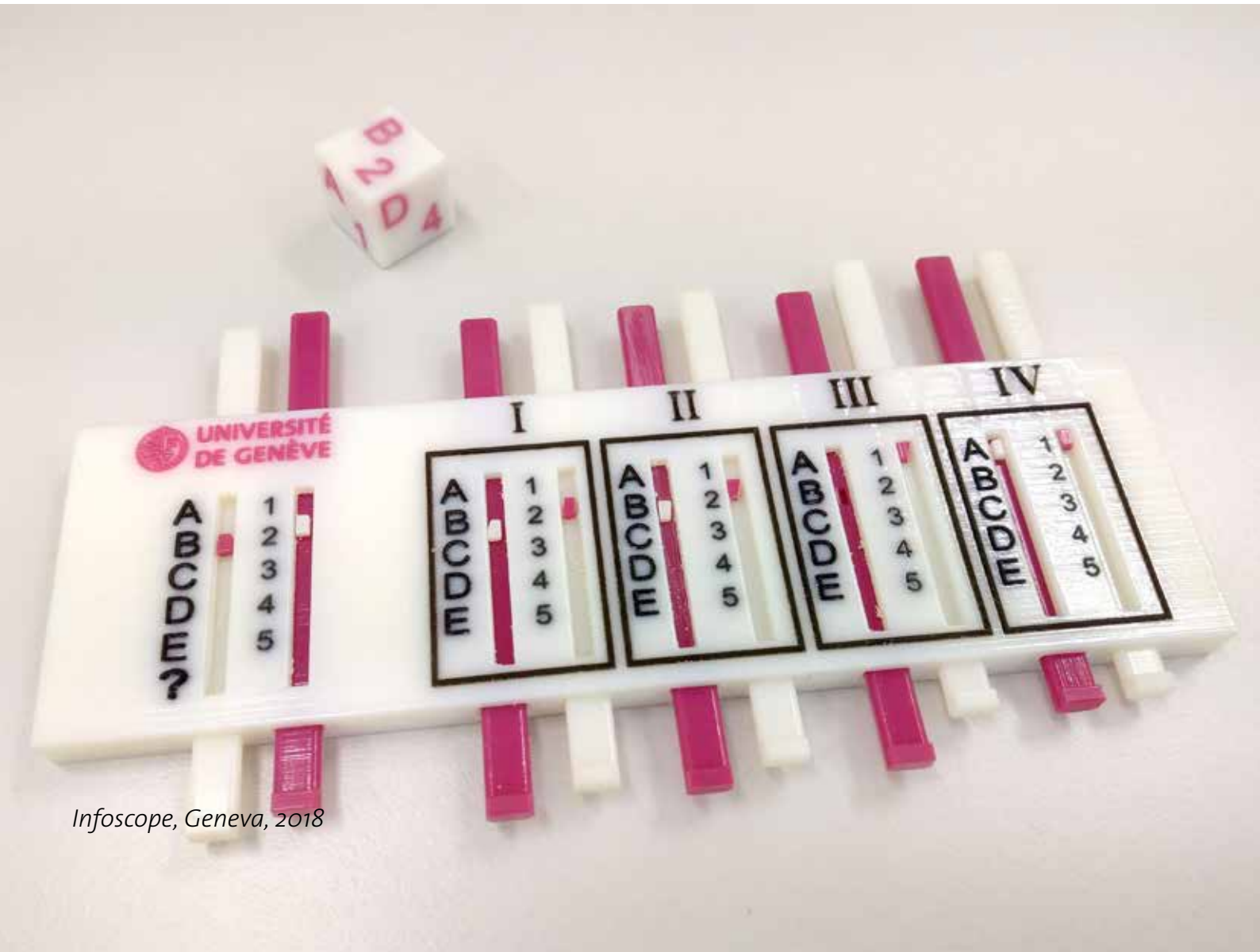
CUI UNI GE

SMV

Software Modeling and Verification



Infoscope, Geneva, 2018

Software Modeling and Verification

Domain activities

Symbolic Model Checking was developed with the idea of verifying complex high level models with a reasonable amount of work for the user. In particular we propose to separate the model to the informations for performing eficiently model checking (clustering, anonymization, partial unfolding). The introduction of new kind of decision diagrams ($\sum$ -DD) based on a generalization of the Shannon decomposition principles allow us to perform model checking for models with huge combinatorial explosion of states (around 10E4500 symbolic states). We are currently exploring the systematic use of rewriting of set of terms principles based on decision diagrams and operational control based on strategies as a metalevel in model checkers.

We currently develop several tools such as StrataGEM for the set rewriting principles, Stew as an abstraction over StrataGEM and Ardoises a meta-environment for managing formalisms and their veri cation tools. We also continue to organize a model checking contest in the conference Petri Nets in order to be able to compare existing model checkers on significant benchmarks. We also study programming language construction that check that the use of memory is alias safe. This language SafeScript is extending JavaScript in an elegant way. We also develop methods to adapt our formalisms (CREST) to the domain of modeling and verification of cyber-physical systems.

Several application domain have been covered by the team such as the development of a domain specific language for computing on sets (Trexmo Tool for the SECO). This language is applied successfully for expressing various models of toxicology analysis in the context of health in the workplace.

Team

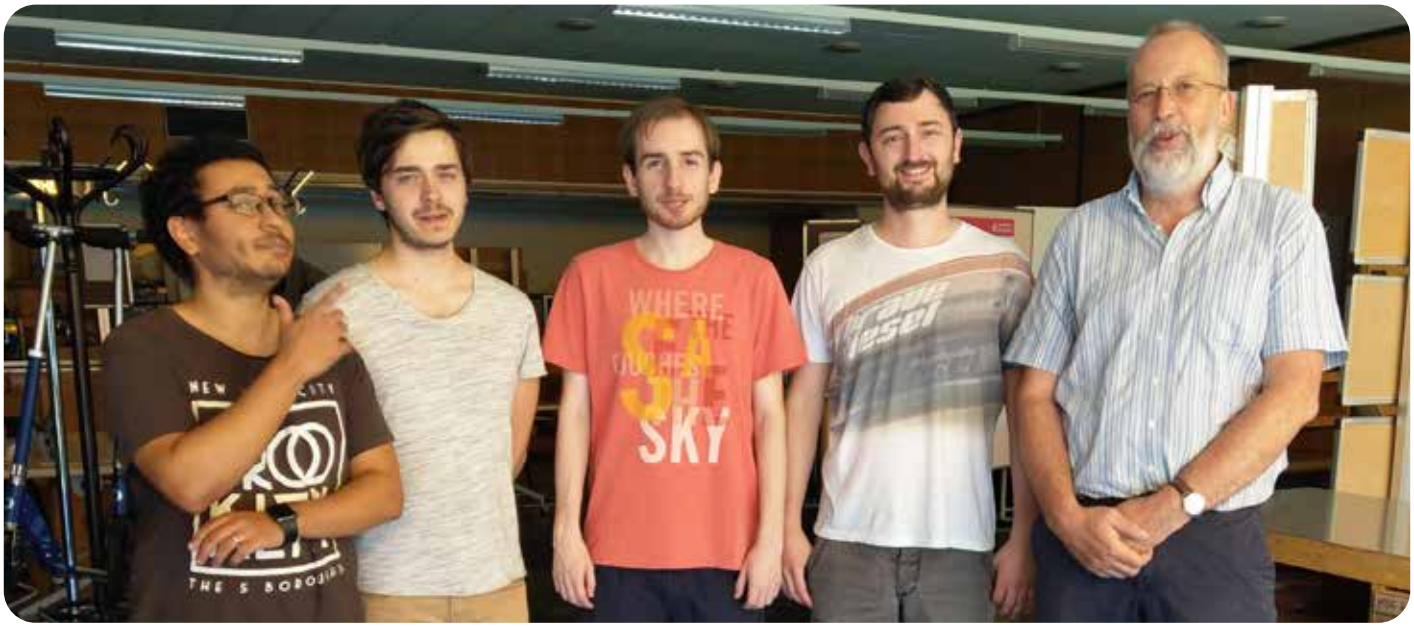
Director
Didier Buchs
Full professor
H-index: 19

Senior researchers
Dr. Alban Linard
Dr. Steve Hostettler

PhD students
Sahar Aljalbout
Eric Harth
Stefan Klikovits
Dimitri Racordon

Administration
Maëlle Saintilan

SMV team in 2019 (from left to right): Dimitri Racordon, Guillaume Marthe (internship), Damien Morard, Stefan Klikovits, Didier Buchs



PhD Thesis

- Eric Harth, Program Understanding: The Narrative Hypothesis, January 2019, co-director Dr. Ph. Dugerdil

List of publications

Refereed papers in international journals

[1] Bruno Barroca and Vasco Amaral and Didier Buchs, Semantic languages for develop- ing correct language translations, Software Quality Journal, 26(2), pp: 417-453. 2018, https://doi.org/10.1007/s11219-016-9352-4

Full refereed papers in Conference Proceedings

[2] Dimitri Racordon, Didier Buchs, A Practical Type System for Safe Aliasing, ACM SIGPLAN International Conference on Software Language Engineering , Boston, Nov 2018.

[3] Stefan Klikovits, Alban Linard and Didier Buchs, CREST - A DSL for Reactive Cyber-Physical Systems, 10th SAM2018 - Languages, Methods, and Tools for Systems Engineering, Copenhagen, october 2018.

[4] Stefan Klikovits, Alban Linard, Dimitri Racordon, Didier Buchs: Petri Sport: A Sport for Petri Netters. PNSE@Petri Nets/ACSD 2018: 35-56

[5] Didier Buchs, Stefan Klikovits, Alban Linard, Romain Mencattini, Dimitri Racordon: A Model Checker Collection for the Model Checking Contest Using Docker and Machine Learning. Petri Nets 2018: 385-395

Conference organization as chair or co-chair

- Didier Buchs, General Chair of Model Checking Contest @ Petri Nets 2018, june 2018, Bratislava.

Member of conference program committees

- Program Committee of Petri Nets 2018, june 2018, Bratislava, Slovakia.

Funded research projects

Participation to European projects

Multi-Paradigm Modelling for Cyber-Physical Systems (MPM4CPS)
ICT COST Action IC1404
COST action management committee
Period: 2014 - 2018
Website: http://www.mpm4cps.eu/

Participation to National projects

CPS-MOVE: Cyber Physical Systems Modeling and Verification
Hasler Project
Period: 2016 - 2019

Stratos
Strategy based Term Rewriting for Analysis and Testing Of Software
FNFS 156068
Partners: Didier Buchs (UNIGE)
Period: April 2015 - March 2018

Others

- Commission du DIP, de constitution du plan d'étude pour enseignement de l'informatique au collège.
- Commission de SwissUniversities de constitution du plan d'étude de Master de
- Fribourg , pour les enseignants d'informatique au collège.

Refereeing

- D. Buchs: Journal of Software and Systems Modeling, 2016

Editorial Responsabilities

- LNCS Transactions on Petri Nets and Other Models of Concurrency (ToPNoC) Editorial Board, Springer Verlag .
- SoSym, editorial board.

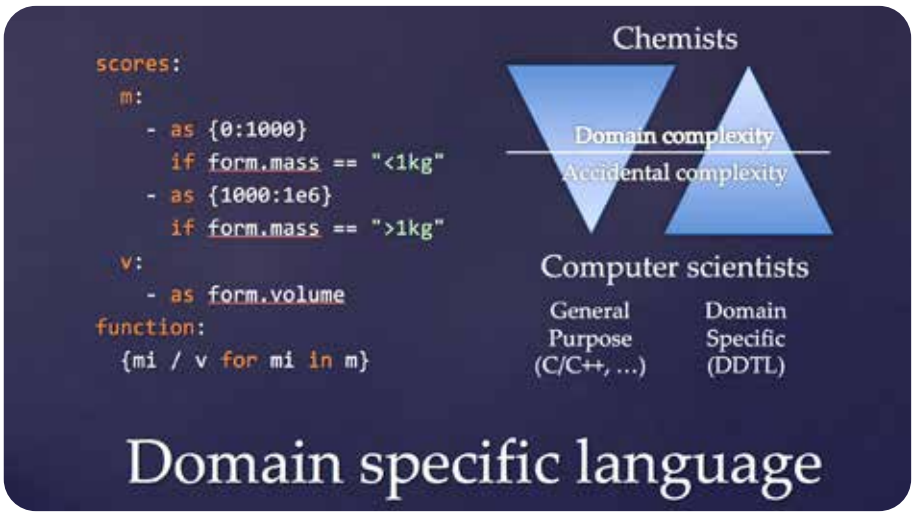


Figure 1: TREXMO is a tool built for chemical safety assessment, using multiple models of exposure. It is the result of a joined effort between the University of Geneva, the Institute for Work and Health and the State Secretariat for Economic Affairs.

Because the result of these models can vary for a given situation, it is desirable to have a tool able to run a scenario against multiple models with little to no user overhead. However, building such a tool can be rather complex, because of the complexity induced by the models translations, which is beyond the expertise of chemists.

In order to address this issue, we offered them a domain specific language that hides out this "accidental complexity" and let them deal with their "domain complexity".

Teaching

- **Software Engineering Course**, Computer Science, Bachelor, 4 ECTS, 56 hours, 14 students
- **Formal Tools for Modelling Systems**, Computer Science, Bachelor, 4 ECTS, 56 hours, 60 students
- **Semantics of Programming Languages**, Computer Science, Bachelor, 4 ECTS, 56 hours, 20 students
- **Modeling and Verification**, Computer Science, Master, 4 ECTS, 56 hours, 20 students
- **Advanced Formal Tools** (Optional), Computer Science, Master, 4 ECTS, 56 hours, 4 students
- **Computer Science Project**, Computer Science, 3rd year Bachelor, 28h course and 56h. lab work, 15 students

Figure 2: Synchronisation diagrams for the co-simulation in cyber-physical systems (PN= Petri net model, CBD= causal block diagram)

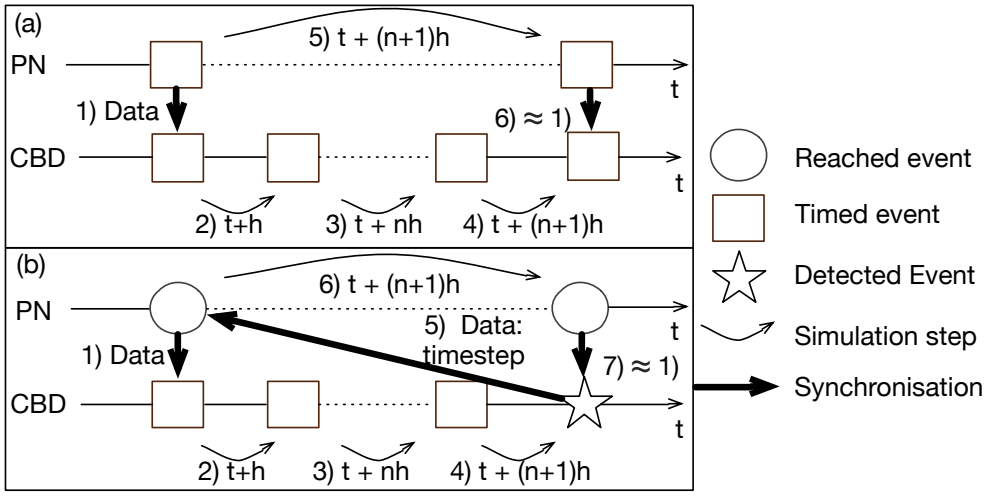
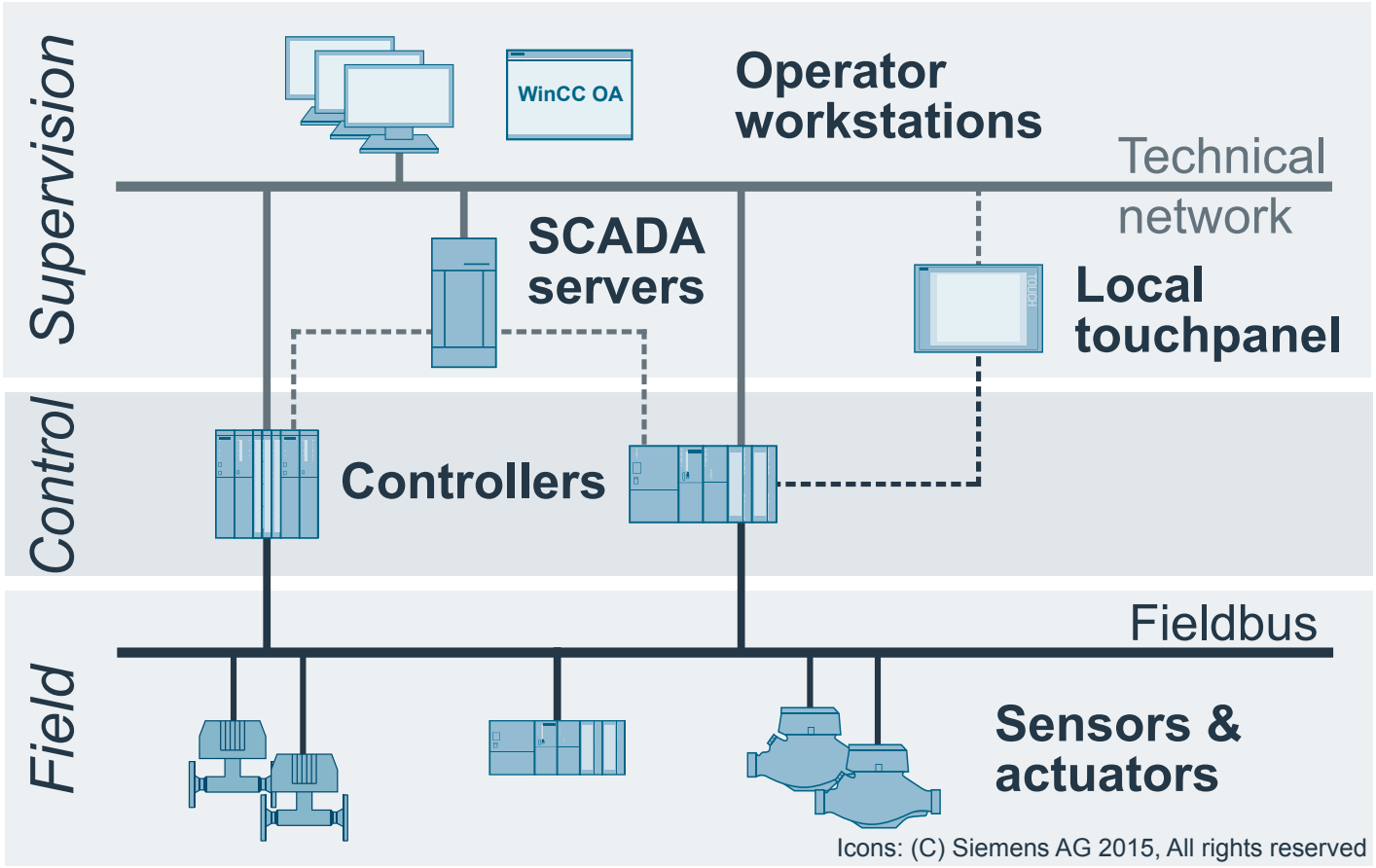


Figure 3: Layer model depicting the connection of field objects, frontend controllers (e.g. PLCs) and Operator Work Stations through SCADA (Supervisory Control and Data Acquisition) applications at CERN LHC



spc.unige.ch

SPC

Scientific and Parallel Computing

TecDay, Collège de Candolle, Geneva, 2019 April 4th

Scientific and Parallel Computing

Websites: http://spc.unige.ch - http://cui.unige.ch/~chopard - http://epicells.unige.ch

Domain activities

A main research activity concerns the study of complex systems, in particular the development of new numerical methods to model and simulate phenomena in natural sciences, economics, social systems and bio-medical applications. Cellular automata, Lattice Boltzmann and multi-agent techniques are central tools to address theses questions. Parallel programs and algorithms are developed to implement the simulation on large PC clusters, supercomputers or GPUs to discover, explain or reproduce new phenomena. In particular we keep developing and improving the PALABOS software, a powerful open-source Lattice Boltzmann solver. We are also strongly involved in the development of HPC resources for UNIGE, in particular through our active participation to CADMOS and the management of the university cluster Baobab.

Biomedical applications and multiscale problems are an important research direction. In the H2020 CompBioMed we are partner of a center of excellence for High Performance biomedical simulations. In particular we developed numerical models for the transport of red blood cells and platelets, in order to study various pathologies.

We have started a new H2020 projecet, INSIST (IN-Silico trials for treatment of acute Ischemic Stroke) whose goal is to build a population of virtual patients on which new treatment for stoke (thrombolysis or thrombectomy) can be tested in-silico. We also develop the modeling of biological tissues, both as the continuation of the SystemX EpiPhysX project that with a new FNS Sinergia project.

Team

Director
Bastien Chopard
Full professor
H-index: 46

Senior researchers
Dr. Jean-Luc Falcone
Dr. Jonas Latt
Dr. Orestis Malaspinas

PhD students
Anthony Boulmier
Federico Brogi
Gregor Chliamovitch
Raphaël Conradin
Christos Kotsalos
Pierre Kunzli
Sha Li
Francesco Marson
Aziza Merzouki
Yann Thorimbert

Administration
Anne-Isabelle Giuntini

SPC team in 2018

PhD Thesis

- Aziza Merzouki, Numerical Modeling of confluent cell monolayers: study of tissue mechanics and morphogeneis, May 4th, 2019.

List of publications

Refereed papers in international journals

[1] Thorimbert, Y., Marson, F., Parmigiani, A., Chopard, B., & Lätt, J. (2018). Lattice Boltzmann simulation of dense rigid spherical particle suspensions using immersed boundary method. Computers & Fluids, 166, 286-294.

[2] Dutta, R., Chopard, B., Lätt, J., Dubois, F., Boudjeltia, K. Z., & Mira, A. (2018). Parameter estimation of platelets deposition: Approximate Bayesian computation with high performance computing. Frontiers in physiology, 9.

[3] Chopard, B., Falcone, J. L., Kunzli, P., Veen, L., & Hoekstra, A. (2018). Multiscale modeling: recent progress and open questions. Multiscale and Multidisciplinary Modeling, Experiments and Design, 1(1), 57-68.

[4] Li, S., Latt, J., & Chopard, B. (2018). The application of the screen-model based approach for stents in cerebral aneurysms. Computers & Fluids. Volume 172, Pages 651-660, https://doi.org/10.1016/j.compfluid.2018.02.007

[5] Quax, R., Chliamovitch, G., Dupuis, A., Falcone, J. L., Chopard, B., Hoekstra, A. G., & Sloot, P. (2018). Information processing features can detect behavioral regimes of dynamical systems. Complexity, 2018.

[6] Kaufmann, L., Razakanirina, R., Groen, D., & Chopard, B. (2018). Impact of immigrants on a multi-agent economical system. PloS one, 13(5), e0197509.

[7] Leclaire, S., Latt, J., Vidal, D., & Bertrand, F. (2018). Multiphase periodic pressure difference boundary condition enhanced by a proportional-integral-derivative controller for the lattice Boltzmann method. International Journal for Numerical Methods in Fluids, 88(9), 434-446.

[8] Aziza Merzouki, Orestis Malaspinas, Aanastasiya Trushko, Aurélien Roux and Bastien Chopard. Influence of cell mechanics and proliferation on the buckiling of simulated tissues using a vertex model. Nat Comput. 2018, vol 17(3) pp 511--519. https://doi.org/10.1007/s11047-017-9629-y.

[9] Sha Li, Jonas Latt and Bastien Chopard. Model for pressure drop and flow deflection in the numerical simulation of stents in aneurysm. International Journal for Numerical Methods in Biomedical Engineering. DOI: 10.1002/cnm.2949, 2018, vol 34, c22949

[10] Alfons G. Hoekstra, Bastien Chopard, David Coster, Simon Portegies Zwart and Peter Coveney. Multiscale Computing for Science and Engineering in the Era of Exascale Performance, Phil. Trans. R.Soc A377, 20180144. DOI 10.1098/rsta.2018.0144.

[11] Gregor Chliamovitch and Yann Thorimbert. Turbulence through the Spyglass of Bilocal Kinetics Entropy 2018, 20(7), 539; https://doi.org/10.3390/e20070539

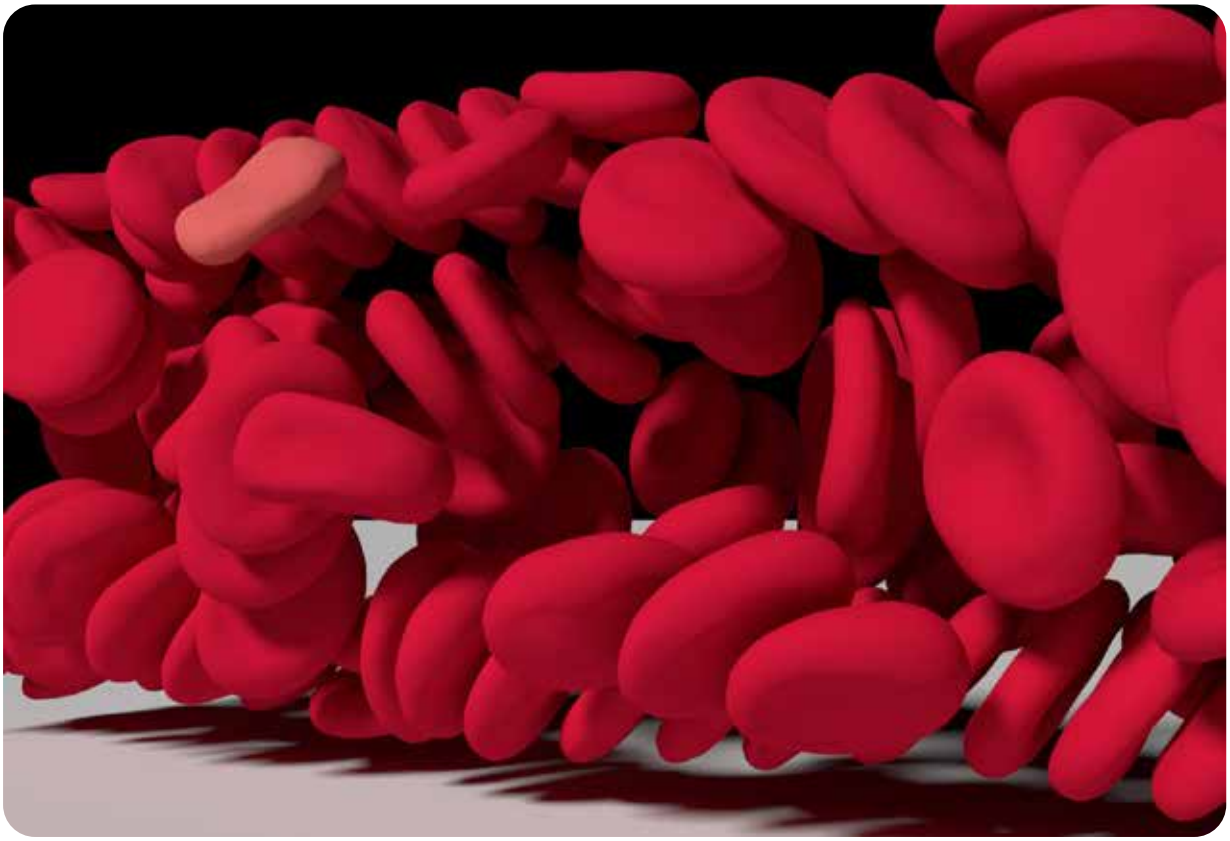
Full refereed papers in Conference Proceedings

[12] Pierre Kunzli, Jean-Luc Falcone, Eduardo Rossi, Paul Albuquerque, Bastien Chopard. HPC multiscale simulation of transport and aggregation of volcanic particles. 17th International Symposium on Parallel and Distributed Computing. DOI 10.1109/ISPDC2018.2018.00013, 2018.

Books and book chapters

[13] Chopard, Bastien, and Marco Tomassini. An Introduction to Metaheuristics for Optimization. Springer, 2018.

Figure 1: Blood cells (Jonas Latt)



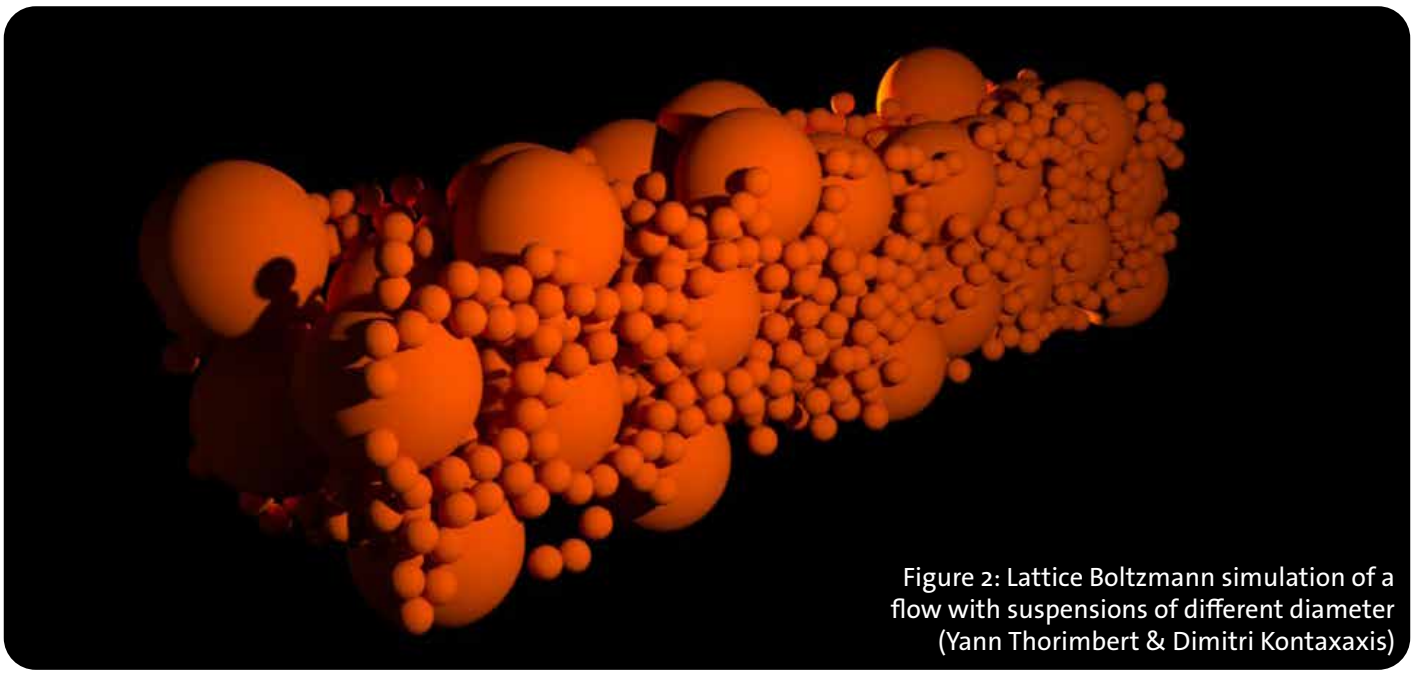


Figure 2: Lattice Boltzmann simulation of a flow with suspensions of different diameter (Yann Thorimbert & Dimitri Kontaxaxis)

International and national advisory committees

- TAC for Anna Stopka, ETHZ, Basel

International and national Research Programs Committees

Scientific evaluation of three international project:

- CECAM (EU)

PhD thesis committees

- Djorge Grbirc, external examiner, UNIGE
- Antonio Martin external examiner, UNIGE
- Roman Kanala external examiner, UNIGE
- David Alocci external examiner, UNIGE

Conference organization as chair or co-chair

- Chair of minisymposium HPUQ at PASC 2018 Basel, July 2-4
- CADMOS Day, Geneva, Nov 2018.

Member of conference program committees

- DSFD, July 2018, USA
- ICCS 2018, June 11-13 Wuxi China
- ISPDC 2018, Geneva, June 25-28

Funded research projects

Participation to European projects

CompBioMed: A Centre of Excellence in Computational Biomedicine
H2020-EU.1.4.1.3, grant agreement No 675451
Partners: University College London, University of Edinbugh, Barcelona Supercomputing Center, University of Geneva, CBK Sci Con Limited, LifeTec Group, Evotec AG, Janssen, University of Amsterdam, SURFsara, University of Oxford, University of Sheffield, University Pompeu Fabra, Acellera, Bull (atos)
Web Site: http://www.compbiomed.eu/
Period: October 2016 - September 2019

INSIST: IN-Silico trials for treatment of acute Ischemic Stroke
H2020, grant agreement No 777072
Partners: Academic Medical Center (Amsterdam, The Netherlands), University of Amsterdam (The Netherlands), Erasmus Medical Centre (The Netherlands), University of Oxford (UK), Neuravi (Ireland), National University of Ireland Galway (Ireland), Catholic University of Leuven (Belgium), Politecnico di Milano (Italy), University of Geneva (Switzerland), Institut de Recherches Internationales Servier (France), Lomonosov Moscow State University (Russia)
Website: https://www.insist-h2020.eu/
Period: 2017 - 2021

Participation to National projects

Virtual Physiological Blood: an HPC framework for blood flow simulations in vasculature and in medical devices
PACS Project
Principal Investigator: Petros Koumoutsakos (ETH Zurich)
Co-Principal Investigators: Bastien Chopard, Mauro Pezzè
Period: July 2017 - June 2020
Web: https://www.pasc-ch.org/projects/2017-2020/virtual-physiological-blood/

Direct numerical simulation of three-phase crystallien suspensions in magmatic flows
FN 200021_165984
Principal Investigator: Jonas Latt
Period: June 2016 - May 2018

A 3D Cell-Based Simulation Framework for Morphogenetic Problem
SNF Sinergia project 170930
Partner: ETHZ
Period: 2017 - 2021

Modeling settling-driven gravitational instabilities from volcanic clouds
SNF 200021_169463
Principal Investigator: Costanza Bonadonne
Period: 3 years

Others

Refeereeing

- Reviewer for many intenational journals

Editorial responsibilities

- Int. J. of Mod Phys, Editorial Board Member
- J. of Computational Sciences (JoCS), Editorial Board Member
- J. of Cellular Automata, Editorial Board Member
- Natural Computing Journal (NACO), Editorial Board Member

Events organised in Geneva

- CADMOS Day, Campus Biotech, Geneva, Nov 23th, 2018

Invited talks

- Blood flow: how much do we understand it?, Workshop on Microscopic Simulation and Cell Experiments for Biological Systems, University of Tokyo, Feb 23th, 2018
- A Physical Description of Platelets Deposition: towards new platelet function tests, VHeart workshop, 28th March 2018, Amsterdam
- PASC 2018 July, 2nd-4th Basel, Combining clinical observations, mathematical modeling and HPC Approxiamate Bayesian computations for developing new diagnosis techniques.
- A framework for Multiscale-Multiscience modeling and simulations, Workshop on multiscale modeling, Lorentz Center, April 6th-20th, 2018 Leiden (NL)
- Cellular Automata for the modeling of natural phenomena, Tutorial at ACRI 2018, Como, Sept 17th

Teaching

- **Méthodes Heuristiques d'apprentissage et d'optimisation**, Computer Science, Master, 6 ECTS, 70 hours, 20 students
- **Parallelisme**, Computer Science, Bachelor, 4 ECTS, 56 hours, 15 students
- **Algorithmique**, Computer Science, Bachelor, 4 ECTS, 56 hours, 15 students
- **Algorithme paralleles/probabilistites**, Computer Science, Master, 4 ECTS, 56 hours, 6 students
- **Modélisation et simulation de phénomènes naturels**, Computer Science, Master, 4 ECTS, 56 hours, 15 students
- **Systèmes Informatiques fonctionalités**, Computer Science, Bachelor, 84 hours, 5 ECTS, 15 students
- **Programmation pour biologistes**, Computer Science, Bachelor, 84 hours, 3.5 ECTS, 58 students
- **Introduction à l'infromatique pour mathématiciens**, Computer Science, Bachelor, 75 hours, 4 ECTS, 40 students
- **CADMOS HPC Course**, Computer Science, Advanced Course, 20 hours, 20 students

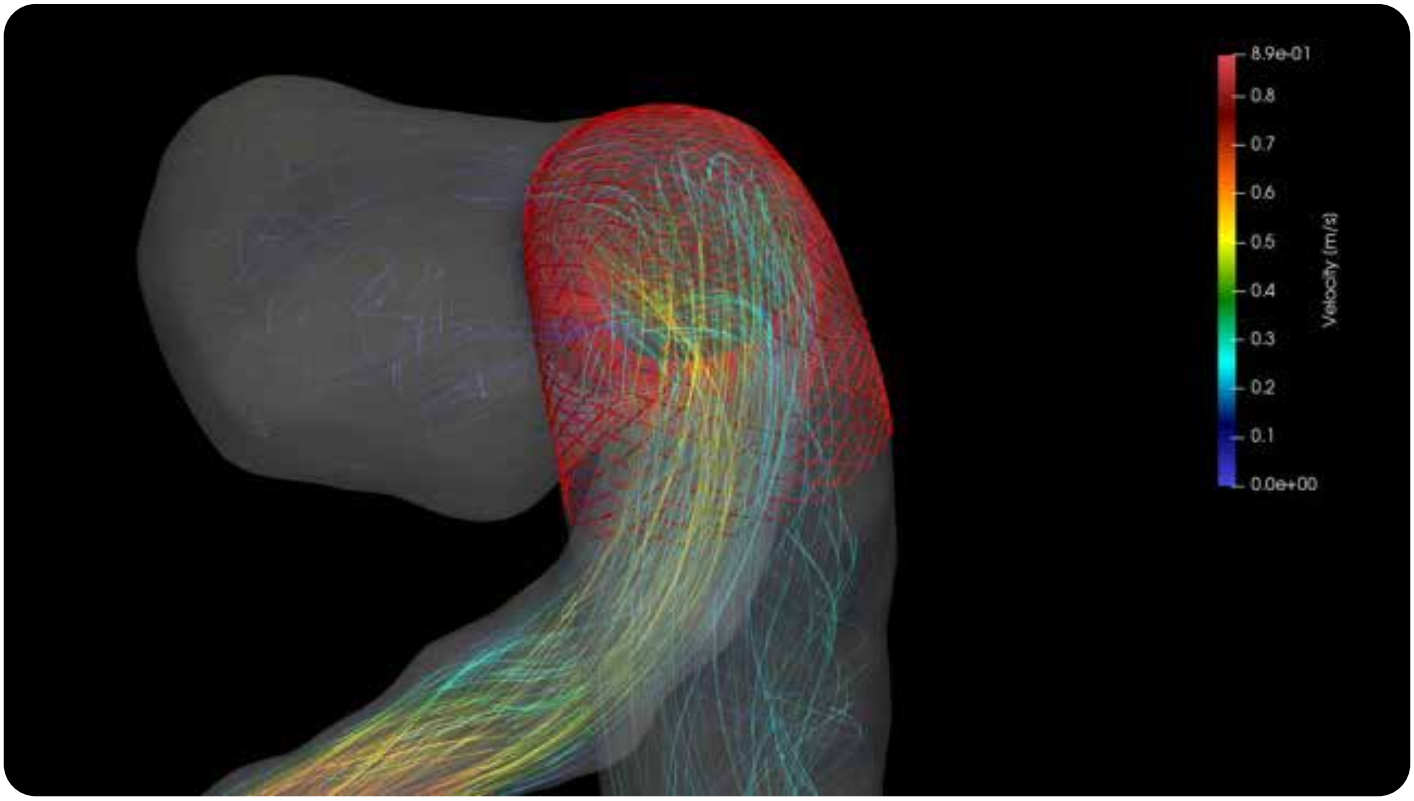


Figure 3: bloodflow in a cerebral aneuyrsm with a flow diverter (Sha Li & Dimitri Kontaxaxis

tcs.unige.ch

TCS

Theoretical Computer Science

Infoscope, Geneva, 2018

Theoretical Computer Science

Domain activities

Experimental driven research on Topology Control Protocols for Wireless Sensor Networks (WSN) using transmission power and throughput rate feedback schemes. The goals include link qualification in terms of symmetry and coherence and link quantification. Transmission power constitutes the link «generator» and throughput rate the link «regulator» to meet the qualitative and quantitative criteria for links between WSN nodes .

Research on designing a geographic routing algorithm for large scale networks, which is an extension to the Virtual Raw Anchor Coordinate localization based geographic routing. The goal is to perform routing in wireless ad-hoc network in a hierarchical manner, where in the top level routing is done between two geographic regions and in the bottom level performing routing to the exact node. A randomized protocol is designed and evaluated with simulations.

Design of a distributed publish/subscribe algorithm for an ubiquitous sensing scenario. We consider unstructured and free-geocoordinates sensing networks in which no network protocol is provided. Our solution, which avoids implying all the nodes of the network in the dissemination process, uses a distributed notification service defined by Directional Random Walks (DRW). A DRW is a probabilistic technique able to go forward into the network following a loop-free path. The principle assumed in our research is that two lines in a plane cross.

Also research on Future Networks, Internet of Things and Crowdsensing. Our efforts focus on problem modeling aspects and incentive formulation regarding the crowd participation in tasks that aim at optimizing spatial and temporal coverage issues.

Also, research on radiation aware wireless networking; studying the cumulative impact on ERM caused by multiple wireless sources in terms of numbers, topology, protocol, etc.

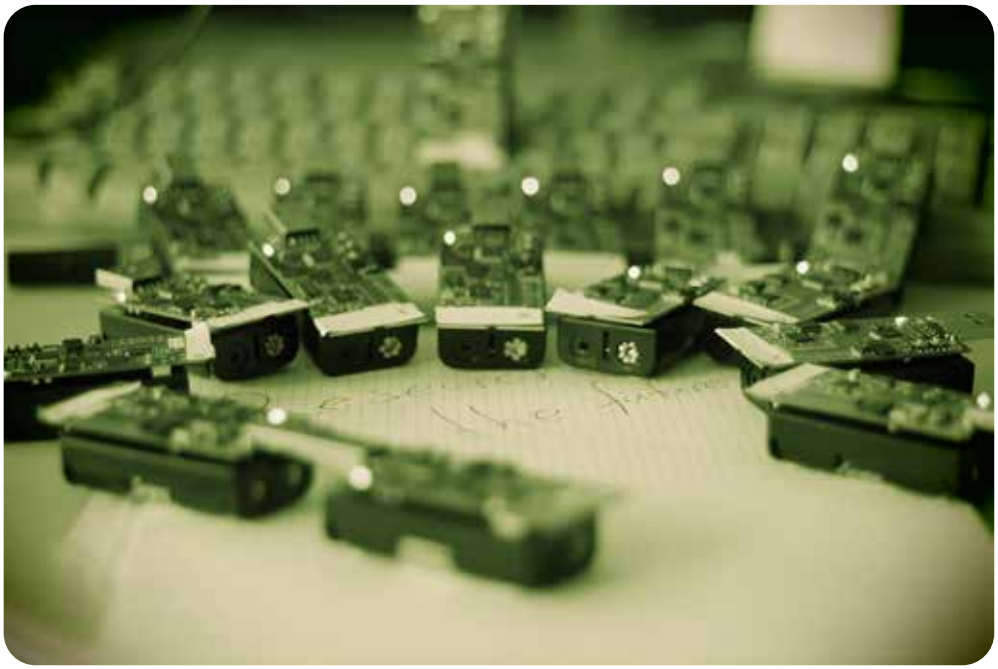


Figure 1: Testing experimental algorithms and models on Wireless Sensor Networks (WSN)
© Orestis Evangelatos

Team

Director
José Rolim
Full professor
H-index: 27

Senior researchers
Prof. Sotirios Nikoletseas (invited prof.)
Dr. Pierre Leone (MER)
Dr. Konstantinos Marios Angelopoulos
Dr. Marios Karagiannis
Dr. Ricardo Wehbe

Senior Lecturer
Eduardo Solana

Assistants (PhD students)
Julia Buwaya
Stéphane Kündig

Administration
Coralie Grossrieder

List of publications

Refereed papers in international journals

[1] Rendezvous search with markers that can be dropped at chosen times, P Leone, S Alpern, Naval Research Logistics (NRL) 65 (6-7), 449-461

[2] Hosseini, M., Angelopoulos, C.M., Chai, W.K., Kündig, S. (2018). Crowdcloud: a crowdsourced system for cloud infrastructure. Cluster Computing, 1-16, ISSN 1573-7543

[3] Luca Luceri, Felipe Cardoso, Michela Papandrea, Silvia Giordano, Julia Buwaya, Stéphane Kündig, Constantinos Marios Angelopoulos, José Rolim, Zhongliang Zhao, Jose Luis Carrera, Torsten Braun, Aristide C.Y. Tossou, Christos Dimitrakakis, Aikaterini Mitrokotsa, VIVO: A secure, privacy-preserving, and real-time crowd-sensing framework for the Internet of Things, Pervasive and Mobile Computing, Volume 49, 2018, Pages 126-138, ISSN 1574-1192

Full refereed papers in Conference Proceedings

[4] Stephane Kündig, Marios Angelopoulos, Jose Rolim. Modelled Testbeds: Visualizing and Augmenting Physical Testbeds with Virtual Resources. Proceedings of the International Conference on Information Technology and Systems (ICITS 2018), pp.804-812, 10.1007/978-3-319-73450-7_76

[5] Luca Luceri, Felipe Cardoso, Michela Papandrea, Silvia Giordano, Julia Buwaya, Stéphane Kündig, Constantinos Marios Angelopoulos, José D. P. Rolim, Zhongliang Zhao, Jose Luis Carrera, Torsten Braun, Aristide C. Y. Tossou, Christos Dimitrakakis, Aikaterini Mitrokotsa:

[6] VIVO: A secure, privacy-preserving, and real-time crowd-sensing framework for the Internet of Things. Pervasive and Mobile Computing 49: 126-138 (2018)

Books and book chapters

[7] Eric Blais, Klaus Jansen, José D. P. Rolim, David Steurer: Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques, APPROX/RANDOM 2018, August 20-22, 2018 - Princeton, NJ, USA. LIPIcs 116, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik 2018, ISBN 978-3-95977-085-9

Conference organization as chair or co-chair

Jose Rolim

- DCOSS 2018 IEEE International Conference on Distributed Computing in Sensor Systems, New York, US ,May 2018 - chair steering committee
- APPROX 2018 – 21st International Workshop on Approximation Algorithms for Combinatorial Optimization Problems – Princeton, August 2018 - chair steering committee
- RANDOM 2018 – 22nd International Workshop on Randomization and Computation –– Paris, August 2018 -chair steering committee
- SEA 2018– 17th International Symposium on Experimental Algorithms –May 2018 –L'Aquila – Italy - chair steering committee
- ALGOSENSORS 2018 - 14th International Workshop on Algorithms for Sensor Systems, Wireless Ad Hoc Networks and Autonomous Mobile Entities –Helsinki, Finland - member steering committee
- IPDPS 2018 – 30th IEEE International Parallel & Distributed Processing Symposium. May 2018, Vanncouver, CA - member steering committee

Member of conference program committees

Jose Rolim

- Wireless Sensor Technologies and Applications (WSTA'18) – Bangalore, India
- 4th INTERNATIONAL CONFERENCE ON ELECTRONIC DESIGN 2018 – Malaysia

Pierre Leone

- 13th International Conference on Software Technologies, ICSOFT 2018, 26-28 July, Porto, Portugal
- 7th International Conference on Theory and Practice in Modern Computing, TPMC 2018, 18-20 July, Madrid, Spain
- 17th International Conference on Ad-Hoc Networks and Wireless - AdHoc-Now 2018, September 5-7, St Malo, France
- 14th International Conference on Distributed Computing in Sensor Systems, DCOSS 2018, June 18 - 20, 2018, Bronx, New York, U.S.A., Organizing Committee
- The Seventh International Conference on Advances in Vehicular Systems, Technologies and Applications VEHICULAR 2018 June 24, 2018 to June 28, 2018 - Venice, Italy
- The Tenth International Conference on Evolving Internet INTERNET 2018 June 24, 2018 to June 28, 2018 - Venice, Italy
- The 16th ACM International Symposium on Mobility Management and Wireless Access (MobiWac 2018) October 28th to November 2nd 2018 in Montreal, Canada
- The Twelfth International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies, UBICOMM 2018 November 18, 2018 to November 22, 2018 - Athens, Greece

Julia Buwaya

- 43nd International Symposium on Mathematical Foundations of Computer Science, Liverpool, August 27-31, 2018

Funded research projects

Participation to National projects

Swiss Sense Synergy
FNSR CRSII2-154458
Principal Investigator: José Rolim
Partners: University of Bern, University of Applied Sciences and Arts of Southern Switzerland (SUPSI), Chalmers University of Technology
Website: http://www.swiss-sense-synergy.ch
Period: January 2015 - March 2018

Others

Refeereeing

Pierre Leone

- Theoretical Computer Science Journal, TCS.
- Springer Computing, COMP
- Ad Hoc Networks

Editorial responsibilities

Pierre Leone

- Member of the Editorial Board of the Ad-Hoc Sensor and Wireless Networks, http://www.oldcitypublishing.com/journals/ahswn-home/ahswn-editorial-board/
- Member of the Editorial Board of the journal Algorithms, http://www.mdpi.com/journal/algorithms

Invited talks

- 18th International Symposium on Dynamic Games and Applications July 9-12, 2018, Session on Search, Patrolling and Rendezvous, Pierre Leone Search-and-Rescue Rendezvous

Others

- Organisation de l'école d'hiver de la CUSO, Modelling of knowledge and the cyber-physical systems, February 5 - February 9, 2018 Champéry, Switzerland (Pierre Leone, Gilles Falquet, Didier Buchs)
- Contribution to the ITU-T standard, approved in December 2018, Y.4205 «Requirements and reference model of IoT-related crowdsourced systems» (Stéphane Kündig).
- Development of the workshop "Citizen Science and Smartphones" for high schools, regularly booked on the InfoScope site of the University of Geneva (Julia Buwaya)
- Full scholar of the "Women in Theory" workshop at Harvard University, June 19-22, 2018
- Mentoring of 4 high school interns (October 18-22, 2018)

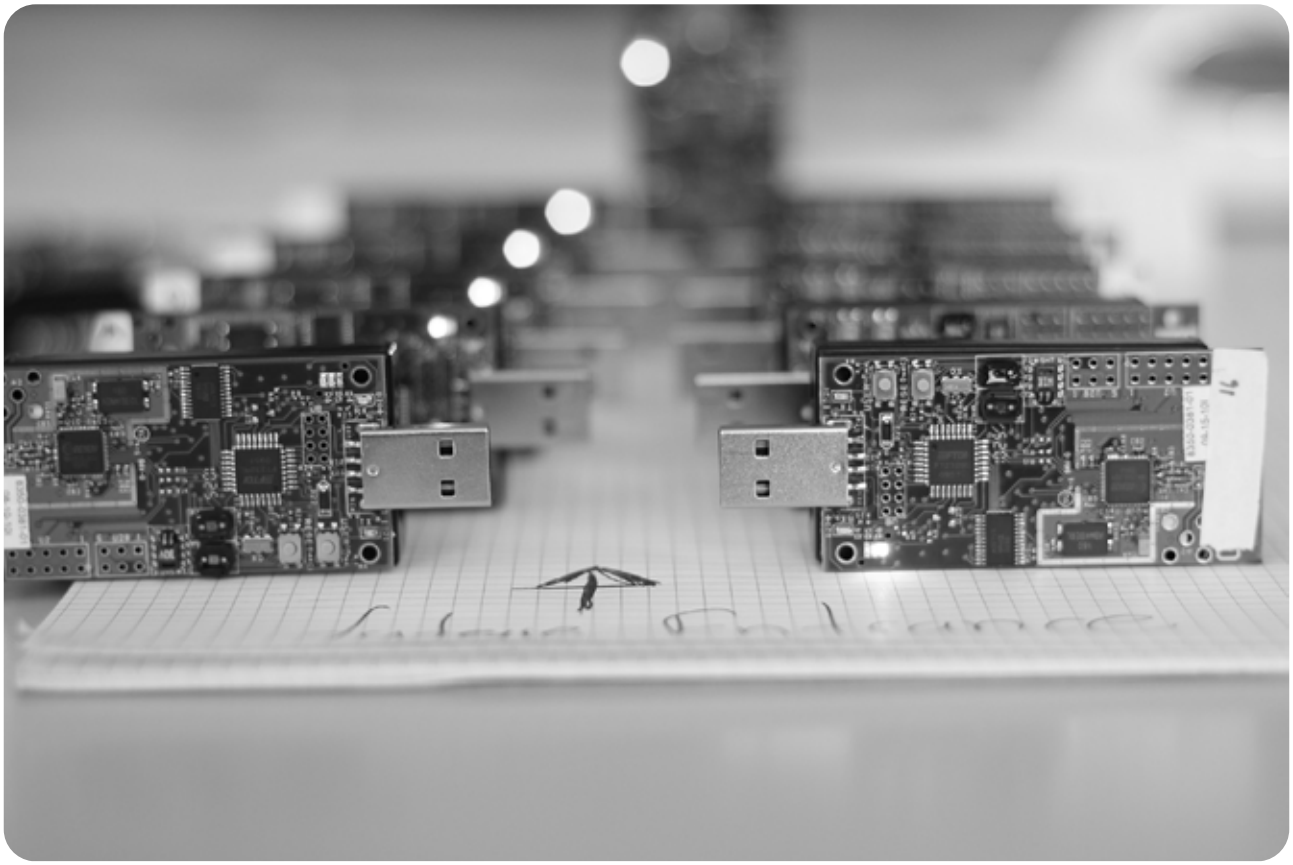
Courses and tutorials

- Julia Buwaya : Mentoring semester project of student Amirhossein Heidari

Teaching

- **Complexité et calculabilité**, Computer Science, Bachelor, TP, 4 ECTS, 56 hours, 41 students
- **Langages Formels**, Computer Science, Bachelor, TP, 4 ECTS, 56 hours, 89 students
- **Modélisation des systèmes d'information et des services**, Computer Science, Bachelor, 6 ECTS, 56 hours, 65 students
- **Algorithmique**, Computer Science, Bachelor, 4 ECTS, 56 hours, 40 students
- **Algorithmes distribués pour réseaux de capteurs sans fils**, Computer Science, Bachelor, 4 ECTS, 56 hours, 6 students
- **Cryptographie et sécurité**, Computer Science, Bachelor, 4 ECTS, 56 hours, 35 students
- **Securité des Systèmes Informatiques**, Computer Science, Master, 4 ECTS, 56 hours, 10 students

Figure 2: Designing Topology Control Protocols for Wireless Sensor Networks (WSN) © Orestis Evangelatos



Highlights

Dicty - Social Amoeba Dictyostelium discoideum as an Inspiration for Higher-Order Emergence in Collective Adaptive Systems

G. Di Marzo Serugendo / ISS

Figure 1: Slugs merging behaviour with kilobots

Understanding collective behavior in nature and its potential links to the engineering of collective artificial behavior attracts many researchers from biology, computer science, and swarm robotics. It impacts different scientific and industrial topics such as cell-biology, cancer study, environment cleaning, swarms of drones, unmanned robots, and more generally collective adaptive systems based on IoT or massive ICT deployment. For instance, cancer cells exhibit collective behaviors, biomedicine researchers look for different examples from nature to design anti-cancer drugs to shrink tumors in human bodies. An interesting form of collective system is demonstrated by Dictyostelium discoideum and its multicellular development process. D. discoideum is a social amoeba able to change its behavior to survive in response to nutrient starvation. Most of its life, the organism lives in the soil as a single amoeba and feeds on bacteria. Individual cells move around on their own when there is plenty of food. Then, when food is scarce, the cells start a multicellular developmental process. Up to a million amoeboid cells artfully self-aggregate via pattern formation (first-order emergent behavior) to build a coherent and cohesive super-organism, similar to a motile slug structure. This complex super-organism has several properties that none of the cells has on its own (e.g. sensitivity to light and heat). The slug moves as a whole (second-order emergent behavior) looking for a suitable place to transform into a fruiting body in which about 20% of the cells die to lift the remaining cells up to a better place for sporulation and dispersal on the surface of the soil. Interestingly, at this point, the cells resume their individual behavior.

D. discoideum life cycle is an excellent example of the emergent phenomenon. These characteristics inspire us to investigate the relationship between first-order and higher-order collective behaviors in terms of emergence. Second- order emergent behavior arises from the interactions of individuals, which are themselves the result of first-order emergent societies. Second-order emergence, refers to systems in which agents recognize the existence of groups that emerged from their own collective behaviors. In the case of D. discoideum, higher-order emergent behavior refers to collective behavior at the level of slugs (themselves the result of collective behavior at the level of cells). Additionally, this social, relatively simple but yet powerful, the behavior is particularly appealing to inspire the engineering of collective adaptive systems, where a large number of simple homogeneous agents coordinate, self-organize and adapt themselves to environmental changes. The Dicty project, therefore, involves the combination of different disciplines - cell biology; self-organizing systems and swarm intelligence into one activity.

Collaborations: we collaborate with Prof. Salima Hassas of the University of Lyon, Professor of Computer Science and specialist of higher-order collective behavior of multi-agent systems, and Prof. Thierry Soldati from the University of Geneva, Professor of biochemistry, specialist of D. discoideum behaviour, and Prof. Prof. Thomas Schmickl, University of Graz, Prof. of Swarm robotics.

On the biology field, although D. discoideum provides a promising research path, not all phases are currently understood and modeled at the micro-level. From the computer science and artificial systems perspectives, first- order emergence is well studied, but higher-order levels of emergent behavior have not received much attention yet. Finally, from the collective adaptive systems perspective, there is no attempt at applying higher-order emergent behavior to this type of systems. The main objectives of this project are to:

- Provide agent-based models of the different phases of D. discoideum life cycle.
- Extract pertinent mechanisms for higher-order emergent behavior and provide them as design patterns for artificial systems.

Dicty project tackles the following research questions:

- What are the social relations and configurations of D. discoideum behaviors at the different phases of its life cycle and how to model them?
- What are the mechanisms favoring higher-order emergence in swarms and artificial collective behavior?
- How to translate and implement those mechanisms into collective adaptive systems? Dicty will substantially advance the state of the art by providing:
  - Fine-grained understanding of D. discoideum individual cells behaviors at all phases of its life cycle and provision of corresponding agent-based models validated with actual biological experiments;
  - Novel self-organizing mechanisms for higher-order emergent behaviors expressed and defined as design patterns for artificial systems.

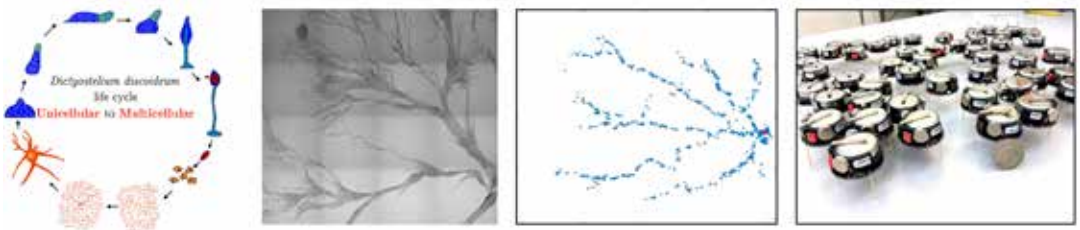


Figure 2: From D. discoideum life cycle to agent-based models, biological validation and implementation of behaviour into kilobots

This project is supported by the **Swiss National Science Foundation (SNSF)** - Grant number: 205321 179023

https://www.unige.ch/cui/cas/research/dicty

Thesis completed

Oumaima Ajmi

Doctor ès Economy and Management, mention Information Systems

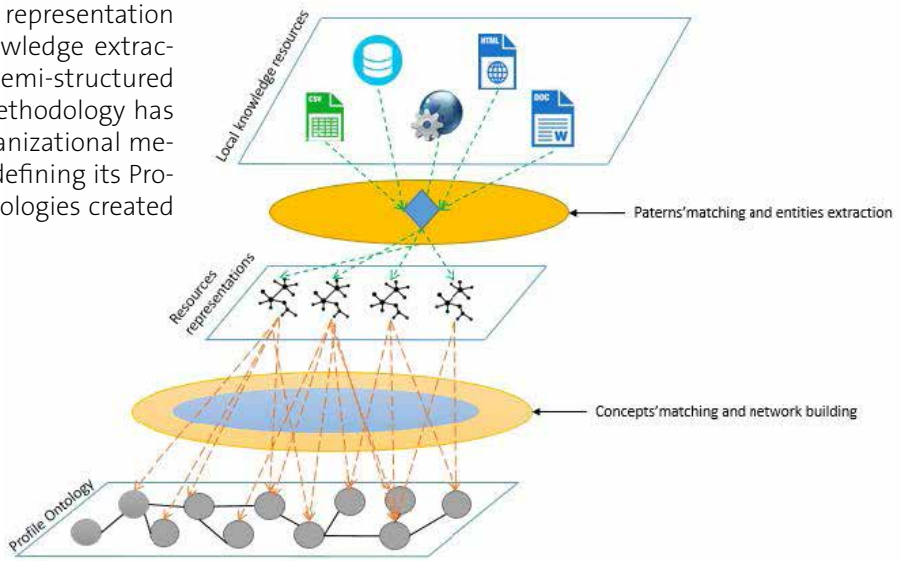
29th August, 2018

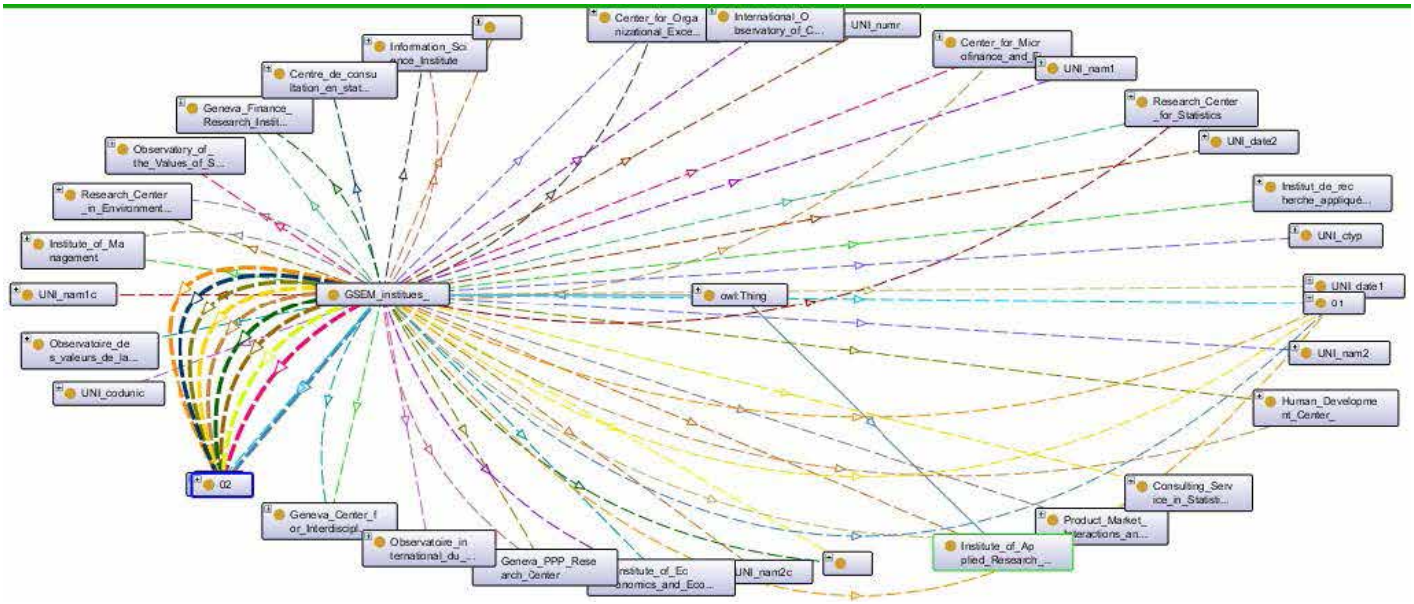
Directors: Prof. Gilles Falquet
Dr. Claudine Métral

Organizational knowledge access: an approach based on ontology networks

Knowledge management has increasingly become a big challenge, especially in large organizations. The known vision of the Semantic Web is to offer intelligent services made possible by facilitative machine understanding of web content, especially by using ontologies.

This work proposes an ontology-based approach for knowledge management, which stems from model based on a network of ontologies capable of representing knowledge from structural and syntactically heterogeneous resources, and of building an organizational knowledge graph based on a network of ontologies. This approach is composed of a Profile Ontology that defines the shared vocabulary of a specific organization and a set of resource representation ontologies created automatically via a knowledge extraction process that deals with structured, semi-structured and unstructured resource formats. This methodology has been successfully tested by creating an organizational memory system for a specific organization by defining its Profile Ontology and building a network of ontologies created from its varied resources.





Doctorat thesis: Univ. Genève, 2018 - GSEM 60 - 2018/08/29
http://archive-ouverte.unige.ch/unige:117088

Davide Alocci

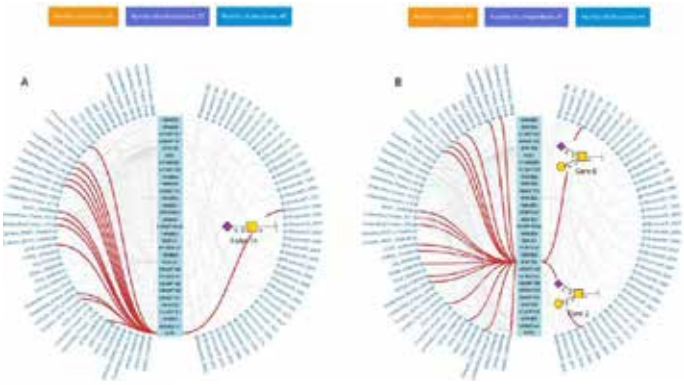
Doctor ès Sciences, mention Bioinformatique

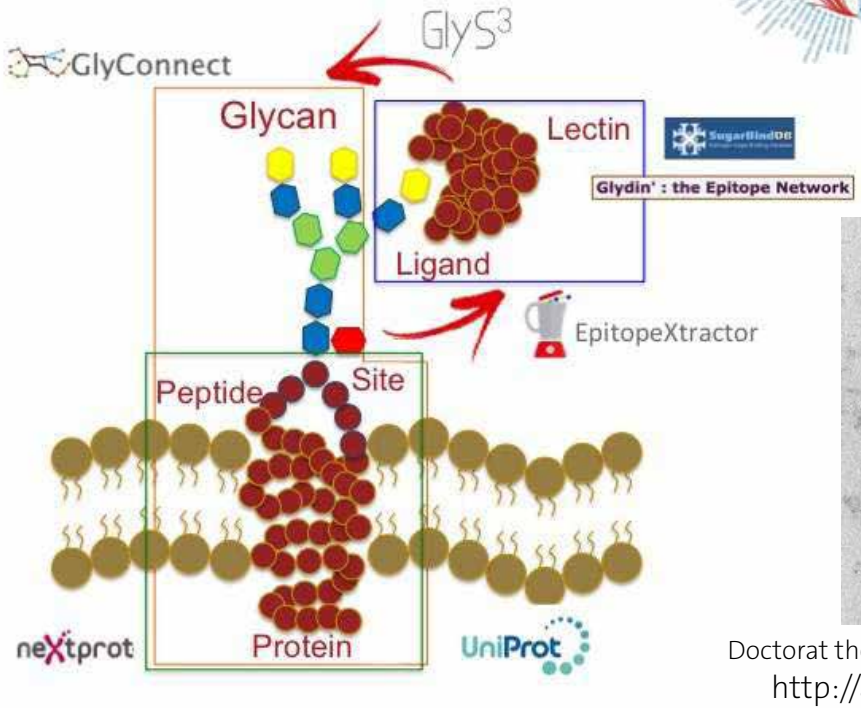
2nd November, 2018

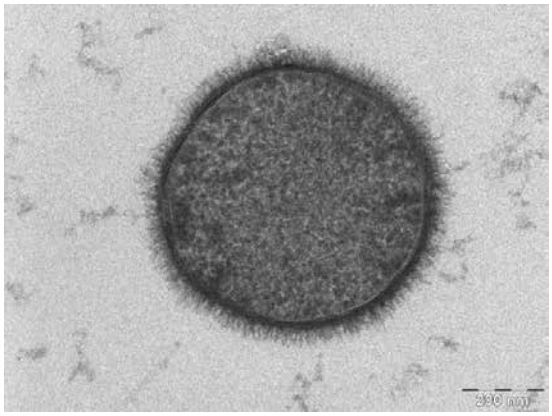
Director: Dr. Frederique Lisacek

An interactive and integrative view of glycobiology

Glycosylation is one of the most abundant post-translational modifications (PTM) and the primary cause of microheterogeneity in proteins (glycoforms). It consists of the addition of a sugar moiety on the surface of a protein, and it has been suggested that over 50% of mammalian cellular proteins are typically glycosylated.
Despite its importance, glycobiology is still lacking concrete bioinformatics support which, in the last two decades, has boosted other major 'omics' like proteomics, transcriptomics and genomics. Additionally, the inherent complexity of carbohydrates and the use of many orthogonal experimental techniques to elucidate a structure have slowed down the annotation of novel glycans leaving glycobiology fragmented internally. This thesis aims at the creation of a collection of tools to reconstitute the puzzle of biological evidence produced by different glycomics experiments and, at the same time, fill the gap with other 'omics'. To characterise the aim of each tool, we have created three different categories: integrative, explorative and knowledgebased.
Integrative tools have been designed to combine specific pieces of information which are stored in different databases and cannot be integrated by a simple connection.
The category is populated by two different tools: GlyS3 and EpitopeXtractor. The first performs glycan substructure search whereas the second defines which glycan epitopes are contained in one or more glycans based on a curated collection. Explorative tools enable the user to perform data analysis with a graphical and interactive approach, speeding up the analysis process. The first tool of this category is PepSweetener which facilitates the manual annotation of glycopeptides. Then, we have Glynsight which proposes a way to visualise and compare glycan profiles with a dedicated web-interface. To conclude, we mention Glydin', a network visualisation of almost 600 glycan epitopes where connections exemplify substructure relationships. The last category regards the Knowledge-based tools and is filled by GlyConnect, an integrated dashboard for glycomics and glycoproteomics analysis.
All tools presented in this thesis are part of the Glycomics@ExPASy initiative which aims at spreading the use of bioinformatics in glycobiology and stressing the relation between glycobiology and protein-oriented bioinformatics.







Doctorat thesis: Univ. Genève, 2018 - Sc. 5280 - 2018/11/02
http://archive-ouverte.unige.ch/unige:112295

Yashin Dicente Cid

Doctor ès Sciences, mention interdisciplinary Computer Science and Physics

27th August, 2018

Directors: Prof. Stéphane Marchand-Maillet,
Prof. Henning Müller

Lung tissue analysis: from local visual descriptors to global modeling

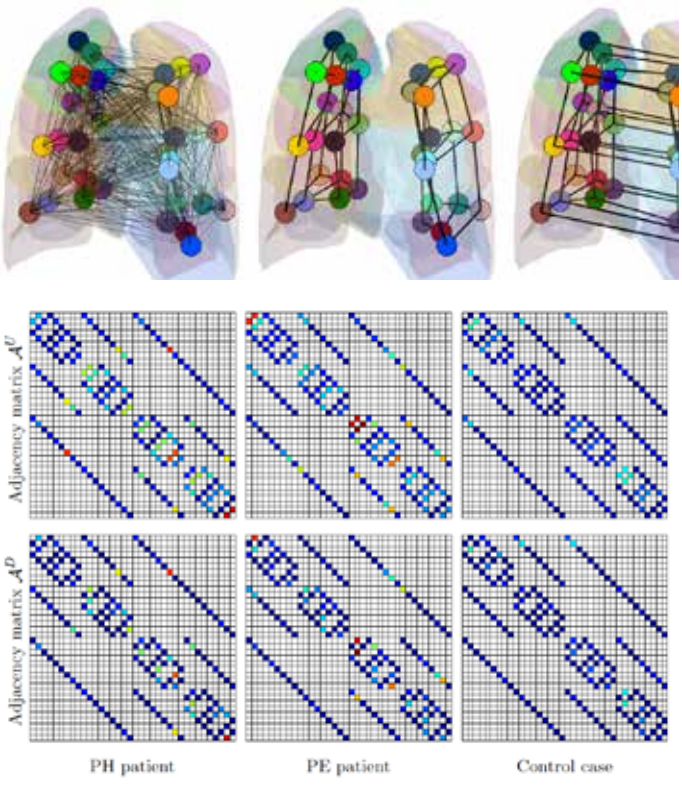
Medical imaging plays an important role in diagnosis and treatment planning, in particular for the assessment of respiratory diseases. Respiratory diseases are among the leading causes of death worldwide, thus, an early and accurate diagnosis of them can have a major impact. A standard procedure to assess a respiratory disease is a Computed Tomography (CT) scan of the chest, where radiologists can detect subtle alterations in the lung tissue that could help to correctly identify and diagnose the disease. However, when there is a general distribution of the disease in the lungs, the pathological changes can be so elusive that more (invasive) studies may be required to establish a diagnosis. Overall, a miss rate as high as 30 % and a false positive rate of up to 15 % has been reported in radiology.

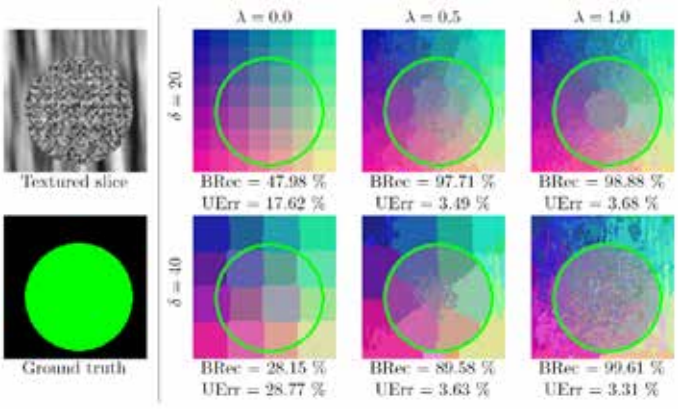
Therefore, many Computer{Aided Diagnosis (CAD) systems have been designed, usually based on characterizing the lung tissue.

CAD systems often include computerized image{based texture descriptors for tissue analysis. The complex structure of the lung parenchyma requires powerful texture descriptors that encode directional information in a rotation{invariant manner. Nonetheless, this is not trivial in 3D volumes and it remains a challenging task in computerized image analysis. State{of{the{art approaches have attempted to diagnose pulmonary pathologies by quantifying local defects in the lung parenchyma. However, in some respiratory diseases, it is not the proportion of abnormal tissue that dierentiates them, but rather the spatial distribution of the aected regions across the lung. Providing advanced computerized techniques to health professionals in a user{friendly platform may help the detection and diagnosis of these complex cases.

This thesis aims at describing the lung tissue in CT scans, both from a local and a global perspective. A new local 3D texture descriptor with the aforementioned properties is presented, as well as a novel graph{based model that provides a global characterization of the lung tissue. In addition, this thesis describes a new on{line platform where clinicians can extract state{of{the{art computerized image{based features. Moreover, this thesis explores all the steps involved in the pipeline for the automatic analysis of the lung tissue: the initial lung segmentation, the division of lung elds into subregions, the extraction of local biomedical features, and the assembly of local features to form a global model.

The methods presented in this thesis have been extensively tested in four datasets, together accounting for more than 14,000 CT scans from over 10,000 patients. They include patients with very diverse diseases, such as tuberculosis and pulmonary circulatory pathologies. The designed experiments and the obtained results conrm the robustness of the techniques detailed in this thesis.





Doctorat thesis: Univ. Genève, 2018 - Sc. 5248 - 2018/08/27
http://archive-ouverte.unige.ch/unige:111394

Marios Aristogenis Fanourakis

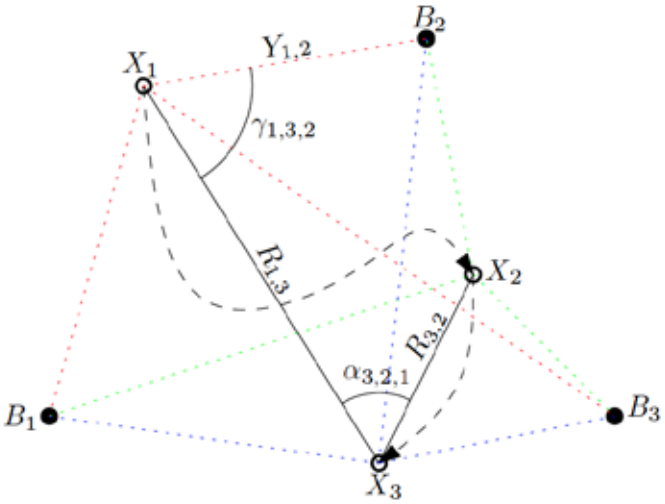
Doctor ès Economy and Management, mention Information Systems

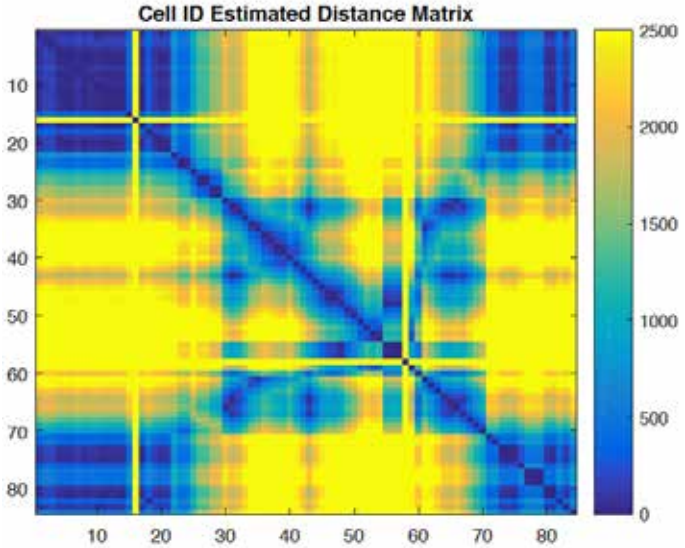
1st November, 2018

Director: Prof. Dimitri Konstantas
Co-Director: Prof. Katarzyna Wac

On the feasibility and privacy benefits of on-device data mining for opportunistic crowd-sensing and service self-provisioning

Mobile device services are increasingly becoming more and more useful to users by automating many of the tasks that users would normally have to perform manually.
This is facilitated by the on-going improvements of the sophistication of services and capabilities of devices. From the evolution of the simple reminder to a multitude of automated actions that are either defined by the user or, in the not-so-far future, learned by the devices/services themselves.
The average mobile device includes several sensors as a standard feature: accelerometer (to know when the screen rotates), compass (for positioning), GPS (for positioning), light (to adjust the display brightness), audio (microphone), and image (camera). Other devices may include different types of sensors like temperature, air quality, heart rate, etc. Moreover, a mobile phone with such sensors roams with its owner, and can be used to collect context information on their behalf.
This can originate in an explicit request, assuming an active human participation and cooperation in context sensing – denoted as participatory sensing. It is often vital to collect data (temperature, air quality, phone usage, etc.) in order to create realistic models that might help us understand and predict the world or verify theories and models developed in lab environments. Assuming that the predictive models and algorithms are in place, the level of automation is only limited by the ability to access data streams and information; however, sharing more and more personal data increases the chance of a user's privacy being compromised by revealing their identity. Although ethical guidelines and committees have been put in place to protect people in terms of how this data is collected and how it is used, there are still privacy concerns that need to be addressed in the fundamental mechanisms by which this data is collected and disseminated.
In this thesis we show that the most secure way to proceed with privacy in opportunistic sensing is to not share data that is a privacy threat from the device when the service or task can very well be performed on the device itself.
We show that most of the sensor data on a device should be handled with caution due to their potential to be a privacy threat and propose solutions for service self-provisioning for measuring location tracking information through unaided triangulation, and location context by using cell ID traces. When data absolutely needs to reach a third party, we show that opportunistic mixing strategies can indeed be effective, but not necessarily time-efficient, in anonymizing the source of the data, however the data itself needs to be shielded from inference attacks by using additional obfuscation methods.





Doctorat thesis: Univ. Genève, 2018 - GSEM 63 - 2018/11/01
http://archive-ouverte.unige.ch/unige:112869

Sohrab Ferdowsi

Doctor ès Sciences, mention Computer Science

7th January, 2019

Director: Prof. Sviatoslav Voloshynovskiy

Learning to compress and search visual data in large-scale systems

This thesis studies high-dimensional vectorial data, in particular, visual information, e.g., digital images or image descriptors and addresses several of the issues dealt with these data, particularly under large-scale setups.

Attempts for general signal and image modeling in the literature are first reviewed where they are framed under the Bayesian paradigm. These are categorized roughly as basic and composite models, where the former benefits from low sample-complexity, as well as sound theoretical bases, while the latter achieves better performance benefiting from larger data samples.

This thesis pursues the algorithmic development of its models from basic to composite ones. The basic models are developed under two families of synthesis and analysis priors. Our synthesis model introduces the rate-allocation criterion as a regularization to the Kmeans algorithm and hence is termed the VR-Kmeans. We show that this is very successful in avoiding over-fitting of K-means at high-dimensional settings and particularly under low-sample setups.

Our analysis-like formulation leads to the framework of Sparse Ternary Codes (STC). This starts with the characterization of its information-theoretic properties and follows by investigating ways to maintain rate-distortion optimal encoding and decoding. We then notice the limitations of these models in achieving high-fidelity and low-complexity encoding and point out the need to opt for more intricate models.

The evolution from basic and single-layer architectures to composite and multi-layer models is done using the principle of successive refinement in information theory. In particular, the VR-Kmeans and the STC are extended to the RRQ and the ML-STC using additive residual-based encoding, respectively. These models are analyzed algorithmically and their rate-distortion performances are shown to be superior compared to their existing alternatives.

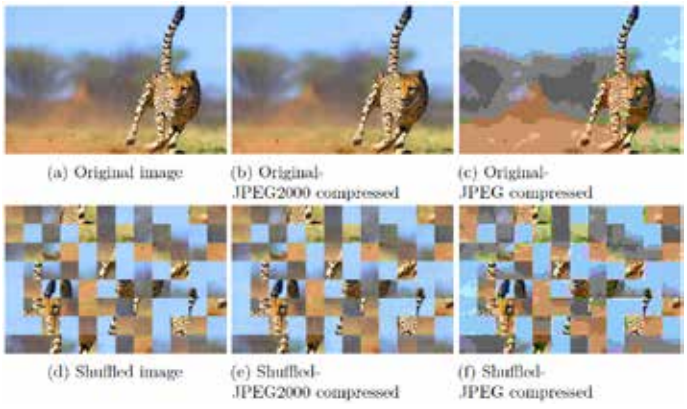
The ML-STC, and its more data-dependent version the ML-STC-Procrustean admit yet another evolution. This is the joint parameter update using the back-propagation framework which resembles that of artificial neural networks and hence we term it as the STNets. However, our model has certain particularities as compared to the common deep learning frameworks. Instead of starting from random weights, the STNets is first pre-trained layer-by-layer and according to the STC. This is then fine-tuned using back-propagation along with other standard recipes of training neural networks. Technically, this is possible thanks to the properties of ternary encoding which allows us to replace the non-differentiable discrete non-linearity with its smooth counterpart and without incurring approximation errors. Consequently, we are able to learn discrete and compact representations for data and under a wide range of data-availability and operational rate-regimes.

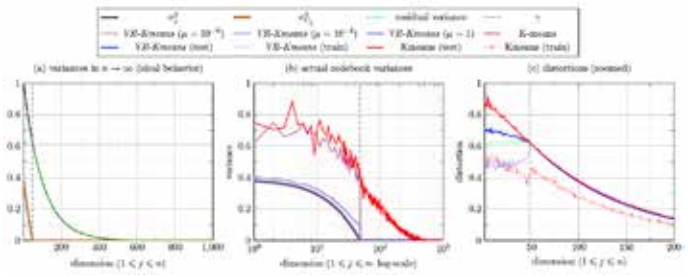
Having developed our algorithmic infrastructure, we next tailor them to three important practical applications. First, the problem of large-scale similarity search in retrieval systems is addressed, where complexity and memory constraints limit the naïve exhaustive scan of the database for a given query. We develop a complete search system based on the STC framework and show its superiority in terms of the triple complexity-memory-performance trade-offs as compared to the two main-stream solutions from the literature, namely the binary hashing and the vector-quantization based family of methods.

We next target the problem of learned image compression. We argue the benefits of learning to compress w.r.t. the conventional codecs and show that it is possible to compress high-resolution natural images using our algorithms trained on a limited number of images and achieve comparable results to the JPEG2000, even without performing different stages of the compression pipeline. More particularly and for a class of domain-specific images, we show that it is possible to benefit from the extra structural redundancy present in these images to compress them further. We also show that learning to compress can be beneficial beyond the task of compression itself.

Finally, we show that compression can be used to solve inverse problems. This is achieved by imposing the compressibility of data under a certain trained model as an effective prior to regularize the solution of ill-posed inverse problems, which is invoked in an iterative algorithm. In particular, we show that it is possible to deonise images using the JPEG2000, or recover under-sampled and noisy auto-regressive data using the ML-STC and through our proposed algorithm.

The thesis is concluded by pointing out some open problems and issues. This paves the way for certain potential directions of very promising future research to be pursued in the interplay between signal processing and machine learning and under the theme of learning compact representations.





Doctorat thesis: Univ. Genève, 2018 - Sc. 5295 - 2019/01/07

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Eléonore Fournier-Tombs

Doctor ès Social Sciences, mention Information Systems

22th June, 2018

Director: Prof. Giovanna Di Marzo Serugendo

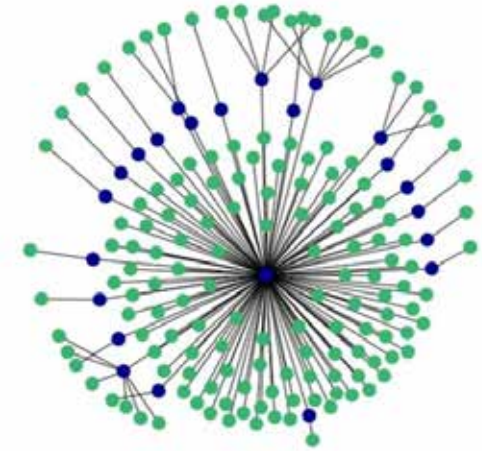
DelibAnalysis: Understanding online deliberation through automated discourse quality analysis and topic modeling

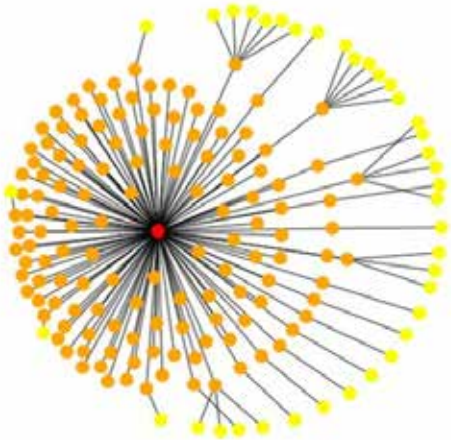
The following thesis examines political discourse quality online and proposes a methodology for analyzing online conversations in an automated way. The study is based on seminal work on the Discourse Quality Index (DQI) by Steenbergen et al (2003) and is primarily grounded in Habermas' The Structural Transformation of the Public Sphere (1961). The study builds on Habermas' work by examining the quality of the public sphere in a digital age. Primarily, we examine the portion of the public sphere which deals with political discussions on online platforms. Drawing on the DQI, we manually code a portion of political comments to create a training dataset for a classifier, which can then be used on much larger data corpuses. We propose a topic clustering algorithm which gives context to the DQI score for any given conversation.

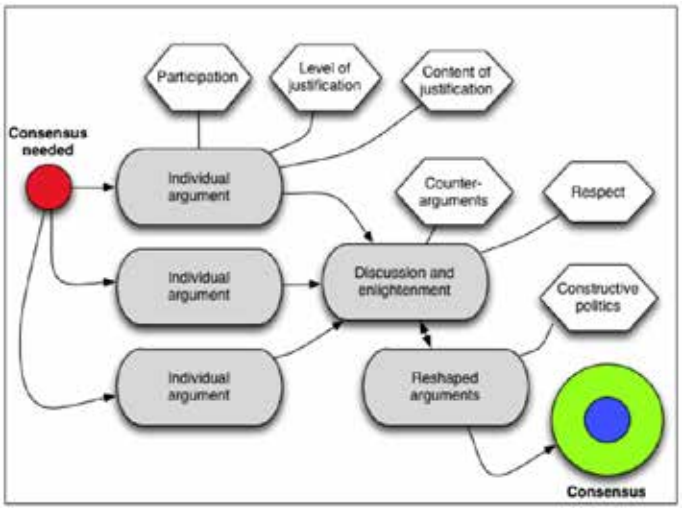
The proposed technique, which we call DelibAnalysis, is a combination of random forests classification and k-means clustering using term-frequency inverse-document-frequency. This methodology was selected after comparative testing using logistic regression and support vector machines (SVM), as well as a variety of data formats and parameters.

After presenting the DelibAnalysis methodology, we apply it to a diverse dataset of online conversations between citizens and elected representatives in Canada, the United States and the United Kingdom using Facebook and blog platforms. We use this analysis to derive insights about the state of the online public sphere and the differences between platforms and discussion frameworks.

The objective of this research is to provide a systematic framework for the semi-automated discourse quality analysis of large datasets, and in applying this framework, to yield insight into the structure and features of political discussions online.







Doctorat thesis: Univ. Genève, 2018 - SDS 94 - 2018/06/22
http://archive-ouverte.unige.ch/unige:112458

Magda Gregorova

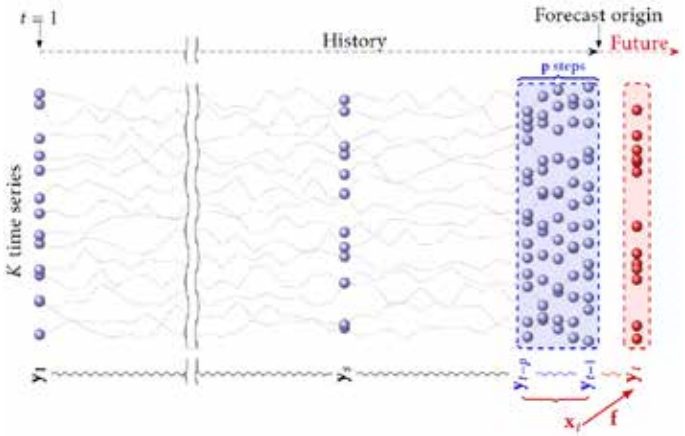
Doctor ès Sciences, mention Computer Science

12th November, 2018

Directors: Prof. Stéphane Marchand-Maillet
Dr. Alexandros Kalousis

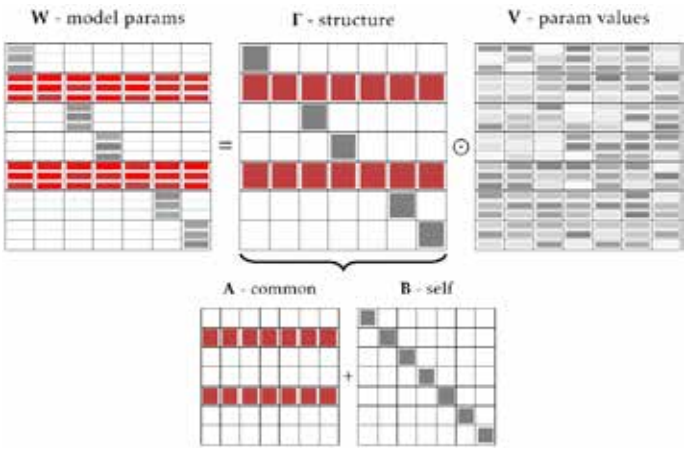
Sparse learning for variable selection with structures and nonlinearities

In this thesis we discuss machine learning methods performing automated variable selection for learning sparse predictive models. There are multiple reasons for promoting sparsity in the predictive models. By relying on a limited set of input variables the models naturally counteract the overfitting problem ubiquitous in learning from finite sets of training points. Sparse models are cheaper to use for predictions, they usually require lower computational resources and by relying on smaller sets of inputs can possibly reduce costs for data collection and storage. Sparse models can also contribute to better understanding of the investigated phenomenons as they are easier to interpret than full models.
We are specifically interested in problems with non-trivial sparse relationships amongst the data. In particular, problems where the dependencies exhibit some sparse patterns that can be exploited in the modelling but for which the prior understanding is not sufficient to formulate explicit constraints to be hard-wired into the model. We build on the ideas of learning with structured sparsity to factor such patterns into the models.



Furthermore, as the relationships may be too complex to be satisfactorily captured by simple linear functions we allow the methods to operate over a broader space of nonlinear functions. For this we rely on the theory of regularised learning in the reproducing kernel Hilbert spaces (RKHSs) and extend it in the direction of sparse learning in nonlinear nonadditive models.
Throughout the thesis we propose multiple new methods for sparse learning over reduced set of input variables. We initially concentrate on the problem of multivariate time series forecasting and develop methods that learn forecasting models together with discovering the Granger causality dependencies amongst the series.
We first consider dependencies that are organised around a limited set of series functioning as leading indicators for the whole system or its parts. Our method discovers these leading indicators as well as the groups of series depending on them together with learning the predictive model.

We next allow for nonlinear relationships amongst the series. Calling upon the theory of learning vector-valued functions in the RKHS and the ideas of multiple kernel learningwe provide the model with enough flexibility to search for the predictive function while still uncovering sparse Granger causal dependencies.
In the second half of the manuscript we focus on the more general problem of learning sparse nonlinear regression functions. Making parallels to linear modelling, we formulate new regularisers based on partial derivatives of the function to promote structured sparsity in the nonlinear model. We show how these can be incorporated into the kernel regression problem and reformulated into a problem solvable in practice by an iterative algorithm derived from the alternating direction method of multipliers (ADMM).
Finally, we address the scalability issues of sparse learning with kernel methods. We use the random Fourier features to approximate the kernel function and shift the sparsity search from the original function space into the space of the random features. We thus significantly reduce the dimensionality of the search space and therefore the computational complexity even when working over large datasets with thousands of data instances.



Doctorat thesis: Univ. Genève, 2018 - Sc. 5318 - 2018/11/12
http://archive-ouverte.unige.ch/unige:115678

Kristina Gulordava

Doctor ès Humanities, mention Linguistics

14th June, 2018

Director: Prof. Paola Merlo

Word order variation and dependency length minimisation: a cross-linguistic computational approach

Word order is one of the most readily observed and extensively studied aspects of the human language. The central object of study of this thesis are cases of variation in word order, i.e., cases when one syntactic structure can be expressed using more than one grammatical linearisation. We are interested in cross-linguistical properties of word order variation and, in particular, in phenomena related to dependency length minimisation (DLM). DLM is known as a tendency for words and phrases that are close in the syntactic structure (dependents) to be linearly adjacent. The evidence for this principle was observed in many languages of the world and in various types of word order distributions.

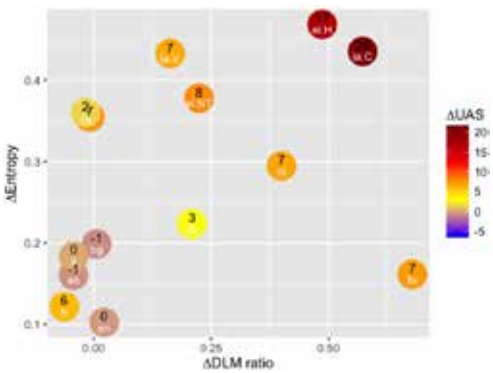
We analyse DLM phenomena observed in word order variation using a computational approach. Our work capitalises on syntactically-annotated corpora (treebanks) and statistical methods which are essential for drawing generalisations from word order variation data across dozens of languages. To analyse similar constructions in various languages in the same way, we treat word order as a mapping between the syntactic structures of utterances, provided by the treebanks, and their linearisations. Since we use treebanks which annotate different languages starting from the same syntactic criteria, the distributions of word order mappings extracted from these treebanks can be compared meaningfully to each other.

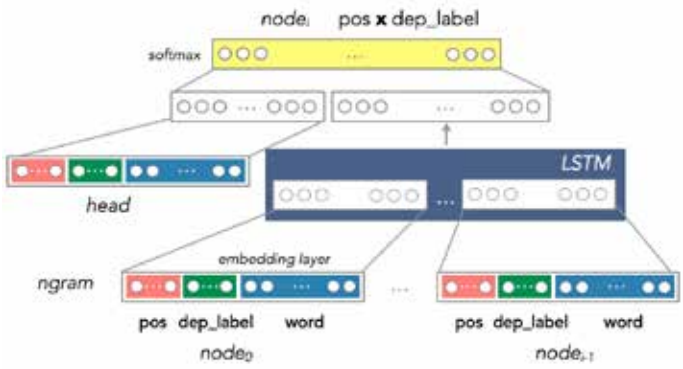
This thesis presents three cross-linguistic computational studies of word order variation and dependency length minimisation at three levels of linguistic representation. First, we look at word order and dependency length distributions at the language level. One of the aims of this study is to examine the general formulation of the DLM principle applied to all types of constructions and dependency relations in a language. All languages tend to minimise dependency lengths; however, the degree of this minimisation varies substantially. The measure of the rate of DLM at the language level provides a way to compare languages typologically across a new interesting dimension.

Secondly, we zoom in on the DLM effects in word order distributions in one syntactic construction: adjective variation in Romance languages. We formalise the predictions of the language-level global DLM principle for this complex syntactic construction involving several dependencies. We test these predictions systematically in treebanks of five Romance languages. We reveal several DLM-related patterns in adjective placement, confirming the promising approach to formalising and probing DLM. For instance, we find that adjectives tend to appear before the noun they modify when the noun has an additional right dependent than when there is no such dependent. We also highlight the limitations of the global DLM principle, e.g., that it cannot explain the fact that different dependencies are optimised to a different extent.

Finally, we analyse distributions of word order as generalisations of linearisation decisions at production time. To this end, we develop a linearisation system which models online, word-by-word production of word order. It is conceived as a plausible model of the word order production process and, at the same time, as a model of word order distributions both at the language and at the construction level. This model integrates the choice between two options for the cases of word order variation and conditions these choices on dependency length factors.

The contributions of this thesis are relevant, first of all, to the linguistic work interested in questions about word order and DLM. Additionally, this thesis is tightly linked to the research in natural language processing (NLP). As part of the analysis of word order variation and DLM at the language level, we investigate how these properties affect the performance of statistical parsers. Our linearisation model is related to the previous work in natural language generation and sentence linearisation and is evaluated against a state-of-the-art NLP system. The results of this thesis are, therefore, of interest to computational studies of syntax and variation and the field of natural language processing.





Doctorat thesis: Univ. Genève, 2018 - L. 920 - 2018/06/14

http://archive-ouverte.unige.ch/unige:106855

Abbass Hammoud

Doctor ès Economy and Management, mention Information Systems

November, 2018

Co-Directors: Dr. MicChel Deriaz
Prof Dimitri Konstantas

Indoor occupancy sensing with ultrasounds

As human beings, we rely on audible sounds as one way to communicate between each other and to infer information about our surrounding environment. Similarly, ultrasounds are used by some species in the animal kingdom to sense objects around them and get relevant information about their environment. In this thesis, we build on the inherent characteristics of ultrasounds and explore their application in occupancy sensing of indoor spaces, as ultrasounds exhibit interesting advantages compared to other technologies. Specifically, we design methods and algorithms to generate and process ultrasonic signals and infer the room occupancy, and we develop systems to evaluate their performance. Throughout the work, we address the implementation of our methods using commodity hardware, we pay attention to design algorithms that are computationally efficient, and we evaluate their time and space complexity. We focus on the reusability aspects in our designs, with the aim of bringing the technology to a wide range of existing and potential commercial devices, that would be able to implement our methods and algorithms seamlessly, and offer insights for new applications (like improving users' experience, enhancing home automation, etc.).

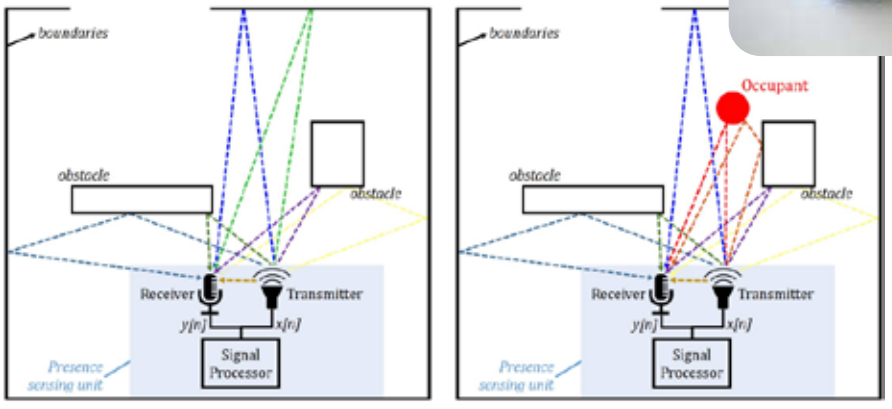
This thesis brings four main contributions. We start off by presenting our solution for a device-based occupancy detection system, in which the room occupancy is determined using people's smartphones. The system wouldn't be robust, unless the problem of signal interference and packet collision is mitigated. Therefore, we show how collisions could be detected, and propose a solution to reduce their occurrence probability.

Then, we move on to address device-free occupancy sensing, where we sense the presence of persons without requiring them to carry or wear any devices. In this regard, our contribution is a self-calibrating motion sensing system that is based on the Doppler effect. We show how unsupervised learning can be used to autocalibrate the parameters of the system without prior information of the installation environment.

While active ultrasonic motion sensing offers a higher accuracy, it generally consumes more energy than traditional passive sensing technologies (like passive infrared sensors). To alleviate this limitation, our third contribution is a novel automatic power switching method that can reduce the energy consumption of the sensors. The method, which we call "power hopping", allows a motion sensor to optimize its transmit power in function of the surrounding environment's conditions, and is automatically triggered every time the layout of the environment is detected to have changed.

In our last contribution, we address the sensing of still persons. For this, we explore the use of reflection patterns of ultrasonic signals. We show how we can process the signals and make use of supervised learning techniques, to accurately detect the presence of still persons, even in low signal-to-noise ratio conditions.

All of the presented methods and algorithms were experimentally evaluated using working prototypes. To summarize this dissertation, we discuss how our proposed methods and algorithms can be applied to make devices and appliances smarter, more aware and responsive to their users. These include smartphones, digital speaker assistants, PCs, smart TVs, and virtually any devices equipped with sound speakers and microphones.



(a) Vacant environment **(b)** Occupied environment

Doctorat thesis: Univ. Genève, 2018 - GSEM 64 - 2018/11
http://archive-ouverte.unige.ch/unige:112355

Oliver Horlacher

Doctor ès Sciences, mention Bioinformatics

27th February, 2018

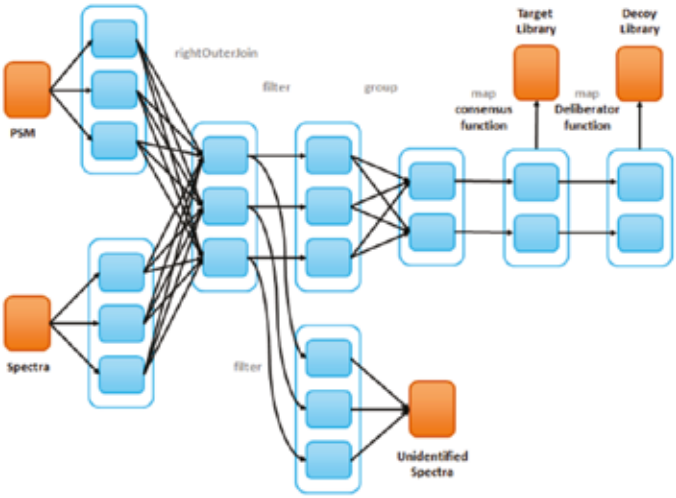
Director: Dr. Frédérique Lisacek

Developing algorithms to automate the identification of post translational modification in LC-MS/MS data

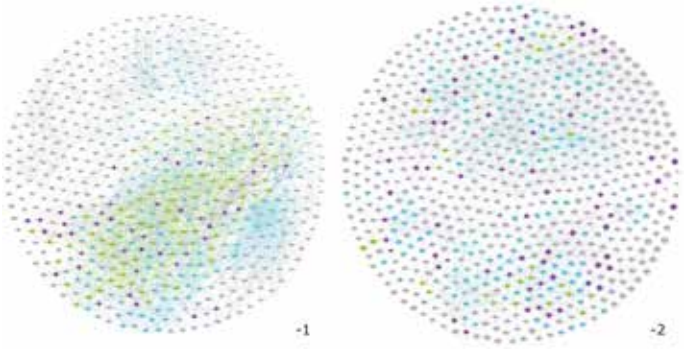
Understanding post-translational modification (PTM) of proteins and how PTMs influences cellular processes is an important part of understanding the biology of both healthy and diseased cells. The most widely used experimental technique for studying PTMs is Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS). When LC-MS/MS is applied to complex mixtures, such as cell lines or tissue samples, a large amount of raw data is produced which needs to be analysed to identify molecular structures. This thesis focuses on the development of software to automate the identification of PTMs in proteomic MS/MS data and identifying glycans in glycomic MS/MS data. The outcome of this thesis are three software packages: MzJava, MzMod and Glycoforest.

MzJava is a library that can be used as building blocks to help guide and accelerate the development of software for processing and interpreting MS/MS spectrometry data. MzJava provides data structures and algorithms for representing and processing mass spectra and their associated biological molecules, such as metabolites, glycans and peptides. To ensure that MzJava contains code that is correct and easy to use, the library's application programming interface was carefully designed and thoroughly tested. MzJava was used to develop all software presented in this thesis and has been published as an open-source project.

MzMod is a spectrum library based open modification search (OMS) engine that is capable of processing MS/MS datasets that contain tens of millions of spectra. In addition to focusing on efficiently processing large datasets, improvements were also made to the accuracy of the OMS scoring function by including the consistency of the backbone ions and the quality of the PTM position. MzMod was validated using a dataset containing 25 million spectra from 30 human tissues and compared to MODa, which is a popular OMS search engine. The validation showed that MzMod is easier to use than MODa when analysing large datasets and that MzMod identifies four to five times more PTMs than MODa for modifications that are not fixed.



Glycoforest is a tool that helps accelerate the process of assigning glycan structures to MS/MS spectra. The biggest challenge that needs to be addressed when developing software to automate the assignment of glycans to MS/MS spectra, is that there is no direct template that can be used to infer the structures that are potentially present in a sample. Glycoforest addressed this challenge by using a partial de novo algorithm that makes use of OMS spectrum similarity to generate candidate glycan structures. To select the correct structure from among the candidates, a scoring function was developed that combines the information from the OMS similarity and the theoretical spectrum of the candidate. Using two manually annotated MS/MS data sets, we showed that Glycoforest can generate the human validated candidate structure for 92% of the test cases. The scoring function was able to select the correct structure for 70% of the test cases and the correct structure was among the top three best scoring candidates for 83% of the test cases.



Doctorat thesis: Univ. Genève, 2018- Sc. 5194 - 2018/02/27
http://archive-ouverte.unige.ch/unige:104517

Dimche Kostadinov

Doctor ès Sciences, mention Computer Science

6th December, 2018

Director: Prof. Sviatoslav Voloshynovskiy

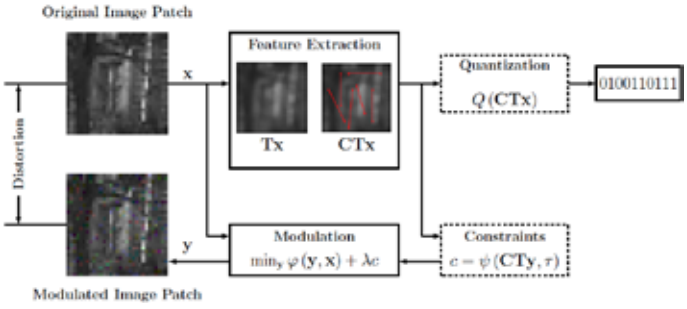
Nonlinear transform learning: model, applications and algorithms

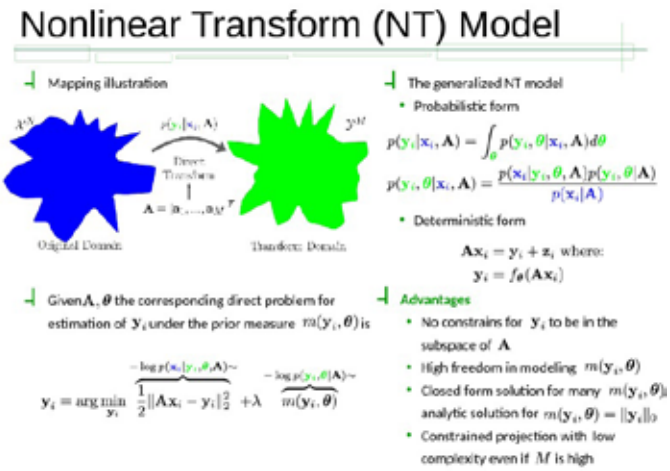
Modeling of nonlinearities is essential for many real-world problems, where its treatment plays a central role and impacts not only the quality of the solution but also the computational complexity. Its high prevalence impacts on a variety of applications, including active content fingerprinting, image restoration, supervised and unsupervised discriminative representation learning for image recognition tasks and clustering.

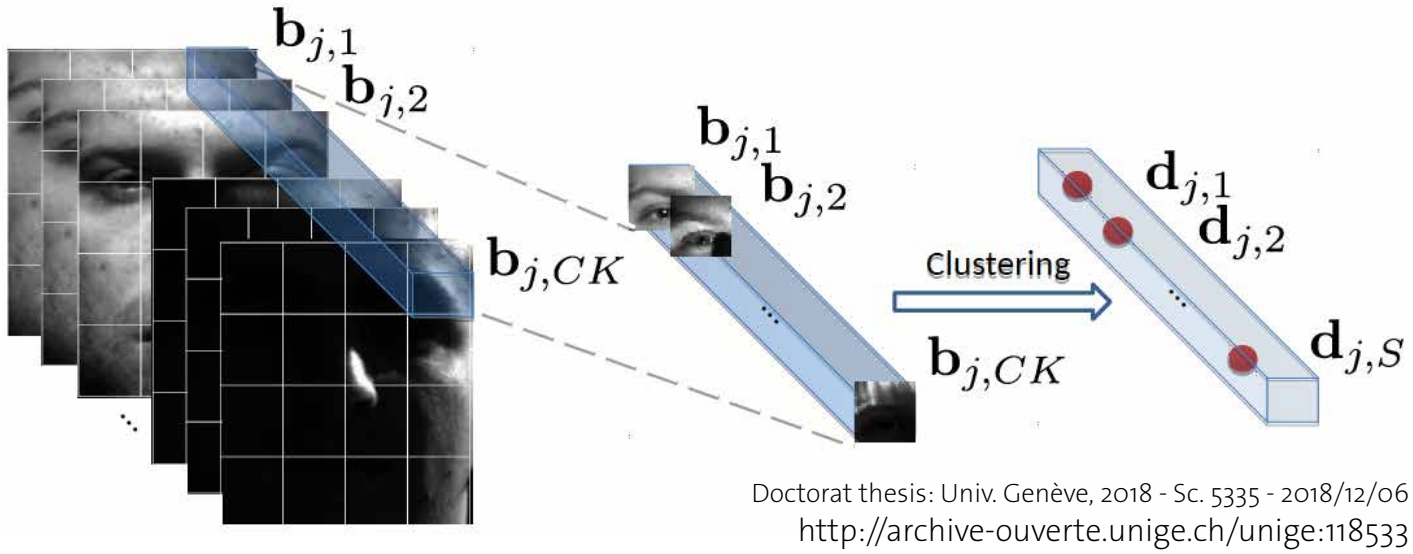
In this thesis, we introduce and study a novel generalized nonlinear transform model. In particular, our main focus and core element is on the nonlinear transform that is expressible by a two-step operation consisting of linear mapping, which is followed by element-wise nonlinearity. To that end, depending on the considered application, we unfold probabilistic interpretations, propose generalizations, extensions and take into account special cases.

An approximation to the empirical likelihood of our nonlinear transform model provides a learning objective, where we not only identify and analyze the corresponding trade-offs, but we give information-theoretic as well as empirical risk connections considering the addressed objectives in the respective problem formulations. We introduce a generalization that extends an integrated maximum marginal principle over the approximation to the empirical likelihood, which allows us to address the optimal parameter estimation. In this scope, depending on the modeled assumptions w.r.t. an application objective, the implementation of the maximum marginal principle enables us to efficiently estimate the model parameters where we propose an approximate and exact closed form solutions as well as present iterative algorithms with convergence guarantees.

Numerical experiments empirically validate the nonlinear transform model, the learning principle, and the algorithms for active content fingerprinting, image denoising, estimation of robust and discriminative nonlinear transform representation for image recognition tasks and our clustering method that is preformed in the nonlinear transform domain. At the moment of thesis preparation our numerical results demonstrate advantages in comparison to the state-of-the-art methods of the corresponding category, regarding the learning time, the run time and the quality of the solution.







Doctorat thesis: Univ. Genève, 2018 - Sc. 5335 - 2018/12/06
http://archive-ouverte.unige.ch/unige:118533

Fatma Aziza Merzouki

Doctor ès Sciences, mention Computer Science

4th May, 2018

Director: Prof. Bastien Chopard

Numerical Modelling of Confluent Cell Monolayers : Study of Tissue Mechanics and Morphogenesis

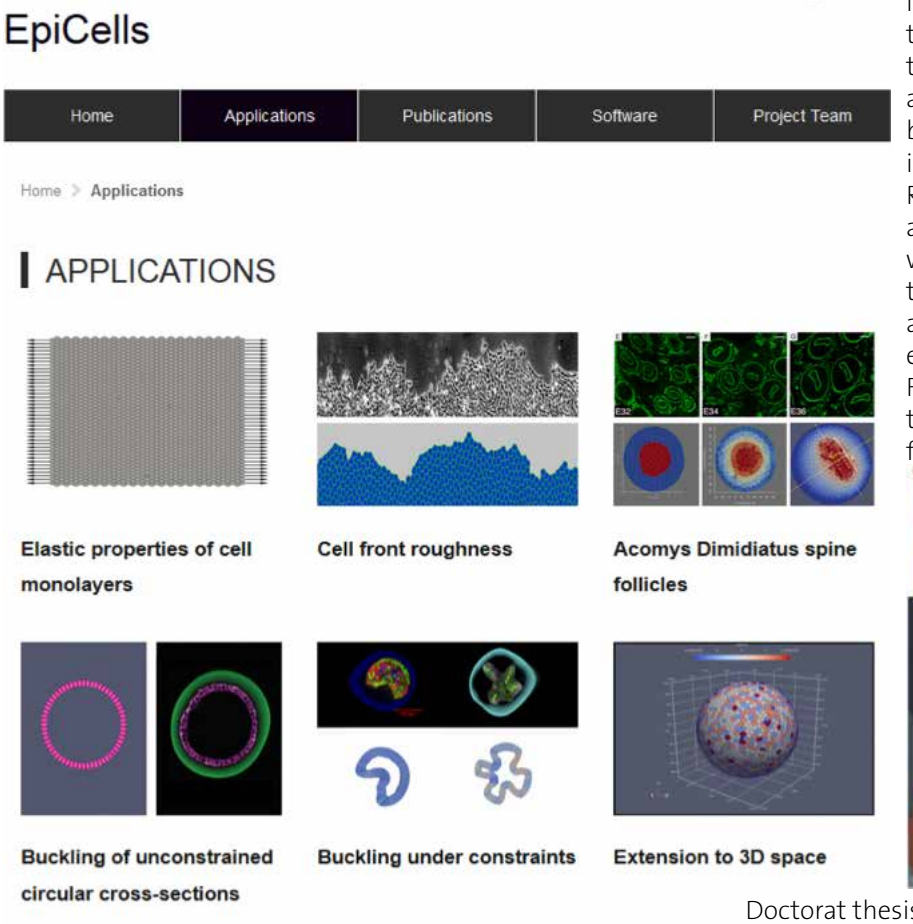
In this thesis, we present the numerical model of confluent cell monolayers that we developed and implemented in order to study the interplay between cell biophysical properties on the one hand and tissue mechanics and morphology on the other hand. Our model is cell-based and combines both cell physics and biology; it includes the representation of cell mechanical properties, the application of external mechanical constraints, as well as the simulation of cell proliferation and signalling. This model was initially inspired from the vertex model of Farhadifar et al. 2007, which we adapted and progressively extended within our EpiCells framework (www.epicells.unige.ch) along with our different studies and collaborations.

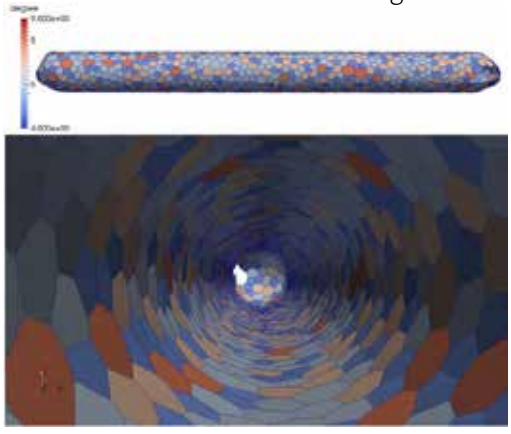
Our model allowed us to investigate how cell mechanical properties, namely the cellular apical contractility and the intercellular adhesion, affect the response of tissues to stretching. We were able to compare our simulations of tissue stretching to the experiments of Harris et al. 2012 and to integrate their experimental measurements to calibrate our model. The calibration results suggested how cell mechanical properties should adjust to tissue stretching in order to match themechanics of cultured epithelium.

Moreover, we used our EpiCells framework to study the development of the spine follicles covering the lower back of Acomys Dimidiatus (also called spinymouse). We focused on how the forces generated by the signal-based proliferation of cells shape the spine follicles. We investigated the factors that drive the Dermal Papilla (DP) cells, located at the center of the follicle, to flatten and slightly off-center between the embryonic stages E32 and E36 (32 and 36 days after fertilisation), whileMatrix cells at the periphery of the follicle proliferate yielding an enlarged follicle.

We also used the vertexmodel to study tissue buckling. We simulated cross-sections of circular cell-monolayers and showed how cell mechanics affect the geometry and the relaxation times of cell monolayers, which are characteristic of buckling tissues. We showed that it is the competition between the cell monolayer relaxation and the cell proliferation that controls the buckling of unconstrained tissues. Moreover, in the context of our collaboration with the Roux Lab where epithelial cell monolayers are cultured inside hydrogel microcapsules, we also investigated the folding of simulated tissues growing under the constraints of an elastic environment.

Finally, we extended our initial 2D model to the 3D space and presented its application for further studies of tissue folding.





Doctorat thesis: Univ. Genève, 2018 - Sc. 5210 - 2018/05/04
http://archive-ouverte.unige.ch/unige:106434

Michal Muszynski

Doctor ès Sciences, mention Computer Science

20th December, 2018

Director: Prof. Thierry Pun
Co-Director: Dr. Guillaume Chanel

Recognizing film aesthetics, spectators' affect and aesthetic emotions from multimodal signals

Even though aesthetic experiences are common in our lives, processes involved in aesthetic experience are not fully understood. Moreover, there is no comprehensive theory that explains and defines the concept of aesthetic experience in art. The challenge of studies on aesthetic experiences is to understand different stages of aesthetic information processing, such as perceptual analysis, cognitive processes, and evaluation resulting in aesthetic judgments and emotions.

The main goal of this thesis is to analyse film aesthetic experience evoked in spectators. In particular, we aim to detect aesthetic highlights in movies, as well as recognize induced emotions and aesthetic emotions elicited in spectators. The outcomes of the research on induced emotions, aesthetic emotions, and aesthetic highlights can be used for emotional and aesthetic scene detection, emotional and aesthetic scene design, video summarization, and prediction of affective and aesthetic content.

In this thesis, a background review on film aesthetic experience is provided. «Everyday» and aesthetic emotions are defined and a clear distinction between induced and perceived emotions of movie audiences is made. Several emotion representations and the characterization of emotion elicitation are discussed. The concept of interpersonal synchronization with regard to watching movies together is determined. An extensive literature review on aesthetic and affective content video analysis is also provided. Existing work on aesthetic and affect recognition as well as highlight detection from video content and spectators' reactions is described and discussed. The main limitations of the existing state of the art research are emphasized.

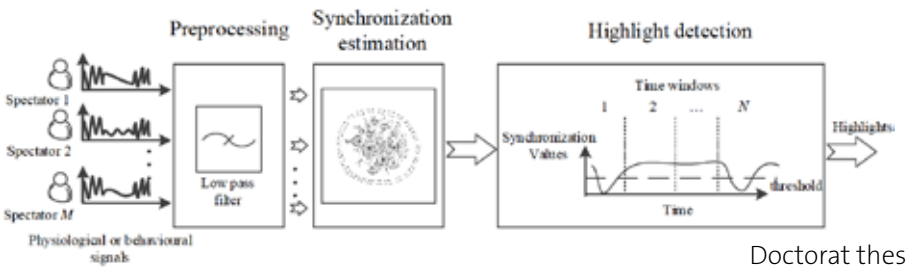
Currently available aesthetic and affective multimedia databases are described in details. The continuous LIRIS-ACCEDE database that was created to study film emotional experience in a movie theater is selected and extended to study film aesthetic experience. Protocols for collecting annotations of aesthetic highlights in movies, perceived emotions and aesthetic emotions felt by movie audiences are described. The statistical analysis of the annotations is carried out.

It is shown that aesthetic highlights in movies elicit a wide range of emotions. The amount of these emotions (a level of arousal and valence intensity) strongly depends on the aesthetic highlight category and on the movie genre. Also, methodology and results of aesthetic highlight detection based on the level of synchronization among spectators' electrodermal activity (EDA) and acceleration (ACC) measurements are presented. The results suggest that the level of synchronization among spectators' EDA and ACC signals is discriminative for aesthetic highlight detection in the context of watching movies together. In particular, pairwise synchronization measures are stable measures of synchronization and achieve the best performance of aesthetic highlight detection independently of movie genre and highlight categories.

The relationship between induced and perceived emotions of movie audiences is investigated. An inconsistency in induced and perceived emotion annotations is observed. In particular, it is found that induced and perceived emotions of movie audiences are not always positively correlated. Furthermore, it is observed that both perceived and induced emotions are characterized by aesthetic highlights. Finally, induced emotions are recognized from spectators' EDA and ACC measurements as well as movie content. To this end we find that Long Short-Term Memory Recurrent Neural Network (LSTM-RNN) models outperform Support Vector Regression (SVR) and Deep Belief Network (DBN) models because their ability to take into account temporal information and hierarchically combine knowledge-inspired affective cues with audio-visual movie content and movie audience responses.

It is shown that aesthetic highlights in movies evoke aesthetic emotions in spectators that are beyond «everyday» emotions. Aesthetic emotions that are felt by spectators are associated with the category of aesthetic highlights as well as the movie genre. In fact, movie aesthetic emotions cannot be accurately described in the arousal-valence space like «everyday» emotions. Four emotional dimensions that can accurately represent aesthetic emotions are found. Furthermore, the influence of personality on aesthetic emotions is assessed by noticing the differences in aesthetic scene ratings with regard to personality traits. Also, it is shown that aesthetic emotions can be predicted based on spectators' reactions (EDA and ACC signals).

To summarize, these promising results allow researchers to better understand processes involved in film aesthetic experience. Nevertheless, understanding of film aesthetic experience is a challenging task due to its complexity and subjective nature. Film aesthetic experience is influenced by several factors, such as personality, life experience, mood, and interest that are difficult to objectively quantify. The conclusion can be made that film aesthetic experience cannot be investigated without taking into account multimodal reactions of spectators in naturalistic conditions, e.g., watching movies together in a movie theater.



Doctorat thesis: Univ. Genève, 2018 - Sc. 5298 - 2018/12/20
http://archive-ouverte.unige.ch/unige:114609

Eugenio Noto

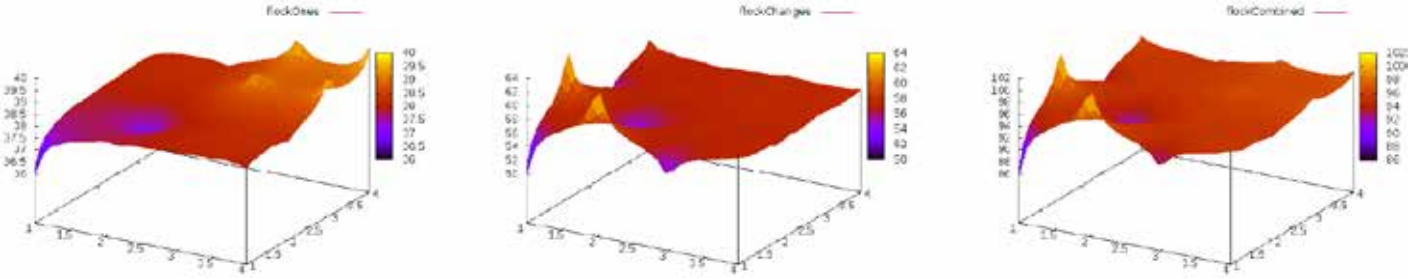
Doctor ès Sciences, mention Computer Science

30th July, 2018

Director: Prof. José Rolim

Energy complexity in population model protocols

Today, energy has a crucial function in electronic devices. Indeed, at a time where a person has electric machines with a processor inside like computers, phones, dishwashers and so on, a device that saves energy means an economy of money and a good thing for the environment. Another thing making the economy of energy important today is the mutiplication of electronic devices working with a battery. For all those devices such as smartphones, tablets, bluetooth loudspeakers etc. that more and more people carry with them, an energy efficient device means a longer duration of utilisation. In most specialised computer science domains, such as sensor networks, the energy is particularly crucial since it means the lifetime of the network. The list of examples of the importance of energy efficient devices is far from being exhaustive. Basically, everybody from the developper to the user has interest in having devices that manage well the energy consumption, and up to now, the research has been done mostly on the hardware but there is another approach. What if the energy consumption could be optimized not only thanks to a better conception of the device but also with the help of the software that is used?
In this thesis this approach will be treated and developed. In the beginning several definitions of energy measurement will be given that will be used to compute the energy consumption in the systems. With that, the atomic parts of a logical system that can be used to construct whatever electronical device and that can be used with the energy measures defined will be set, explaining why those choices are made. Several basic structures needed in real time systems are also built in order to see how they consume energy and to have a first idea of how a system will use his energy.
Then, since it is impossible to analyse all the possible devices at once, one type is chosen: the Population model protocol. The model will be defined, its properties will be checked and its possibilities of computations will be explored. With all that, the choice of this particular model instead of others will be justified due to its very good properties which are very positive for this kind of work. Then, thanks to the components defined, it will be explained how to complete a physical Population model protocol in which the energy consumption can be computed.
In the next part, the complexity of the Population model protocol will be studied in general. Due to the patterns used to build the systems, a method will be defined to compute the space complexity. Then, several mathematical tools will be defined and theorems will be proved in order to compute the time complexity and finally a formula to compute the energy consumption will be given. This part is very important for the proof that the energy consumption is a complexity value, so the link between energy time and space must be shown.
After that, several algorithms will be implemented in a dedicated architecture in order to get an energy consumption value that is the closest possible to the value of the algorithms and not to the physical architecture. Those algorithms will be compared and studied from all sides of the complexity.
In the end, the observations on the algorithms will be explained, with the conclusion that energy is a complexity value, the link between energy time and space will be provided for the case of Population model protocols and criteria to choose the best algorithm in therm of energy consumption will be given. Finally, the results obtained will be injected in other simple device architecture to get a clue if the results obtained for the Population model protocols are also usable for other systems.



Doctorat thesis: Univ. Genève, 2018 - Sc. 5243 - 2018/07/30
http://archive-ouverte.unige.ch/unige:107658

Arianna Religi

Doctor ès Sciences, mention Computer Science

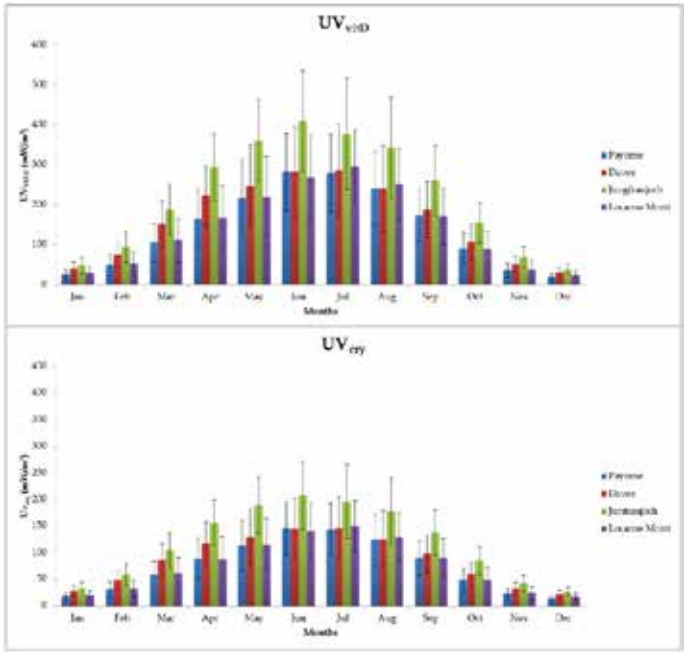
24th September, 2018

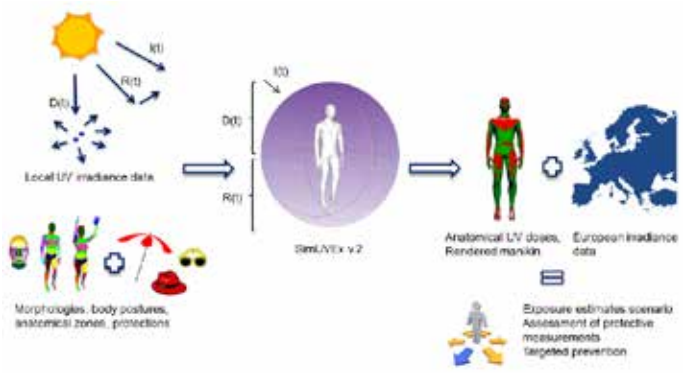
Directors: Prof. Stéphane Marchand-Maillet
Dr. Laurent Moccozet

Ground UV irradiance and 3D rendering techniques to predict anatomical solar UV exposure in skin cancer research and prevention

The solar ultraviolet (UV) radiation is one of the most relevant environmental factors for human health. While small amounts of UV can bear favourable effects and are essential in the production of vitamin D, protracted exposure may cause acute and chronic effects on skin, eyes and immune system. In particular, UV radiation has a significant influence on the premature ageing of the skin and on the development of skin cancers like cutaneous malignant melanoma (CMM), basal cell carcinoma (BCC) and squamous cell carcinoma (SCC). Over the past decades, because of the progressive increase in outdoor leisure activities, vacations in sunny regions and change in clothing habits, the incidence of skin cancer has sharply increased in many industrialised countries. On the other hand, studies suggest that upwards of 30–50% of children and adults are at risk of vitamin D deficiency. It is crucial then to estimate effective solar UV radiation needed for the vitamin D production and, at the same time, low enough to decrease sun damage risk. This research stems from this need, focusing on the existing gaps between the growing burden of both skin cancer and vitamin D deficiency and the tools available to assess and manage UV exposure, gathering competencies in different fields, such as 3D computing science (Centre Universitaire d'Informatique, Geneva, Switzerland), meteorology (MeteoSwiss, Payerne, Switzerland), public health (Institute for Work and Health, Lausanne, Switzerland) and epidemiology (Cancer Epidemiology Unit of the Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland).

Since UV exposure is highly heterogeneous and strongly influenced by host and behavioural factors, such as posture, orientation to the sun, skin complexion and clothing, a three-dimensional numeric model (SimUVEx) has been developed to assess the dose and distribution of anatomical UV exposure. The model uses 3D computer graphics techniques to compute UV radiance on the basis of ambient irradiation data without necessitating time-consuming individual dosimetry, ensuring a wide potential use in skin cancer prevention and research. With the purpose to improve simulation capabilities and obtain more realistic scenarios in quantifying effective sun protection strategies, a second version (SimUVEx v2.0) was released and will be illustrated within this thesis, describing the model and its validation analysis. Various sun protection estimates, both artificial (sunglasses, hats, shade structures) and natural (hair) will be investigated for facial zones, including eyes. Afterwards, some applications carried out within the project are shown moving from the individual basis and considering the whole Switzerland and some other countries with which we established a collaboration. In particular, our focus lied on: cloud effects on erythemally weighted UV radiation for estimating exposure ratio (in Switzerland and Sweden), estimation of an optimal UV exposure balance between vitamin D and skin damage (in Switzerland), measurements of UV reflection on coastal sand (in Spain) and on the analysis of the dynamic effect on exposure (in Germany). Finally the results of the project will be summarize, underlining some potential applications and an overview of future work areas.





Doctorat thesis: Univ. Genève, 2018 - Sc. 5277 - 2018/09/24
http://archive-ouverte.unige.ch/unige:112464

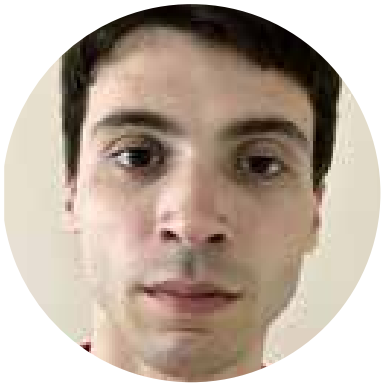
Felipe Simao Neto

Doctor ès Sciences, mention Bioinformatics

28th August, 2018

Directors: Prof. Evgeny Zdobnov
Dr. Frédérique Lisacek

De novo genomics of non-model arthropods



The extreme diversity of arthropods provides many opportunities for understating how ecological and genetic factors have interacted over the course of evolution. However, there is a marked imbalance on the genomic sampling of the arthropod tree of life due to a variety of reasons. Entire orders of basal arthropods have gone entirely unsampled in terms of genomic data, although they would be very informative for evolutionarily comparisons. This sparseness of available sequencing data is partially explained due to the inherent difficulties in sequencing organisms possessing both large genome sizes and high levels of heterozygosis, further compounded by an absence of inbred laboratory colonies for most of these clades. To enable genomic evolutionarily comparisons of early radiated arthropod lineages, we sequenced, de novo assembled, and annotated the genomes of several basal insects, including some previously unsampled arthropod orders, such Notoptera and Odonata.

Doctorat thesis: Univ. Genève, 2018 - Sc. 5254 - 2018/08/28
https://archive-ouverte.unige.ch/unige:109542

Isabelle Stevant

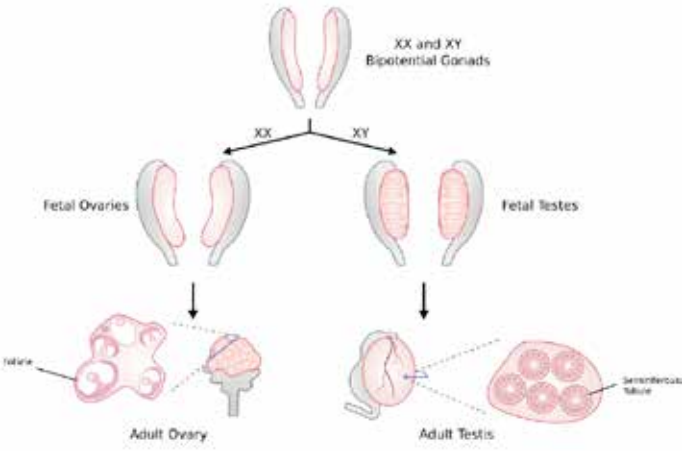
Doctor ès Sciences, mention Bioinformatics

29th March, 2018

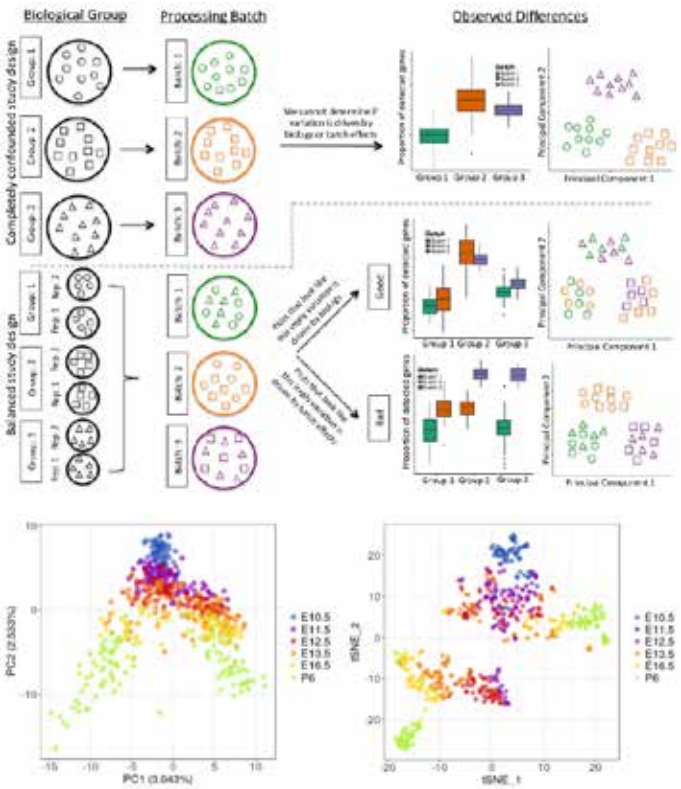
Directors: Prof. Serge Nef,
Prof. Emmanouil Dermitzakis
Dr. Frédérique Lisacek

Monitoring gonadal somatic cell differentiation during sex determination using single-cell RNA sequencing

Mammalian sex determination is a particularly interesting model to study cell fate decision. Depending on the genetic sex, the common gonadal primordiumis able to differentiate as two different organs, the testis and the ovary. The fate of this primordiumis determined by the presence or the absence of a short gene located on the Y chromosome: Sry (1,188 base pairs only). The supporting cell lineage is the first cell type to differentiate in the gonad. Its differentiation into either Sertoli (XY) or pre-granulosa (XX) cells determines the phenotypic sex of the individual. The expression of Sry in a sensitive window of time controls the differentiation of the supporting cells as Sertoli cells, while in the absence of Sry, the supporting cells differentiate as pre-granulosa cells through the activation of the WNT/¯-catenin pathway. Once committed, the supporting cells of both sex control the differentiation of the other somatic cells of the gonads, including the steroidogenic cells (theca cells in XX and Leydig cells in XY) that will secrete the hormones necessary for the development of the secondary sexual characteristics.
Numerous questions regarding sex determination remain. The cell composition of the bipotential gonad is a matter of debate. The classical model states the presence of two cell lineages, the supporting cells and the steroidogenic cells, prior to sex determination. Recent studies challenged this statement toward a common progenitor cell population but did not provide clear evidence. How and when these the cell lineages are specified remain unclear. After lineage specification, the cells operate sex determination by adopting their respective sex specific cell type. The precursors of the steroidogenic cells in both sex are still poorly characterised. While supporting cells differentiate cell autonomously as early as E11.5 in mouse, the steroidogenic cell lineage differentiation is delayed (E12.5 in XY, after birth in XX) and occurs under the influence of the committed supporting cells.



This PhD project aimed to dissect with single-cell RNA-sequencing the process of sex determination in mouse by characterising the transcriptomic changes occurring in the different somatic cell lineages from the bipotential state to advanced developing testes and ovaries. For this purpose, we proceeded to single-cell RNA sequencing of the gonadal somatic cells (NR5A1 expressing cells) from XX and XY mice at key stages of the gonad development. With cell lineage predictive algorithms and pseudotime ordering, we were able to reconstruct the chronology of events driving testis and ovary development, as well as sex fate decision in both supporting and steroidogenic cell lineages. We detected a single cell population prior sex determination that is able to specify into either supporting and steroidogenic fate. We characterised the dynamic of expression underlying the specification and the differentiation of these two cell lineages in both sex.
With this study we provide the most resolutive transcriptomic study of early gonadal development in both sex and revisit the classicalmodel of sex determination.



(a) First two PCs from a PCA, with the percentage of variance in the PCs (prcomp package, input: log(RPKM+1), centred, scaled)). **(b)** T-SNE representation (Rtsne package, input: 9 PCs from prcomp, 5000 iterations, default perplexity (30).

Doctorat thesis: Univ. Genève, 2018 - Sc. 5200 - 2018/03/29
http://archive-ouverte.unige.ch/unige:105840

Yvain Tisserand

Doctor ès Sciences, mention Computer Science

19th February, 2018

Directors: Prof. Nadia Magnenat-Thalmann
Prof. José Rolim

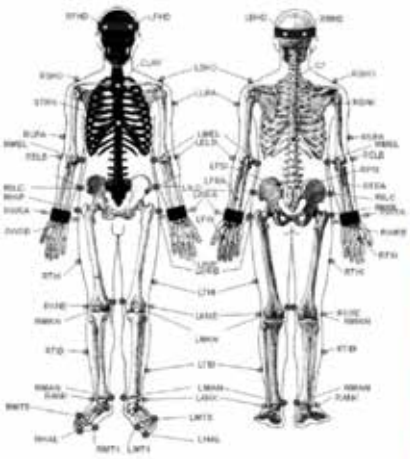
Fast prototyping and deformation of virtual humans

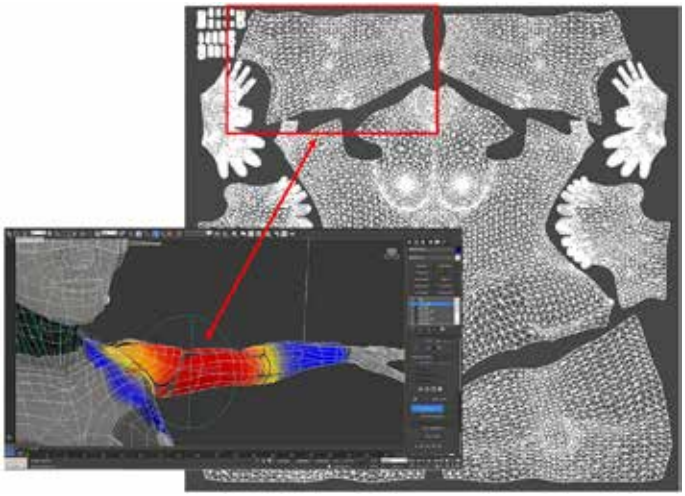
A virtual human is a model of the physical human body with simulated human behaviours in three-dimensional environments. The creation of virtual representations of real humans is a challenging task that has been investigated for the last three decades. It utilizes a multi-dimensional approach that is used extensively in computer graphics and computer animation applications, and it also involves various fields, such as body modelling, body and face deformation methods, hair simulation, virtual clothing, or emotion recognition and simulation. This work focuses on facilitating and improving the process of the representation and animation of virtual humans so that they can be used in a wide range of real-time applications. Investigations and contributions to the different steps of the virtual human creation and animation pipeline are detailed in this thesis. The aim of this work is to improve some of the existing procedures involved in the creation of a virtual human by reducing the cost factor, enhancing automation and improving realism. Within this work, we focus on three main areas of virtual human creation: (i) body modelling, (ii) virtual clothing, and (iii) real-time body deformation.

Firstly, body modelling of humans is implemented using a cost-efficient imagebased 3D scanner. A method to reduce computational time, noise and artefacts on the reconstructed 3D avatar is incorporated into the existing photogrammetry reconstruction pipeline, and a pre-processing step prior to the reconstruction is added. By applying Primatte chroma key algorithm to the pictures taken, the quantity of data to be analyzed and processed during the 3D reconstruction is reduced. Thus, the obtained model is more accurate and the processing time is drastically reduced.

Secondly, virtual human clothing is approached. Positioning virtual garments onto a 3D avatar is known to be a time-consuming process. An automatic method based on surface energy minimization that allows for the automatic positioning of a 3D virtual cloth without deformation of the pattern is our contribution in this domain. The minimum of surface energy is reached by animating the humanoid avatar. Humanoid joints are manipulated to place a 3D avatar into the virtual garment.

Finally, a triple-pass deformation method to improve the skin deformation of virtual humans for real-time environments is investigated. The deformation quality is enhanced by combining kinematic data with anatomical and physiological data. By using a 2D representation of surface muscles, we propose to generate real-time deformation based on muscle activity. The deformation provides visually convincing results of virtual human skin movement during animations.





Doctorat thesis: Univ. Genève, 2018 - Sc. 5186 - 2018/02/19
http://archive-ouverte.unige.ch/unige:105665

Christiana Tsiourti

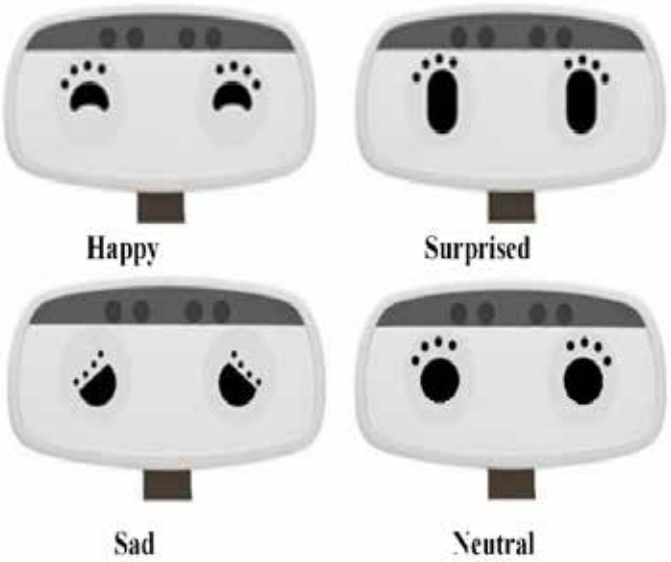
Doctor ès Economy and Management, mention Information Systems

22th June, 2019

Directors: Prof. Dimitri Konstantas
Prof. Katarzyna Wac

Artificial agents as social companions: design guidelines for emotional interactions

Socially intelligent agents are virtual agents or robots capable of exhibiting natural-appearing social and emotional intelligence. A core requirement for such agents is the ability to establish and maintain engaging relationships with their
human users. Socially intelligent virtual agents and robots are becoming increasingly prominent, taking on a variety of everyday life roles, including assistants, tutors, coaches, and even social companions. Such systems have the potential to enhance the quality of life of a broad population of users: the elderly, individuals with physical impairments or in rehabilitation therapy, and individuals with cognitive, developmental and social disorders.
Much research has already been done on the development of socially intelligent agents in Affective Computing, Social Robotics, Human-Computer Interaction (HCI) and Human-Robot Interaction (HRI). Nevertheless, the task of designing socially intelligent embodied systems, able to engage in natural interaction with human users, is an open research area with numerous interesting questions and challenges. Social interactions are complex, and designers need to determine ways to design social and affective behaviours, which would allow human users to establish bonds with virtual agents and robots, of the nature similar to those formed with other humans (e.g., a companion, a partner or a friend). Specifically, artificial companions aiding human users must be capable of sensing, processing and interpreting information about the user and the context in which the interaction takes place. In addition, companions must effectively interact with users, displaying natural communicative behaviour that is acceptable, believable and appealing to the user. Social acceptance is another major challenge. Designers need to understand the circumstances in which people (especially those with special needs) accept an artificial companion in their environment and the factors that influence long-term engagement, beyond the novelty effect.
This cumulative dissertation includes five original scientific papers whose purpose is to explore some of the abovementioned fundamental questions regarding the design and development of socially intelligent virtual agents and robots, and the evaluation of their effectiveness as affective artificial companions. This work is focused on three core aspects of research. The first part of the dissertation addresses the ability to sense and recognise a user's affective states. This is a core requirement of artificial companions, in order to
become more human-like, more effective, and more efficient. In a face-to-face interaction, humans detect and interpret nonverbal communicative cues (i.e., facial expressions, body movements, vocal and physiological reactions) with little or no effort. Yet the design and development of artificial agents that accomplish this task in real-world environments is still challenging. In the context of this dissertation, the use of psychophysiological signals which reflect autonomic nervous system (ANS) activity are discussed as a possible way to recognise a user's affective states. A systematic literature review is presented, which surveys 173 publications reporting research studies on ANS activity in emotion, with emphasis on the study design and sensor devices employed. The findings of this theoretical investigation are distilled into a set of guidelines and recommendations for the successful measurement of emotion-relevant physiological activation in real-world environments.
The second part of the dissertation addresses the synthesis and expression of emotions through robotic embodiments. An artificial companion must be endowed with mechanisms for expressing social, affective behaviour. This includes non-verbal (e.g., facial and bodily expressions) and verbal communicative cues. Two empirical HRI user studies are presented, which investigate how people perceive different verbal and non-verbal communication (facial and bodily expressions, non-verbal vocalisations) modalities and their combinations, within the context of social interactions with humanoid robots. These studies aim to develop guidelines on how to use and combine verbal and non-verbal communicative cues to design behaviours that convey the affective states and intentions of robots in a way that is recognisable and believable, within the context of social HRI scenarios.
Finally, in order to illustrate the concept of artificial companions, in the third part of the dissertation, a real-world use-case is presented, from the application domain of elderly care. In this scenario, a virtual agent is discussed as a possible daily life companion that supports ageing-in-place and independent living for older adults. The virtual agent tries to develop a long-lasting "companionship" with users, by chatting, informing, entertaining, comforting and assisting the execution of daily tasks, without making any technical demands. First, a user-centred design study is discussed which investigates requirements on social skills for such a companion. Next, an evaluation study is presented where an artificial companion prototype system is deployed in the homes of twenty older adults for twelve weeks. The experimental results of these two studies provide the foundation for the development of design guidelines for social behaviour (i.e., appearance, social skills, tasks) that is comfortable and acceptable to older adults.



Doctorat thesis: Univ. Genève, 2018 - GSEM 59 - 2018/06/22
http://archive-ouverte.unige.ch/unige:110600

Administrative Staff


Marie-France Culebras


Anne-Isabelle Giuntini


Coralie Grossrieder


Maëlle Saintilan


Séverine Walter

The administrative staff of CUI is dedicated to serving at its best the community of researchers, teachers and students. Essentially covering four domains :

Administration: Its role is to manage the CUI budget, logistics, communication, etc. It also manages the Web site, the production of documents (activity report, flyers, etc.) as well as the organization and coordination of public and promotional events such as the book and student fair (Salon du Livre et de l'Etudiant)

- **Elie Zagury** is direction assistant.

Secretariat: Works at the departments level of CUI. Hiring and contract renewals of doctoral students as well as all the tasks related to CUI operations are handled by the secretariat. It also provides a perfect connection to major University services such as HR, accounting, etc.

- **Marie-France Culebras** is secretary;
- **Anne-Isabelle Giuntini** is part-time secretary (50%);
- **Coralie Grossrieder** is secretary;
- **Maëlle Saintilan** is part-time secretary (50%);
- **Séverine Walter** is part-time (40%) student secretary, since July 2017.

IT: Two systems-engineers manage the basic computer infrastructure of CUI (data storage, backups, servers, network, etc.) using Linux, Mac and Windows. Their help and support is appreciated daily by the whole CUI community. This service works closely with the University IT Division.

- **Nicolas Mayencourt** is system-engineer;
- **Daniel Agulleiro** is system-engineer.


Daniel Agulleiro


Nicolas Mayencourt


Elie Zagury

Library: The CUI Library provides services and tasks as any specialized library of an universitary center. It is part of the library network of the University of Geneva (http://www.unige.ch/biblio/sciences/infos/cui.html) and is proud to offer some specifities in its field. Its current collection contains approximately 10'000 books and 25 specialized print journals.

- **Amélia Marcelino** is head librarian.


Amélia Marcelino

Financial Report

CUI

Staff	CHF 926'684.-
• Academic	CHF 298'643.-
• Administrative and Technical	CHF 452'749.-
• Employer's social contributions	CHF 175'292.-
Operating costs - Investment	CHF 62'800.-
Operating costs - Others	CHF 182'950.-
CUI subtotal	**CHF 1'172'434.-**

Faculty of sciences (Computer Science Department)

Staff	CHF 3'107'551.-
• Academic	CHF 2'367'513.-
• Administrative and Technical	CHF 152'858.-
• Employer's social contributions	CHF 587'180.-
Operating costs - Investment	CHF 74'074.-
Operating costs - Others	CHF 33'840.-
Sciences subtotal	**CHF 3'215'465.-**

Geneva School of economics and management

Staff	CHF 730'329.-
• Academic	CHF 588'657.-
• Employer's social contributions	CHF 141'672.-
Economics and management subtotal	**CHF 730'329.-**

Geneva School of Social Sciences

Staff	CHF 576'573.-
• Academic	CHF 466'264.-
• Employer's social contributions	CHF 110'309.-
Social Sciences subtotal	**CHF 576'573.-**

Faculty of humanities (Unit of Computer Science for the Humanities)

Staff - Academic, incl. Charges (estimation)	CHF 579'389.-
Operating costs	CHF 20'000.-
Humanities subtotal	**CHF 599'389.-**

TOTAL BUDGET **CHF 6'294'190.-**

External funding obtained by the professors	Credit
CUI	
UE-funded Projects	CHF 939'297.-
Swiss-funded Projects	CHF 740'750.-
CUI subtotal	**CHF 1'680'047.-**
Faculty of sciences (Computer Science Department)	
UE-funded Projects	CHF 570'798.-
Swiss-funded Projects	CHF 785'422.-
Sciences subtotal	**CHF 1'356'220.-**
Geneva School of economics and management	
UE-funded Projects	CHF 1'260'081.-
Swiss-funded Projects	CHF 357'677.-
Economics and management subtotal	**CHF 1'617'758.-**
Geneva School of Social Sciences	
UE-funded Projects	CHF 0.-
Swiss-funded Projects	CHF 113'571.-
Social Sciences subtotal	**CHF 113'571.-**
Faculty of humanities (Unit of Computer Science for the Humanities)	
UE-funded Projects	CHF 0.-
Swiss-funded Projects	CHF 0.-
Humanities subtotal	**CHF 0.-**
TOTAL CREDIT	**CHF 4'767'596.-**

TecDay
Collège de Candolle, *Geneva*
2019 April 4th

« Cryptographie » animation

Infoscope
Battelle, Carouge
2018 May 14th

Miguel De Bruyne (CUI student) and Aslam Cader (Computer Science student), animators for Infoscope. « Jeu mobile » animation

TecDay
Collège de Candolle, *Geneva*
2019 April 4th

Some students experimenting « Post-numérisation » animation

(R)amène ta science
C.O. Vuillonex, *Geneva*
2019 April 12th

« Cryptographie » animation

Infoscope
Battelle, Carouge

CUI customized cardboards for « VR/AR » animation

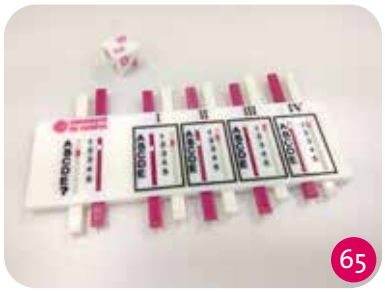
Infoscope
Battelle, Carouge
2018 May 14th

Student experimenting « Jeu mobile » animation

TecDay
College de Candolle, Geneva
2019 April 4th

Raphaël Lutz (Computer science student), animator for Infoscope. « Jeu mobile » animation.

Infoscope
Battelle, Carouge



Special board 3D-printed by CUI for « Algorithmique collective » animation

Nuit de la science
Parc de la Perle du Lac, Geneva
2018 July 7th

Two yound visitors experimenting « VR/AR » animation

Nuit de la science
Parc de la Perle du Lac, Geneva
2018 July 7th

Théo Giovanna (Computer Science student), animator for Infoscope. « Trie-toi, toi même! » animation

illustrations CUI UNIGE

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Battelle - Bâtiment A
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UNIVERSITÉ DE GENÈVE