



RESEARCH CENTER
Sophia Antipolis - Méditerranée

FIELD

Activity Report 2017

Section Contracts and Grants with Industry

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AROMATH Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

MISSLER Software provided a grant to the team AROMATH, related to the collaboration on geometric modeling methods for toolpath generation and machining.

DATASHAPE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Collaboration with Sysnav, a French SME with world leading expertise in navigation and geopositioning in extreme environments, on TDA, geometric approaches and machine learning for the analysis of movements of pedestrians and patients equipped with inertial sensors (CIFRE PhD of Bertrand Beaufile).
- Collaboration with Fujitsu on TDA and Machine learning (started in Dec 2017).

8.2. Bilateral Grants with Industry

- DATASHAPE and Sysnav have been selected for the ANR/DGA Challenge MALIN (funding: 700 kEuros) in September 2017.

KAIROS Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. *IRT Saint-Exupery ATIPPIC project*

Participants: Robert de Simone, Julien Deantoni, Amin Oueslati.

We are collaborating here with Thales Alenia Space and some of their partners, with engineering forces put in secondment to the direct governance of IRT Saint-Exupery, on the topic of introducing COTS processor usage for satellite mission systems, with the corresponding methodological needs (sharing software tasks on a single (multi)processor, with safety-critical constraints against cosmic radiations). We attempt to make this a show-case study for our formal model-based design approach.

7.1.2. *GLoSE project of the SAFRAN DESIR research programme*

Participants: Robert de Simone, Julien Deantoni, Giovanni Liboni, Frédéric Mallet.

SAFRAN tech set up a collaborative research programme with the major French academic partners in the field of Embedded Systems and Data Analytics, named DESIR. Robert de Simone is Prime Investigator for the Embedded System side. Julien DeAntoni heads a specific research project of this programme, named GloSE (Globalization in Systems Engineering), on co-modeling and co-design to enable co-simulation using enhanced FMU/FMI interfaces. A new PhD thesis should start early next year under a related CIFRE grant, with Giovanni Liboni as PhD candidate (he was with us already as intern last Spring).

MARELLE Project-Team (section vide)

ACUMES Project-Team (section vide)

APICS Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

6.1.1. Contract CNES-Inria-XLIM

This contract (reference Inria: 11282) accompanies the PhD of David Martinez and focuses on the development of efficient techniques for the design of matching network tailored for frequency varying loads. Applications of the latter to the design output multiplexers occurring in space applications will be considered.

6.1.2. Contract BESA GmbH-Inria

This is a research agreement between Inria (Apics and Athena teams) and the German company BESA ⁰, which deals with head conductivity estimation and co-advising of the doctoral work of C. Papageorgakis, see Section 5.1.3 . BESA is funding half of the corresponding research grant, the other half is supported by Region PACA (BDO), see Section 1 .

6.1.3. Contract Inria-SKAVENJI

This is a scientific consulting activity for the start-up company SKAVENJI. The latter develops an innovative and communicative device to facilitate the production and home consumption of small amounts of energy, produced by one or more local sources of renewable energy. Ongoing work consists in designing a simple controller improving the energy efficiency of the energy production while minimizing the number of charge and discharge cycles of the associated battery. The retained control strategy is based on consumption and production profiles.

⁰<http://www.besa.de/>

ECUADOR Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Ecuador and Lemma have a bilateral contract to share the results of Stephen Wornom, Lemma engineer provided to Inria and hosted by Inria under a Inria-Lemma contract.
- Ecuador and EDF had a three months contract to study the adjoint differentiation of the hydrology code Mascaret.

MCTAO Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contract with Industry: CNES - Inria - UB Contract

Contract number: 130777/00. Call Number: R-S13/BS-005-012

"Perturbations and averaging for low thrust" (Poussée faible et moyennation).

Research contract between CNES and MCTAO (both the Inria and the Université de Bourgogne parts). It run from 2014 till mid-2017. It concerned averaging techniques in orbit transfers around the earth while taking into account many perturbations of the main force (gravity for the earth considered as circular). The objective was to validate numerically and theoretically the approximations made by using averaging, and to propose methods that refine the approximation. It has co-funded the PhD thesis of Jérémy Rouot (defended in October, 2016, also co-funded by Région PACA) and fully funded the postdoc of Florentina Nicolau and 2016 [9], [8] and the postdoc of Lamberto dell'Elce this year.

NACHOS Project-Team (section vide)

TOSCA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- M. Deaconu is involved in a bilateral contract with Venathec. She is supervising, with E. Vincent (EPI Multispeech), the Ph.D. thesis of B. Dumortier on the acoustic control of wind farms noise.

8.2. Bilateral Grants with Industry

- M. Bossy is member of a MERIC project (MERIC is the marine energy research & innovation center in Chile) on stochastic Lagrangian models to better estimate energy production variability with water turbine, granted with the Lemon Inria Team.
- M. Bossy is the Coordinator of the TER project from the PGMO (FMJH) granted with the SME METIGATE, on the statistical description of coupled regional temperatures. D. Talay also participates to this project.
- M. Bossy is the Coordinator of the SPARE projet at UCA-JEDI on Monte Carlo approaches for the simulation of particles transport in a flow, with EDF and Observatoire de la Côte d'Azur.
- M. Bossy is the Coordinator of the POPART Industrial partnership projet at UCA-JEDI on the modeling of fiber transport in turbulent flow. This partnership is granted by EDF and by UCA, and in collaboration with Observatoire de la Côte d'Azur.

ABS Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

In this section, we describe the collaboration between ABS and MS Vision (<http://msvision.eu/>), a company based in the Netherlands. MSVision was created in 2004 and currently involves 20 employees; it is a worldwide leader in delivering tailored hardware solutions to the mass spectrometry community. As detailed below, the collaboration aims at strengthening the offer of the company on the algorithmic and software sides.

This collaboration is funded by the Instituts Carnots (<http://www.instituts-carnot.eu/en>).

6.1.1. Context

Protein complexes underlie most biological functions, so that studying such complexes in native conditions (intact molecular species taken in solution) is of paramount importance in biology and medicine. Unfortunately, the two leading experimental techniques to date, X ray crystallography and cryo electron microscopy, involve aggressive sample preparation (sample crystallization and sample freezing in amorphous ice, respectively) which may damage the structures and/or create artifacts. These experimental constraints legitimate the use of mass spectrometry (MS) to study biomolecules and their complexes under native conditions, using electrospray ionization (ESI), a soft ionization technique developed by John Fenn (Nobel prize in chemistry, 2002). MS actually delivers information on the masses of the molecular species studied, from which further information on the stoichiometry, topology and contacts between subunits can be inferred. Thanks to ESI, MS is expected to play a pivotal role in biology to unravel the structure of macromolecular complexes underlying all major biological processes, in medicine and biotechnology to understand the complex patterns of molecules involved in pathways, and also in biotechnologies for quality checks.

6.1.2. Specific goals

A mass spectrometer delivers a mass spectrum, i.e. an histogram representing the relative abundance of the ions (ionized proteins or protein complexes in our case), as a function of their mass-to-charge (m/z) ratio. Deconvoluting a mass spectrum means transforming it into a human readable mass histogram. Due to the nature of the ESI process (i.e. the inclusion of solvent and various other molecules) and the intrinsic variability of the studied biomolecules in native conditions, the interpretation of such spectra is delicate. Methods currently used are of heuristic nature, failing to satisfactorily handle the aforementioned difficulties. The goal of this collaboration is to develop optimal algorithms and the associated software to fill the critical gap of mass spectra deconvolution. The benefits for the analyst will be twofold, namely time savings, and the identification of previously undetected components. Upon making progress on the deconvolution problem, the collaboration will be expanded on the geometric and topological modeling of large macro-molecular assemblies, a topic to which ABS recently made significant contributions [2], [3].

ASCLEPIOS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. CIFRE PhD Fellowships

7.1.1.1. Neurelec/Oticon Medical

Participants: Thomas Demarcy [correspondent], Hervé Delingette, Nicholas Ayache, Dan Gnansia [Oticon Medical].

The work of Thomas Demarcy, *Segmentation and anatomic variability of the cochlea and other temporal bone structures from medical images*, is supported by a PhD fellowship from the Neurelec/Oticon Medical company.

7.1.2. Microsoft Research

Microsoft Research is funding through the Inria-Microsoft joint lab the projects "**4D Cardiac MR Images**"⁰ and "**Medilearn**"⁰ which aim at analyzing large databases of cardiac images to help the diagnosis of cardiac diseases and planning of therapy. This project involves A. Crimisi from MSR and partially funds the PhDs of Pawel Mlynarski.

7.1.3. Spin-off company Therapixel

Therapixel⁰ is a spin-off of the Asclepios (Inria Sophia Antipolis) and Parietal (Inria Saclay) project teams founded in 2013. Therapixel makes surgical information systems. It relies on depth sensing, advanced software processing and innovative user interfaces to provide touchless control of the computer. This technology allows for a direct control of the computer, which sterility constraints made impractical in the past. In 2015, Therapixel obtained the CE marking of its product on touchless visualization of medical images.

7.1.4. Spin-off company inHEART

inHEART⁰ is a spin-off of the Asclepios team and IHU Liryc founded in 2017. inHEART provides a service to generate detailed anatomical and structural meshes from medical images, that can be used during ablation interventions. inHEART received 2 awards, one from Aquitaine region and one i-LAB from the BPI.

7.1.5. Siemens HealthCare

Siemens Healthcare, Medical Imaging Technologies, Princeton, NJ (U.S.A). is funding the Phd work of Julian Krebs which aims at developing robust medical image registration methods

⁰<http://www.msr-inria.fr/projects/4d-cardiac-mr-images>

⁰<http://www.msr-inria.fr/projects/medilearn>

⁰<http://www.therapixel.com/>

⁰<http://www.inheart.fr/>

ATHENA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- The **Olea Medical** company from La Ciotat (FR) funds 50% of the PhD of Marco Pizzolato, supervised by Rachid Deriche, which is funded by the PACA Region for the remaining 50%.
- The dMRI Library has been transferred to the **Olea Medical** company.
- The **BESA** company (Brain Electrical Source Analysis) from Germany funds 50% of the PhD of Christos Papageorgakis, co-supervised by Maureen Clerc (ATHENA) and Juliette Leblond (APICS), which is funded by the PACA Region for the remaining 50%.
- The **Neurelec company** (Cochlear Implants) supports a CIFRE PhD funding for Kai Dang, supervised by Maureen Clerc.

BIOCORE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

BioEnTech: the collaboration with the BioEnTech start-up is aiming at developing new functionalities for ODIN in order to improve the advanced monitoring and control of industrial anaerobic digesters.

Inalve: with the Inalve start-up we develop a breakthrough process that we patented, in which microalgae grow within a moving biofilm. The objective of the collaboration is to optimize the process by enhancing productivity, while reducing environmental footprint.

BIOVISION Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. ARVIP: Augmented reality for visually impaired people

Participants: Josselin Gautier, Pierre Kornprobst, Frédéric Dosière [Bosch Visiontec], David Coupé [Bosch Visiontec]

Duration: August 2017 to March 2018

In Biovision, we want to develop new augmented reality systems for low-vision people, to facilitate scene interpretation by enhancing important scene characteristics. Research and investigations are conducted using automotive industry HW solutions, thanks to a partnership with Bosch Visiontec. Our goal is to investigate how such hardware could be used to design efficient vision aid systems. The case-study that we are considering is the one of improving the social interaction which is amongst the first reported needs. We are studying methods to selectively enhance faces in real time, thus allowing low-vision people to better capture faces and emotions of their interlocutors. This work is also conducted in collaboration with Centre hospitalier Pasteur 2 (service d'ophtalmologie, Nice, France) and "27Delvalle" (Centre d'Innovation Santé de la ville de Nice, France) in order to have feedback on our prototype as we develop it.

CAMIN Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- FUI MMCD (Multifunctions Modular Cockpit Display) [2014-2018] Labels : Pegase, ASTech
The MMCD project (Multi Functions Modular Cockpit Display) aims at designing a mechatronic architecture that is modular, certifiable and evolutive in terms of embedded GPU. This project will contribute to Avionics 2020 by developing a mock-up of new cockpit display system, allowing easy to manage GPU evolution.
Our contribution concerns formal design and prototyping of embedded supervisory functions, using the HILECOP methodology and tool.
- collaboration contract with FEETME⁰ company.
- collaboration contract with Innopsys⁰ company.
- collaboration contract with NEURORESP⁰ company (CIFRE PhD thesis).

⁰<http://www.feetme.fr>

⁰<https://www.innopsys.com/en>

⁰<http://neuroresp.com/>

CASTOR Project-Team (section vide)

COFFEE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Contract with Andra financing the two years postdoctoral position of Nabil Birgle (april 2016- march 2018) and dealing with domain decomposition algorithms to couple the non-isothermal liquid gas Darcy flow and the free gas flow occurring at the interface between the nuclear waste repository and the ventilation galleries. Supervision Roland Masson from LJAD-Inria and Laurent Trenty from Andra.
- Contract with Andra financing the two year postdoctoral position of Joubine Aghili (october 2017 - september 2019) and dealing with the simulation of compositional liquid gas Darcy flows in highly heterogeneous porous medium with network of fractures using Discrete Fracture Matrix models (DFM). It is applied to the simulation of the desaturation of the nuclear waste storage in the neighbourhood of the galleries. Supervision Roland Masson and Konstantin Brenner from LJAD-Inria, Jean-Raynald de Dreuzy from Geosciences Rennes and Laurent Trenty from Andra.

LEMON Team (section vide)

MATHNEURO Team (section vide)

MORPHEME Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

General Electric Healthcare: a 36 months (from feb. 2016 to jan. 2019) companion contract for the Cifre thesis of E. Poulain.

Bayer, Lyon: a 6 months (from jan. 2017 to jun. 2017) companion contract for the Master intership of S. Laroui.

VIRTUAL PLANTS Project-Team (section vide)

COATI Project-Team (section vide)

DIANA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

We have signed a bilateral contract for one year with Safran in order to build a network simulator specialised for aeronautical networks.

We are involved in an ADR "Rethinking the Network: Virtualizing Network Functions, from Middleboxes to Applications" with Nokia Bell Labs. The idea is to work on Unified control plane for fast NFV deployment.

7.2. Bilateral Grants with Industry

The ANSWER project is leaded by the QWANT search engine and the Inria Sophia Antipolis Méditerranée research center. This proposal is the winner of the "Grand Challenges du Numérique" (BPI) and aims to develop the new version of the search engine <http://www.qwant.com> with radical innovations in terms of search criteria, indexed content and privacy of users. In the context of this project, we got with Nataliia Bielova from the INDES project-team a funding for a 3 years Ph.D. student to work on Web tracking technologies and privacy protection.

FOCUS Project-Team (section vide)

INDES Project-Team (section vide)

NEO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

NEO members are involved in the

- Inria-Nokia Bell Labs joint laboratory: the joint laboratory consists of six ADRs (Action de Recherche/Research Action) in its second phase (starting October 2012). NEO members participate in one ADR (see §8.1.1);
- Inria-Orange Labs joint laboratory;
- Inria-ALSTOM joint laboratory: the joint laboratory consists of four projects. NEO members participated in project P11.

8.1.1. ADR “Network Science” (June 2013 – March 2017)

Participants: Konstantin Avrachenkov [coordinator], Giovanni Neglia.

- Contractor: Nokia Bell Labs (<http://www.bell-labs.com>)
- Collaborators: Philippe Jacquet (coordinator), Alonso Silva.

“Network Science” aims at understanding the structural properties and the dynamics of various kind of large scale, possibly dynamic, networks in telecommunication (e.g., the Internet, the web graph, peer-to-peer networks), social science (e.g., community of interest, advertisement, recommendation systems), bibliometrics (e.g., citations, co-authors), biology (e.g., spread of an epidemic, protein-protein interactions), and physics. The complex networks encountered in these areas share common properties such as power law degree distribution, small average distances, community structure, etc. Many general questions/applications (e.g., community detection, epidemic spreading, search, anomaly detection) are common in various disciplines and are being analyzed in this ADR “Network Science”. In particular, in the framework of this ADR we were interested in efficient network sampling. Related publication: [20]

8.2. Bilateral Grants with Industry

8.2.1. Huawei CIFRE on the topic “Scalable Online Algorithms for SDN controllers” (June 2016 – May 2019)

Participants: Zaid Allybokus, Konstantin Avrachenkov.

- Contractor: Huawei Technologies (<http://www.huawei.com/en/about-huawei/research-development>)
- Collaborators: Jérémie Leguay and Lorenzo Maggi

Software-Defined Networking (SDN) technologies have radically transformed network architectures. They provide programmable data planes that can be configured from a remote controller platform.

The objective of this CIFRE thesis is to provide fundamental answers on how powerful SDN controller platforms could solve large online flow problems to optimize networks in real-time and in a distributed or semi-distributed fashion. We use methods from both optimization and dynamic programming.

GRAPHDECO Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. *Optis*

Participants: Valentin Deschaintre, Adrien Bousseau, George Drettakis.

Valentin Deschaintre has a CIFRE PhD fellowship on Material Acquisition using Machine Learning, in collaboration with Optis, a company specialized in material acquisition and rendering.

7.1.2. *Adobe*

Participants: Adrien Bousseau, Johana Delanoy.

As part of a long standing collaboration with Adobe, J. Delanoy interned at Adobe Research with A. Hertzman, (San Fransisco). Adobe provides research and software donations as part of this collaboration.

7.1.3. *Technicolor*

Participants: George Drettakis, Adrien Bousseau.

We have initiated a collaboration with Technicolor on the use of deep learning for computational photography and video tasks. This involves the use of our synthetic ground truth data generation platform for graphics and vision tasks.

GRAPHIK Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

- Régilait contract: In the framework of a contract between INRA IATE and STLO (Rennes) research units, a master student from Toulouse University has been recruited in 2017. He developed a new version of the CoGui-Capex software tool, based on Cogui, which permits to navigate and reason in decision-support trees that link food descriptors and the actions that can be undertaken by some operators. The final delivery (December 2017) will be evaluated by Régilait till mid-2018.

HEPHAISTOS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Airbus

Participant: Yves Papegay.

Results of research activities on MOSELA environment have been transferred by a contract with Airbus company.

8.2. Ellicie Healthy

Participants: Alain Coulbois, Jean-Pierre Merlet.

A contract has been granted for the evaluation of the performances of connected glasses that are developed by this company.

LAGADIC Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Robocortex

Participants: Souriya Trinh, Fabien Spindler, François Chaumette.

no Inria Rennes 11369, duration: 20 months.

This contract with the Inria Robocortex start up in Sophia-Antipolis started in September 2016. It is devoted to provide our expertise in visual tracking for an application specified by Dassault Aviation.

8.1.2. ABB

Participants: Souriya Trinh, Fabien Spindler, François Chaumette.

no Inria Rennes 12597, duration: 8 months.

This contract with ABB in Barcelona started in September 2017. It is devoted to provide our expertise in visual tracking and visual servoing for an industrial application.

8.1.3. IRT b<>com

Participants: Hadrien Gurnel, Fabien Spindler, Alexandre Krupa.

no Inria Rennes 11774, duration: 36 months.

This contract started in October 2016 and concerns the leasing to IRT b<>com of two modules of the Lagadic medical robotic platform. Each module is rent 40 days during a 3-year period in the context of the IRT b<>com NeedleWare project (see Section 9.1.7).

8.2. Bilateral Grants with Industry

8.2.1. Technicolor

Participants: Salma Jiddi, Eric Marchand.

no Univ. Rennes 1 15CC310-02D, duration: 36 months.

This project funded by Technicolor started in October 2015. It supports Salma Jiddi's Ph.D. about augmented reality (see Section 7.1.9).

8.2.2. Realyz

Participant: Eric Marchand.

no Inria Rennes 10822, duration: 36 months.

This project funded by Realyz started in October 2015. It is achieved in cooperation with Anatole Lécuyer from Hybrid group at Irisa and Inria Rennes-Bretagne Atlantique to support Guillaume Cortes Ph.D. about motion tracking in virtual reality.

8.2.3. Pôle Saint Hélier

Participants: Louise Devigne, Marie Babel.

no Insa Rennes 2015/0890, duration: 36 months.

This project started in November 2015. It addresses the following two issues. First, the idea is to design a low-cost indoor / outdoor efficient obstacle avoidance system that respects the user intention, and does not alter user perception. This involves embedding innovative sensors to tackle the outdoor wheelchair navigation problem. The second objective is to take advantage of the proposed assistive tool to enhance the user Quality of Experience by means of biofeedback as well as the understanding of the evolution of the pathology.

8.2.4. Axyn

Participants: Dayana Hassan, Paolo Salaris, Patrick Rives.

no Inria Sophia 10874-1, duration: 36 months.

The objective of this project that started in November 2016 is to explore new methodologies for the interaction between humans and robots, autonomous navigation and mapping and to transfer the results obtained on the robotic platform developed by AXYN for assisting disabled/elderly people at home or in hospital structures. Cost limits, good accessibility to aged people, robustness and safety related to the applications are at the heart of the project. This contract (ANRT-CIFRE) support Dayana Hassan's Ph.D (see Section 7.5.6).

STARS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- **Toyota Europ:** this project with Toyota ran from the 1st of August 2013 up to 2017 (4 years). It aims at detecting critical situations in the daily life of older adults living home alone. We believe that a system that is able to detect potentially dangerous situations will give peace of mind to frail older people as well as to their caregivers. This will require not only recognition of ADLs but also an evaluation of the way and timing in which they are being carried out. The system is intended to help them and their relatives to feel more comfortable because they know potentially dangerous situations will be detected and reported to caregivers if necessary. The system is intended to work with a Partner Robot (to send real-time information to the robot) to better interact with older adults.

TITANE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Google

Participants: Pierre Alliez, Cedric Portaneri.

We aim to develop a novel approach and software prototype for the compression of 3D models. Our main focus is on progressive compression of surface triangle meshes with color textures, with emphasis on fine grain, genericity and flexible metric. The proposed methodology is to turn the input models into a stream of refinements, in which both mesh and texture refinement details are multiplexed in accordance to rate-distortion principles. Fine grain will be achieved through considering all components, local as well as non-local, from both the mesh and its textures: mesh complexity, vertex accuracy, texture definition and accuracy. We will leverage the recent advances on perceptual metrics to improve the visual appearance, and perform joint consolidation and encoding of the models to further optimize the rate-distortion tradeoffs and visual perception.

- Starting date: January 2017 - Duration: 1 year

8.1.2. Geoimage

Participants: Liuyun Duan, Florent Lafarge.

The aim of this collaboration is to devise a new type of 2.5D representation from satellite multi-view stereo images which is more accurate, compact and meaningful than the conventional digital elevation models (DEMs). A key direction consists in incorporating semantic information directly during the image matching process. Such a semantic information is related to the type of components of the scene, such as vegetation, roofs, building edges, roads and land.

- Starting date: November 2013 - Duration: 4 years

8.1.3. CSTB

Participants: Hao Fang, Florent Lafarge.

The goal of this recent collaboration is to develop methods for analyzing and exploring scale-spaces into urban 3D data.

- Starting date: March 2016 - Duration: 3 years

8.1.4. Luxcarta

Participants: Jean-Philippe Bauchet, Florent Lafarge.

The goal of this recent collaboration is to design automated approaches for producing city models from the last generation of satellites. The models should conform to the level 2 (LOD2) of the popular CityGML format.

- Starting date: October 2016 - Duration: 3 years

8.1.5. CNES

Participants: Emmanuel Maggiori, Yuliya Tarabalka.

The objective of the project was to devise hierarchical approaches for object-oriented classification of multi-source images. Multi-source images are generated from a scene observed by different types of sensors.

- Starting date: November 2015 - Duration: 2 years

8.1.6. CNES and Acri-ST

Participants: Onur Tasar, Yuliya Tarabalka.

The aim is to devise efficient representations for satellite images.

- Starting date: October 2017 - Duration: 3 years

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WIMMICS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. PREMISSE Collaborative Project

Participants: Molka Dhouib, Catherine Faron Zucker, Andrea Tettamanzi.

Partner: SILEX France.

This collaborative project with the SILEX France company started in march 2017, funded by the ANRT (CIFRE PhD) and UCA (post-doc). SILEX France is developing a B2B (business to business) platform where service providers and consumers upload their service offers or requests in free natural language; the platform is intended to recommend service providers to the applicant, which are likely to fit his/her service request. The aim of this project is to develop a solution to link together service providers and consumers.

8.1.2. Synchronext Collaborative Project

Participants: Raphaël Gazzotti, Catherine Faron Zucker, Fabien Gandon.

Partner: Synchronext.

This project is funded by the ANRT (CIFRE PhD). Synchronext is a startup aiming at developing Semantic Web business solutions. The goal of this project is to develop a NLP and semantic Web based artificial agent for online support in the insurance domain. The objective is to reduce the dropout rate of Internet users on FAQs and to reduce the number of incoming calls and e-mails. This will enable to customer advisers to focus on more difficult questions. As a first step, we are working on automatically categorizing online requests to properly rout them.

8.2. Bilateral Grants with Industry

8.2.1. Intelliquiz Carnot Project

Participants: Oscar Rodríguez Rocha, Catherine Faron Zucker.

Partner: GAYAtch/QWANT.

This project started in March 2017. It is a joint project with Gayatech (now acquired by QWANT) on the automatic generation of quizzes from the Web of Data. It is a continuation of a former collaborative project with GAYAtch on the recommendation of pedagogical resources based on ontology-based modelling and processing.

Based on example quizzes extracted from the famous game *Les Incollables* card game, we are proposing an approach to develop quizzes from a domain ontology and we are experimenting on the geographical domain for primary school students.

8.2.2. Inria LabCom EduMICS

Participants: Catherine Faron Zucker, Geraud Fokou Pelap, Olivier Corby, Fabien Gandon, Alain Giboin.

Partner: Educlever.

EduMICS (Educative Models Interactions Communities with Semantics) is a joint laboratory (LabCom, 2016-2018) between the Wimmics team and the Educlever company. Adaptive Learning, Social Learning and Linked Open Data and links between them are at the core of this LabCom. The purpose of EduMICS is both to develop research and technologies with the ultimate goal to adapt educational progressions and pedagogical resource recommendation to learner profiles.

During the first year of the project we worked on developing light-weight ontologies and thesaurus to capture the Educlever ontological knowledge and we annotated the pedagogical resources of the Educlever solution. Then we developed a benchmark and showed that Semantic Web solutions can be deployed within their industrial context. In the continuation of this first step of the project, we will show the added value of Semantic Web modelling enabling ontology-based reasoning on the acquired knowledge graph.

ZENITH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Microsoft ZcloudFlow (2013-2017)

Participants: Ji Liu, Esther Pacitti, Patrick Valduriez.

ZcloudFlow is a project in collaboration with the Kerdata team in the context of the Joint Inria–Microsoft Research Centre. It addresses the problem of advanced data storage and processing for supporting scientific workflows in the cloud. The goal is to design and implement a framework for the efficient processing of scientific workflows in clouds. The validation is performed using synthetic benchmarks and real-life applications from bioinformatics on the Microsoft Azure cloud with multiple sites.

8.2. Triton I-lab (2014-2017)

Participants: Benjamin Billet, Didier Parigot.

Triton is a common Inria lab (i-lab) between Zenith and Beepeers (<http://www.beepeers.com>) to work on a scalable platform for developing social networks in mobile/Web environments. The main objective of this project is to design and implement a new architecture for Beepeers applications to scale up to high numbers of participants. The new platform relies on our SON middleware and NoSQL graph databases.

8.3. SAFRAN (2018)

Participants: Reza Akbarinia, Florent Masegla.

SAFRAN and Inria are involved in the DESIR frame-agreement (Florent Masegla is the scientific contact on "Data Analytics and System Monitoring" topic. In this context, SAFRAN dedicates 80K€ for a joint study of one year on time series indexing. The specific time series to be exploited are those of engine benchmarking with novel characteristics for the team (multiscale and multidimensional).