RESEARCH CENTER
Lille - Nord Europe

FIELD

Activity Report 2018

Section Contracts and Grants with Industry

Edition: 2019-03-07

BONSAI Project-Team (section vide)

BONUS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Our current industrial contracts and granted projects are completely at the heart of the BONUS project. They are summarized in the following.

- *Beckman & Coulter (2015-2018, California, USA)*: the goal of this contract is the strategic and operational planning of large medical laboratories (Phd of S. Faramarzi-Oghani). More exactly, the focus is put on the multi-objective modeling and solving of large (e.g. dozens of thousands of medical test tubes to be analyzed) strategic, tactical and operational problems such as the layout design, machine selection and confguration, assignment and scheduling. The project deals also with the coupling between optimization and simulation for performance assessment.
- *EDF (2015-2019, Paris)*: this project deals with demand-side management in smart grids with EDF, a major electrical power player in France. The Energy Management System (EMS) in the home receives the market and system signals and controls the loads, Heating, Ventilation and Air Conditioning systems (HVAC), storages and local generation units according to the user preferences. A large number of home users and appliances and several conflicting objectives have to be considered.
- *ONERA & CNES (2016-2020, Paris)*: the focus of this project with major European players in vehicle aerospace is put on the design of aerospace vehicles, a high-dimensional expensive multidisciplinary problem. Such problem needs the use of the research lines of BONUS to be tackled effectively and efficiently. Two jointly supervised Phd students (J. Pelamatti and A. Hebbal) are involved in this project.
- *In contact with EXOTEC (2018-2019, Lille)*: This project deals with the optimization of logistics flows of robots. More exactly, the problem consists in efficient complex scheduling without collision of thousands of missions realized by a fleet of dozens of robots and several operators in a 3D logistics warehouse.

DEFROST Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

TDR group is a robotics integrator specialized on optimizing production chains, usually multiplexing robots to perform several activities. Hence, their interest in graspers and the time invested in this activity has been growing within the last years. To improve this aspect, we have been developing together a concept of "universal grasper", based on soft robotics technology and capable of grasping an object with an arbitrary shape, and partially misplaced or misoriented. The prototype developed complies with the specifications and allows for scalability, with flexibility between grasping force and shape tolerance, and the ability for replacing objects without the need of an external vision system. Relying in SOFA for physical simulation, we have validated a prototype, and realize it. An industrial version of the prototype has been realized this year. It will be commercialized next year.

FUN Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Sencrop
  Participants: Brandon Foubert, Nathalie Mitton [correspondant].

  This collaboration aims to develop a complete multi-technology bilateral wireless communication stack for agriculture sensor networks.
- Enedis and NooliTic
  Participants: Ibrahim Amadou, Nathalie Mitton [correspondant].

  This collaboration aims to investigate a novel localization approach based on wireless propagations. It is a tri-partite contract between our Inria team, the SME NooliTic and Enedis.

GAIA Team

8. Bilateral Contracts and Grants with Industry

8.1. Safran Electronics & Defense

Within the CIFRE PhD thesis (2014-2018) [15], we have studied new robust stabilization techniques for gyrostabilized systems with unfixed model parameters (e.g. modes, masses, stiffness of springs, damper magnitudes). Parameters of their models indeed slowly change with the temperature, fatigue, etc., yielding time-consuming re-computations of robust controllers. Moreover, the possibility to quickly know robustness indicators (e.g. margins) and explicit robust controllers in terms of the model parameters can highly speed up the design of a project. Finally, closed-form solutions for robust controllers in terms of the model parameters are the first steps towards the development of adaptive robust controllers which can be embedded in gyrostabilized platforms since no optimization algorithms are then required for a real-time implementation and only the parameters have to be estimated from time to time to re-compute the robust controller (based on a basic arithmetic). To do that, we have introduced algebraic methods and computer algebra techniques to initiate a new approach entitled *parametric robust control*. For mor details, see [15] and [98], [100], [99]. This new approach will be further developed in the future since it opens both theoretical and practical interesting questions. In particular, the new PhD thesis of Grace in GAIA aims to study the underlying mathematical problem from both a theoretical and an implementation perspectives.

8.2. Ellcie Healthy

A new collaboration with Ellcie Healthy, a company based in Nice began in October 2017. It involves the analyze of signals coming from optical sensors installed in glasses. With Denis Efimov, the first studies obtained were very promising. This collaboration was formalized with the signature of a first contract in March 2018. The first objective of this project was to design algorithms for intelligent filtering of data coming from infrared sensors, especially for light-related disturbances. Discussions are currently underway for the submission of new joint projects.

INOCS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Fluxys (2016-2018). Study of optimization problems arising in the management of gas networks.

HappyChic (2018). Study and implementation of optimization methods for problems arising in the warehouse management context.

Keolis (2018). Study and implementation of optimization methods for problems arising in the management of mediation officers in public transportation.

Utocat (2018). Study optimization problems arising in the blockchain.

8.2. Bilateral Grants with Industry

Design and Pricing of Electricity Services in a Competitive Environment within the Gaspard Monge Research Program (PGMO) funded by the Fondation Mathématiques Jacques Hadamard. EDF is the industrial partner (2015-2018).

Robust Energy Offering under Market Equilibrium Constraints within the Gaspard Monge Research Program (PGMO) funded by the Fondation Mathématiques Jacques Hadamard. EDF is the industrial partner (2017-2019).

8.3. Inria Innovation Lab

COLINOCS is an Inria Innovation Lab between Colisweb, a start-up company addressing last-mile delivery and INOCS, which was created at the end of 2016. This collaboration roots back to 2015, when a bilateral contract was devoted to optimization problems arising in courier scheduling. The main objective of this Innovation Lab is to model and solve optimization problems related to revenue management, transport mutualization, a better visibility on their activities for the couriers. See also: https://www.inria.fr/centre/lille/actualites/inria-innovation-lab-colinocs-entre-colisweb-et-l-equipe-inocs.

LINKS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

Posos. A. Lemay is directing an internship of a master student (*projet de fin d'étude*) in cooperation with the POSOS company from Amiens. The goal of this collaboration is to work on efficient schema for a large pharmaceutical Knowledge Base.

Strapdata. C. Paperman is actively collaborating with the Strapdata company on efficient distributed graph database using an Apache novel technology to query distributed graph *Gremlin* that could benefit of the main product of Strapdata: Elassandra as a *database backend*.

LOKI Team (section vide)

MAGNET Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Coreference resolution

Along a collaboration with Orange, we developed a Natural Language Processing library for co-reference resolution. The library is based on a previous work (CorTeX) and was extended in several ways. It handles the French language, it includes new features based on vectorial representations of words (word embeddings) and it is more scalable. PASCAL DENIS is the local PI at Inria of this project.

8.2. Privacy preserving data mining for Mobility Data

JAN RAMON is the local PI at Inria for the ADEME-MUST project (Méthodologie d'exploitation des données d'usage des véhicules et d'identification de nouveaux services pour les usagers et les territoires). We study machine learning and data mining methods for knowledge discovery from mobility data, which are time-stamped signals collected from cars, for example, GPS locations, accelerations and fuel consumption. We aim to discover knowledge that helps us to address important questions in the transportation system such as road safety, traffic congestion, parking, ride-sharing, pollution and energy consumption. As the mobility data contains a lot of personal information, for instance, driving styles and locations of the users, we hence also study methods that allow the users to keep their personal data and only exchange part of them to collaboratively derive the knowledge.

The project has four partners, including, Xee company, CEREMA, i-Trans and Inria. The Xee company is responsible for recruiting drivers and collecting the data. CEREMA and i-Trans function as domain experts who help us to form the questions and verify the analytical results. MAGNET is responsible for developing and applying data mining methods for analyzing the data. The developed methods and the discovered knowledge from the project will be transferred to Metropole Lille and ADEME.

8.3. Predictive justice

Claim assistance is a French company that develops assistance for conflict resolution. The main service is RefundMyTicket [0]. In the general project of partial automation of analysis of complains, we have provided consulting and supervision. The general approach was to be able to analyze, parse and reason on legal texts. We have developed strategies based on natural language processing in the specific domain of legal texts. Techniques include learning representation and structured prediction among others.

[0] https://www.refundmyticket.net

MEPHYSTO-POST Team (section vide)

MODAL Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts: SEMENCES DE FRANCE

Sophie Dabo-Niang has a contract with the enterprise SEMENCES DE FRANCE, concerning the realisation of a statistical software.

8.2. Bilateral Contracts: Arcelor-Mittal

Participants: Christophe Biernacki, Vincent Vandewalle.

Arcelor-Mittal is a leader company in steel industry. This contract (which began in 2016 and finished in 2018) aims at optimizing predictive maintenance from mixed data (continuous, categorical, functional) provided by multiple sensors disseminated in steel production lines. Several thousands of sensors are simultaneously involved in this study, most of them providing functional (chronological) values.

It is a joint work with Quentin Grimonprez and Vincent Kubicki (InriaTech engineers).

8.3. Bilateral Contracts: Alstom

Participants: Christophe Biernacki, Benjamin Guedj.

Alstom is a world leader company in integrated transport systems. This contract aims at optimizing predictive maintenance from free text annotations provided by maintenance people. The proposal consists in using co-clustering as a way for grouping both maintenance operations and words describing them.

It is a joint work with Etienne Goffinet (InriaTech engineer).

8.4. Bilateral Contracts: Decathlon

Participant: Christophe Biernacki.

Decathlon is a leading sports retailer.

It is a joint work with Etienne Goffinet (InriaTech engineer). The purpose was to propose a innovative method for sales forecast by using complex data they have (mixed data, chronological series, etc.).

NON-A POST Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

A transfer contract with Ellcie Healthy on intelligent filtering of measurements in smart eyeglasses.

RAPSODI Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

C. Cancès supervised the PhD thesis of N. Peton at IFPEn from October 15, 2015 to October 12, 2018. The bilateral contract enters the framework-agreement between Inria and IFPEn.

RMOD Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. BlockChain

Participants: Henrique Rocha, Marcus Denker, Stéphane Ducasse
From 2016, ongoing.

We started a new collaboration with a local startup (UTOCAT) about tools and languages in the context of Blockchain systems. The collaboration started with a 2 month exploration phase involving an engineer at Inria Tech. A postdoc started in 2017.

8.1.2. Pharo Consortium

Participants: Esteban Lorenzano, Clément Béra, Marcus Denker, Stéphane Ducasse
From 2012, ongoing.

The Pharo Consortium was founded in 2012 and is growing constantly. By the end 2018, it has 32 company members, 17 academic partners. Inria supports the consortium with one full time engineer starting in 2011. In 2018, the Pharo Consortium joined InriaSoft.

More at http://consortium.pharo.org.

8.2. Bilateral Grants with Industry

8.2.1. Thales CIFRE

Participants: Brice Govin, Anne Etien, Nicolas Anquetil, Stéphane Ducasse
From 2015, ongoing.

We are working on large industrial project rearchitecturization. PhD in progress: Brice Govin, *Support to implement a rejuvenated software architecture in legacy software*. CIFRE Thales started Jan 2015.

8.2.2. Remodularization of Architecture

Participants: Nicolas Anquetil, Santiago Bragagnolo Stéphane Ducasse, Anne Etien, Benoît Verhaeghe
From 2017, ongoing.

We started a new collaboration with the software editor Berger Levrault about software architecture remodularization. The collaboration started with an end study project exploring the architecture used in the company in order to later migrate from GWT to Angular JS since GWT will not be backward supported anymore in the next versions. An internship and a PhD CIFRE thesis will start in 2018.

SEQUEL Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Lelivrescolaire.fr

- contract with http://Lelivrescolaire.fr; PI: Michal Valko

  Title: Sequential Machine Learning for Adaptive Educational Systems

  Duration: Mar. 2018 – Feb. 2021

  Abstract: Adaptive educational content are technologies which adapt to the difficulties encountered by students. With the rise of digital content in schools, the mass of data coming from education enables but also ask for machine learning methods. Since 2010, Lelivrescolaire.fr has been developing some learning materials for teachers and students through collaborative creation process. For instance, during the school year 2015/2016, students has achieved more than 8 000 000 exercises on its homework platform Afterclasse.fr. Our approach would be based on sequential machine learning: the algorithm learns to recommend some exercises which adapt to students gradually as they answer.
  Participants: Julien Seznec, Michal Valko.

8.1.2. Sidexa

- contract with "Sidexa"; PI: Philippe Preux

  Title: vision applied to the segmentation and recognition of cars and car related documents.

  Duration: 6 months

  Abstract: this is a follow-up to the successful contract realized in 2017 with Sidexa. We studied multi-class supervised classification problems in order to classify documents related to a car, and also to identify various characteristics of a car, such as its color, its make, its type.

  This work is done with an InriaTech engineer.
  Participant: Philippe Preux.

8.1.3. Renault

- contract with Renault; PI: Philippe Preux

  Title: Control of an autonomous vehicle

  Duration: 3 years (12/2017–11/2020)

  Abstract: This contract comes along the CIFRE grant on the same topic. This work is done in collaboration with the NON-A team-project.
  Participants: Édouard Leurent, Odalric Maillard, Philippe Preux.

8.1.4. Critéo

- contract with "Criteo"; PI: Philippe Preux

  Title: Computational advertizing

  Duration: 3 years (12/2017–11/2020)

  Abstract: This contract comes along the CIFRE grant on the same topic. The goal is to investigate reinforcement learning and deep learning on the problem of ad selection on the Internet.
  Participants: Philippe Preux, Kiewan Villatel.

8.1.5. Orange Labs

- contract with “Orange Labs”; PI: Olivier Pietquin

  Title: Inter User Transfer in dialogue systems

  Duration: 3 years

  Abstract: This contract comes along the CIFRE grant on the same topic. The research aims at developing new algorithms to learn fast adaptation strategies for dialogue systems when a new user starts using them while we collected data from previous interactions with other users. Especially, it addresses the cold-start problem encountered when a new user faces the system, before samples can be collected to optimize the interaction strategy.
  Participants: Merwan Barlier, Nicolas Carrara, Olivier Pietquin.

8.1.6. 55

- contract with “55”; PI: Jérémie Mary

  Title: Novel Learning and Exploration-Exploitation Methods for Effective Recommender Systems

  Duration: Oct. 2015 – Sep. 2018

  Abstract: This contract comes along the CIFRE grant on the same topic. In this Ph.D. thesis we intend to deal with this problem by developing novel and more sophisticated recommendation strategies in which the collection of data and the improvement of the performance are considered as a unique process, where the trade-off between the quality of the data and the performance of the recommendation strategy is optimized over time. This work also consider tensor methods (one layer of the tensor can be the time) with the goal to scale them at RS level.

  The PhD was defended in Fall 2018.
  Participants: Jérémie Mary, Romain Warlop.

8.1.7. AB-Tasty

- Thompson Sampling for A/B/C Testing with Delayed Conversions; PI: Émilie Kaufmann

  Duration: 1 month

  Abstract: We investigated the use of Thompson Sampling as well as other state-of-the-art methods for the stochastic MAB problem in the context of delayed feedback. We provided theoretical justification for a method developed by AB Tasty, and proposed some variants of it, as well as a comparison with existing methods from the literature.
  Participant: Émilie Kaufmann.

SPIRALS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. ip-label

Participant: Romain Rouvoy [correspondant].

A software exploitation license of the APISENSE® crowd-sensing platform has been sold to the ip-label company. They use this platform as a solution to monitor the quality of the GSM signal in the wild. The objective is to provide developers and stakeholders with a feedback on the quality of experience of GSM connection depending on their location.

8.2. Scalair

Participants: Yahya Al-Dhuraibi, Philippe Merle [correspondant].

This collaboration (2015–18) aims at proposing a framework to deal with elasticity in cloud computing environments. This framework must cover all kinds of resources, IaaS, PaaS, SaaS, must provide a solution for interoperability between different clouds and virtualization technologies, and must enable the specification and composition of reactive and predictive strategies.

This collaboration is conducted in the context of the PhD thesis of Yahya Al-Dhuraibi defended in December 2018.

8.3. Davidson

Participants: Romain Rouvoy [correspondant], Lionel Seinturier.

This collaboration (2017–20) aims at proposing new solutions for optimizing the energy footprint of ICT software infrastructures. We want to be able to measure and assess the energy footprint of ICT systems while preserving various quality of service parameters, such as performance and security. We aim at proposing a testbed for assessing the energy footprint of various programming languages. This testbed will also incorporate frameworks for web and mobile programming. Finally, we want to be able to issue recommendations to developers in order to assist them in improving the energy footprint of their programs. This collaboration will take advantage of the PowerAPI software library.

The PhD of Mohammed Chakib Belgaid takes place in the context of this collaboration.

8.4. Orange Labs #1

Participants: Philippe Merle [correspondant], Lionel Seinturier.

This collaboration (2017–18) aims at defining a computational model for software infrastructures layered on top of virtualized and interconnected cloud resources. This computational model will provide application programming and management facilities to distributed applications and services. This computational model will define a pivot model that will enable the interoperability of various existing and future standards for cloud systems such as OCCI and TOSCA. This pivot model will be defined with the Alloy specification language [54]. This collaboration takes advantage of the expertise that we are developing since several years on reconfigurable component-based software systems [66], on cloud systems [60], and on the Alloy specification language [58].

This collaboration with Orange Labs is a joint project with Jean-Bernard Stefani from the Spades Inria project-team.

8.5. Orange Labs #2

Participants: Zakaria Ournani, Romain Rouvoy [correspondant], Lionel Seinturier.

This collaboration (2018–21) aims at proposing new solutions for modeling the energy efficiency of software systems and to design and implement new methods for measuring and reducing the energy consumption of software systems at development time. We especially target software systems deployed on cloud environments.

The CIFRE PhD of Zakaria Ournani takes place in the context of this collaboration.

8.6. Amaris

Participants: Sacha Brisset, Romain Rouvoy [correspondant], Lionel Seinturier.

This collaboration (2018–21) aims at proposing new solutions for automatically spotting and fixing recurrent user experience issues in web applications. We are interested in developing an autonomic framework that learns and classifies the behaviors and figures out causality links between data such as web GUI events, support tickets and user feedback, source version management events (e.g. recent commits). The ultimate objective is to implement an AI-powered recommendation system to guide the maintenance and even to automatically predict and solve user issues.

The CIFRE PhD of Sacha Brisset takes place in the context of this collaboration.