RESEARCH CENTER
Sophia Antipolis - Méditerranée

FIELD

Activity Report 2019

Section Highlights of the Team

ABS Project-Team (section vide)

ACUMES Project-Team (section vide)

AROMATH Project-Team (section vide)

ATHENA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Maureen Clerc left the group and took up her new position as new Director and Head of the Inria Sophia Antipolis - Méditerranée research centre on 8 November 2019.

5.1.1. *Awards*

The European Association for Signal Processing (EURASIP) elevated on Sept. 2019 Rachid DERICHE to EURASIP FELLOW, the Association's most prestigious honour in recognition of outstanding achievements in the broad field of Signal Processing and in particular in Computational Brain Imaging.

November 22nd 2019, Université Côte d'Azur officially launched its new Institute of artificial intelligence *3IA Côte d'Azur*. Rachid Deriche and Maureen Clerc are among the 27 awarded 3IA chairs.

BIOCORE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Highlights

- The patented approach to produce microalgae under a biofilm form was further optimized with gradient based approaches [71] and strategies to still enhance productivities were identified and tested experimentally [26].

- The introduction of resistant plants for the protection against pathogens often leads to the appearance of virulent pathogenic strains that are capable of infecting these resistant plants. We developed a model for the pyramiding of these qualitative resistances with genetically controlled infection bottlenecks, and showed the efficiency of this technique when the fitness cost of Resistance Breaking pathogen variants in susceptible plants is intermediate [36].

- In the context of ANR project ICycle, following the PhD thesis of Sofia Almeida and in collaboration with F. Delaunay's lab (Institut Biologie Valrose, CNRS), a calibrated and validated model of the mammalian circadian clock was published in [13]. The interactions between the circadian clock and the cell cycle were then investigated [44]. The coupled models replicate the oscillators' period-lock response and recover clock to cell cycle period ratios such as 1:1 or 3:2, as observed in F. Delaunay's lab.

5.1.2. Awards

- Lucie Chambon and J.-L. Gouzé won a Best Paper award at the DYCOPS conference in Brazil (April 2019), on original control strategies for the genetic toggle switch.

BEST PAPERS AWARDS :

[46]

L. CHAMBON, J.-L. GOUZÉ.*A new qualitative control strategy for the genetic Toggle Switch*, in "DYCOPS 2019 - 12th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems", Florianopolis, Brazil, B. CHACHUAT, O. BERNARD, J. E. NORMEY-RICO (editors), IFAC-PapersOnLine, Ifac, 2019, vol. 52, n⁰ 1, p. 532-537 [*DOI :* 10.1016/J.IFACOL.2019.06.117], https://hal.inria.fr/hal-02319873

<p align="center">**BIOVISION Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

In November 2019, the Biovision project team recruited Dr. Aurelie Calabrèse as a "Starting Research Position" for a 3-year period. A. Calabrèse is a psychophysicist specialized in visual neuroscience with a strong clinical expertise. She has done extensive work on enhancing further the methods to detect and measure reading deficit in low-vision populations. She has extensive practice in experimenting with visually impaired individuals and will be a great asset to bridge the gap between development and validation of assistive technology solutions.

CAMIN Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Student Paper price: X. Lu, D. Guiraud, S. Renaux, T. Similowski, C. Azevedo-Coste, "Monitoring phrenic nerve stimulation-induced breathing via tracheal sounds", the 58th International Spinal Cord Society Annual Scientific Meeting (ISCoS), Nice, France, 2019

Student Paper competition Finalist: L. Fonseca, A. Bo, D. Guiraud, B. Navarro, A. Gelis and C. Azevedo-Coste, "Investigating Upper Limb Movement Classification on Users with Tetraplegia as a Possible Neuro-prosthesis Interface," 2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Honolulu, USA, 2018, pp. 5053-5056.

CASTOR Project-Team (section vide)

CHORALE Team (section vide)

COATI Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Julien Bensmail: "Jeunes Talents France-Chine" funding for one travel to China in 2019;

- Christelle Caillouet: UCA Excellence award;

- Emilio Cruciani: recipient of a 2019 Testing and Verification research award;

- François Dross: recipient of an accessit to the PhD prize Graphes "Charles Delorme" 2019 for his PhD entitled *Vertex partition of sparse graphs* [87];

- William Lochet: recipient of the PhD prize Graphes "Charles Delorme" 2019 for his PhD entitled *Substructures in digraphs* [92];

- Emanuele Natale: awarded the "Best Italian Young Researcher in Theoretical Computer Science" by the Italian Chapter of the EATCS.

5.1.2. Promotions

- Patricia Riveill: promoted to Administrative Engineer.

BEST PAPERS AWARDS :

[47]

C. CAILLOUET, T. RAZAFINDRALAMBO, D. ZORBAS.*Optimal placement of drones for fast sensor energy replenishment using wireless power transfer*, in "WD 2019 - Wireless Days 2019", Manchester, United Kingdom, April 2019, Best Paper Award, https://hal.inria.fr/hal-02043123

COFFEE Project-Team (section vide)

DATASHAPE Project-Team (section vide)

<p style="text-align:center;color:red;font-weight:bold;">DIANA Project-Team</p>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Ekinops

We have started a collaboration with EKINOPS on the topic of Multi-access Edge Computing. The activity started with a CIFRE thesis. The PhD student Mamoutou Diarra started his PhD on this topic on November 2019.

4.1.2. ACM CoNEXT 2019 Artefact Evaluation Committee

As a continuation of our long lasting efforts in encouraging reproducibility [17], Damien Saucez and Mohamed Naoufal Mahfoudi from our project-team have co-chaired the ACM CoNEXT 2019 Artefact Evaluation Committee. In 2019, 11 papers out of the 32 accepted at the conference have requested for being evaluated, resulting in 10 artefacts being awarding with a badge. Interestingly, we are witnessing an important improvement in the quality of the artefacts proposed by the SIGCOMM community.

ECUADOR Project-Team (section vide)

EPIONE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

- Nicholas Ayache, Hervé Delingette, Marco Lorenzi, Xavier Pennec, and Maxime Sermesant were awarded a chair at the institute *3IA Côte d'Azur* focused on artificial intelligence.
- Hervé Delingette was elected a Fellow of MICCAI society at MICCAI 2019 : http://www.miccai.org/about-miccai/miccai-fellows/
- Julian Krebs received the Best Presenter Award at the workshop STACOM for his presentation of the paper
- Marco Lorenzi was awarded a Contrat jeune chercheur by the National Research Agency (ANR) for his Fed-BioMed project.
- Sara Garbarino was awarded the IPMI 2019 Erbsmann Award for her paper entitled "Modeling and inference of spatio-temporal protein dynamics across brain networks".
- Nicholas Ayache was awarded the Grand Prize of the City of Nice by the Mayor of Nice, at the Villa Masséna, on May 24, 2019.
- Maxime Sermesant received the Innovator of the Year Award by CentraleSupelec on January 21st, 2019.
- Yann Thanwerdas was nominated among the 5 running papers for the best paper award at the Geometric Sciences of Information conference GSI' 2019 at ENAC in Toulouse.

4.1.2. Dissemination

- Publication of the book *Riemannian Geometric Statistics in Medical Image Analysis* [53] edited by Xavier Pennec, Stefan Sommer and Tom Fletcher, 3rd volume of "The Elsevier and MICCAI Society book series". The book contains 5 introductory chapters on the methodological foundations by Xavier Pennec, Tom Fletcher, Stefan Sommer, Stephen Marsland and Marco Lorenzi, and 11 contributed chapters on applications, including a chapter by Nina Miolane, Loic Devillier and Xavier Pennec.
- Publication of the book *Voir l'invisible - Tome 2, Comprendre, Agir* by the Collectif Amir with Maxime Sermesant as one of the scientific contributors. The second version of the book informs the public reader of the latest innovations in science and technology from different fields.
- Organization of the scientific program of the conference "The Academie des sciences in Nice and Sophia Antipolis" by N. Ayache in June 20-21, 2019.

BEST PAPERS AWARDS :

[40]

J. KREBS, T. MANSI, N. AYACHE, H. DELINGETTE.*Probabilistic Motion Modeling from Medical Image Sequences: Application to Cardiac Cine-MRI*, in "STACOM 2019 - 10th Workshop on Statistical Atlases and Computational Modelling of the Heart", Shenzhen, China, October 2019, https://arxiv.org/abs/1907.13524 - Probabilistic Motion Model, Motion Tracking, Temporal Super-Resolution, Diffeomorphic Registration, Temporal Variational Autoencoder, https://hal.inria.fr/hal-02239318

[48]

S. GARBARINO, M. LORENZI.*Modeling and Inference of Spatio-Temporal Protein Dynamics Across Brain Networks*, in "IPMI 2019 - 26th International Conference on Information Processing in Medical Imaging", Hong-Kong, China, LNCS, Springer, 2019, vol. 11492, p. 57-69, https://hal.inria.fr/hal-02165021

FACTAS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Robotic tuning: a nice outcome of our long lasting experience in the field of computer assisted tuning for microwave devices

A contract was signed with the French small and midsize business (SMB) Inoveos for the realization of a robotic prototype for the mass tuning of microwave devices. In addition to Inria, this project includes the university of Limoges Xlim and the engineering center Cisteme https://cisteme.net. Our team will be responsible of the driving software of the robot based on our long lasting experience in circuit extraction methods and in connection with our tools Presto-HF and Dedale-HF. Among the technical and scientific challenges for us on this project we can list:

- Improvement of the computational efficiency of our circuit methods in order to be compatible with real-time measurements techniques of filter. Typically a circuital extraction needs to be performed in less than 1 second when dealing with a filter of order 10.

- Handling the ambiguity resulting from the use of multiple solutions coupling topologies yielding several equivalent circuits for a single DUT (device under tuning).

<p style="text-align:center;color:red;font-weight:bold;">FOCUS Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Ugo Dal Lago has been awarded an ERC CoG for his project "Differential Program Semantics" (DIAPASoN), which started on March 1st, 2019.

- Francesco Gavazzo has received the award for "Best Italian PhD Thesis in Theoretical Computer Science", by the Italian Chapter of EATCS (European Association for Theoretical Computer Science)

- Raphaëlle Crubillé has been awarded the "prix de thèse Gilles Kahn 2019 (Societé Informatique de France and Académie des Sciences)

GRAPHDECO Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The SIGGRAPH paper "Multi-view relighting using a geometry-aware network" by J. Philip et al. [19] was presented at the Adobe Max event in November 2019 in San Fransisco. The project was part of the 11 projects selected out of 200 to be presented at Adobe MAX under the name project #LightRightSneak (Link to the video of the event).

G. Drettakis presented at the French Academy of Sciences days at Sophia-Antipolis in June: video on the Academy of Sciences site.

4.1.1. Awards

Jean-Dominique Favreau (co-supervised with the TITANE team) received the best Ph.D. thesis award 2019 (assessit prize) from IGRV.

<p style="text-align:center; color:red">GRAPHIK Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

- One of our papers ([15]) has been recognized as a **highlight of the year 2020** of the INRA department CEPIA.

- The SudoQual engine, which was developed in the context of the Qualinca research project (2012-2016), has been reused by ABES (the French National Agency for Academic Libraries) to build Paprika, a professional tool for documentalists, released this year (https://paprika.idref.fr/). SudoQual/Paprika is devoted to data curation in the context of bibliographic databases.

<p style="text-align:center">**HEPHAISTOS Project-Team**</p>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Science

- strong advances on the analysis of cable-driven parallel robots (section 6.1.1)
- first results the daily activities monitoring in a day hospital (section 6.2)

4.1.2. Experimentation

- Two months experimentation of a very large cable-driven parallel robot for an artistic exhibition (section 6.1.2)
- Completion of the second version of our immersive environment for rehabilitation (section 5.3.2.1)

INDES Project-Team (section vide)

Kairos Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- New Collaboration with Renault Software Labs - CIFRE starting in April 2019
- ANR Project on the verification of smart contracts on the use of multi-modalities transportations in the smart city - AAPG 2019 PRCE

5.1.1. Awards

Frederic Mallet is Laureate of the program 'Jeune Talent France Chine 2019' from French Embassy in China.

<p align="center" style="color:red">LEMON Project-Team</p>

4. Highlights of the Year

4.1. Highlights of the Year

- Antoine Rousseau and Cécile Choley have participated to the Climate Change Conference (COP25) in Madrid.
- Year 2019 has been a year with lots of changes for the team with 4 new members and 1 departure:
    - Since October 2019, Fátima Palacios Rodríguez is hired as associate professor at the *Departement Economía Financiera Actuarial y Estadística de Facultad de Ciencias Económicas y Empresariales de Universidad Complutense de Madrid*
    - 4 new members joined the team in 2019: Pascal Finaud-Guyot (associate professor at the Montpellier University, Laboratory HydroSciences Montpellier) has a permanent member and Cécile Choley (PhD, funding: ANR Project DEUFI), Vita Ayoub (PhD, funding: Luxembourg National Research Fund) and Yassine Bel-Ghaddar (PhD, funding: Bourse CIFRE ANRT).

MATHNEURO Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Ariane Delrocq received on 29th November 2019, a price from Ecole Polytechnique Paris for her research internship co-supervised by E. Deval and R. Veltz.

MCTAO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Laetita Giraldi has been awarded the price "My Innovation is" by SATT Sud & Corse for her research project on the control of swimming microbots.

MORPHEME Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Luca Calatroni get a CNRS position as scientist and joined the team in october 2019.

NACHOS Project-Team (section vide)

NEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Maximilien Dreveton, PhD student in NEO, has co-authored a book: *Leçons pour l'agrégation de mathématiques* [61].

The members of NEO have edited three collections: [64], [65], [66]. One collection is a result of the very successful EU Project CONGAS: Multilevel Strategic Interaction Game Models for Complex Networks.

Sara Alouf has been elected member of the Board of Directors of the ACM SIGMETRICS.

A workshop in the honor of Eitan Altman, at the occasion of his 60th birthday, took place at the University of Avignon on June, 3rd, 2019. Recordings of the presentations are available, see https://www.canal-u.tv/producteurs/universite_d_avignon_et_des_pays_de_vaucluse/colloque/wiopt_2019.

PRIVATICS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

PRIVATICS members have written several position documents for policy makers: a report on facial recognition, algorithmic decision-making, pseudonymisation and a white book on cybersecurity.

STAMP Project-Team (section vide)

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. *People detection*

People detection is a very challenging topic, where many top-level research groups are competing and have already proposed impressive approaches (e.g. Faster-RCNN, SSD, YOLO). Yet, we were able to design a novel algorithm able to better balance the speed and accuracy trade-off on the most challenging pedestrian detection benchmarks (e.g. Caltech and Citypersons).

4.1.2. *Person Re-Identification*

Person Re-Identification is a very challenging task, where current Computer Vision algorithms manage to obtain better results than humans. By proposing a simple and elegant technique, based on Spatial-Channel Partitions, we have obtained the best performance compared to the State-of-the-art approaches on the most popular benchmark datasets (e.g. Market-1501, CUHK03 and MARS).

4.1.3. *Action recognition*

This year, we have proposed several action recognition approaches able to outperform the State-of-the-art algorithms and get nearly maximal performance on most of ADL benchmark video datasets (e.g. Northwestern-UCLA Multiview Action 3D, NTUTU-RGB and DAHLIA). We have also released a novel ADL benchmark video dataset, which is more challenging, as it has been collected within real-world settings.

4.1.4. *Awards*

Antitza Dantcheva and Abhijit Das recceived a Best Poster Award at the 14th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2019) in Lille, France (the flagship face analysis conference) for the paper: "Robust remote heart rate estimation from face utilizing spatial-temporal attention" [28].

<p style="text-align:center;color:red;font-weight:bold;">TITANE Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

Pierre Alliez was program co-chair of the EUROGRAPHICS 2019 conference and of the Symposium on Solid and Physical Modeling (SPM). From February 2019 Yuliya Tarabalka is on leave to the Luxcarta company for two years.

5.1.1. *Awards*

Cédric Portaneri and Pierre Alliez obtained a best paper award at the ACM Conference on Multimedia Systems for a contribution to the progressive compression of textured meshes, in collaboration with the Draco team from Google. Jean-Philippe Bauchet obtained an award for the best presentation at a national workshop (GMTG 2019). Jean-Dominique Favreau received the best PhD thesis award 2019 (assessit prize) from IG-RV. Onur Tasar was part of the winning team of the tomtom AI summer school challenge organized in the Netherlands.

TOSCA Team (section vide)

WIMMICS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

28th International Joint Conference on Artificial Intelligence (IJCAI-2019) Runner-up (second place) for the Application Impact Award for the paper "DISPUTool – A tool for the Argumentative Analysis of Political Debates", for Shohreh Haddadan, Serena Villata and Elena Cabrio [22].

Best Poster Runners-Up at the 34th ACM/SIGAPP Symposium On Applied Computing (SAC 2019), for the paper: Pinar Arslan, Michele Corazza, Elena Cabrio, Serena Villata, *Overwhelmed by negative emotions?: maybe you are being cyber-bullied!* [7].

Hai Huang and Fabien Gandon received the Université Côte d'Azur Research Award.

Fabien Gandon, Andrea Tettamanzi and Serena Villata were nominated Fellow of the 3IA Côte d'Azur.

5.1.1. *Awards*

BEST PAPERS AWARDS :

[24]

H. HUANG, F. GANDON.*Learning URI Selection Criteria to Improve the Crawling of Linked Open Data*, in "ESWC2019 - 16th Extended Semantic Web Conference", Portoroz, Slovenia, June 2019, https://hal.inria.fr/hal-02073854

[33]

S. REN, S. LETZ, Y. ORLAREY, R. MICHON, D. FOBER, M. BUFFA, E. AMMARI, J. LEBRUN.*FAUST online IDE: dynamically compile and publish FAUST code as WebAudio Plugins*, in "WAC 2019 - 5th Web Audio Conference", Trindheim, Norway, December 2019, https://hal.inria.fr/hal-02366725

ZENITH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Antoine Liutkus and Fabian Stoter won the second place at the Global Pytorch Summer Hackaton 2019 organized by FaceBook with the open-unmix software.
- Antoine Liutkus obtained the *Outstanding Reviewer Award* from IEEE.
- Vitor Silva obtained the *best PhD thesis award* from SBBD.

5.1.2. Software

The Pl@ntNet mobile application reached its ten million downloads.