RESEARCH CENTER

FIELD
Perception, Cognition and Interaction

Activity Report 2015

Section Contracts and Grants with Industry

Edition: 2016-03-21

VISION, PERCEPTION AND MULTIMEDIA INTERPRETATION

DAHU Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

The CIFRE scholarship of David Montoya started in 2014, with Sinovia, Cofely Ineo (group GDF Suez). The topic is on analysis of multimodal itineraries and the integration of itinerary data with other personal data.

DREAM Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. SocTrace: analysis of SOC traces

Participants: Serge Vladimir Emteu Tchagou, Alexandre Termier.

SoCTrace is a FUI project led by STMicroelectronics, with the companies ProbaYes and Magilem, Université Joseph Fourier and Inria Rhône-Alpes. Its goal is to provide an integrated environment for storing and analyzing execution traces. In this project, we are working on data mining techniques for analyzing the traces, and on the use of ontologies to enable querying traces with a higher level of abstraction.

8.1.2. ITRAMI: Interactive Trace Mining

Participants: Alexandre Termier, Thomas Guyet, René Quiniou.

ITRAMI is a Nano2017 project. Such projects are designed to support joint research efforts between STMicrolectronics and academic partners in the domain of embedded systems. Alexandre Termier is the PI of this projet, having for goal to design novel data mining methods for interactive analysis of execution traces. Such methods aim at considerably reducing the time that STMicroelectronics developers spend at understanding, debugging and profiling applications running on STMicrolectronics chips. The project work is done at University Joseph Fourier (Grenoble), in collaboration with DREAM researchers Thomas Guyet and René Quiniou. Two contractual personnel are working on the project in Grenoble: Willy Ugarte as a postdoc, and Soumay Ben Alouane as an engineer.

EXMO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Collaboration with Meaning engines

EXMO collaborates with the meaning engine start-up company whose goal is to help improve the knowledge of corporate knowledge, e.g., catalogs, costumer data, through linked data principles (the application of semantic web technology for publishing data). Among their prospective costumers are music aggregators as well as banks. We have benefited from the position of Nicolas Guillouet for developing generic connectors based on our Alignment API. They introduce two novel features: using the notion of link keys to identify identical items in a data flow and performing hybrid integration which either identifies or creates objects from the incoming flows. In fact, hybrid integration is a type of knowledge evolution that provides new interesting research problems.

GRAPHIK Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. CTFC

Participants: Patrice Buche, Jérôme Fortin.

In 2015, we relied on our collaboration with the technical center of Comptois' cheese (CTFC : Centre Technique des Fromages Comtois), initiated in the previous years, to build an enlarged project involving different traditional food chains (CNAOL, Conseil National des Appelations d'Origine Laitière). The aim of this project is to develop a platform that will be used in traditional cheese processing for expert knowledge management. This project was pre-selected by the French Ministry of agriculture but finally not accepted, hence we are working on a new version.

8.1.2. ABES

Participants: Michel Leclère, Michel Chein.

See results in Section 7.3 and the ANR project Qualinca in Section 9.1 .

LINKS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

Innovimax is founding the PhD thesis of Tom SEBASTIAN (2011-15). The thesis is supervised by J.NIEHREN in cooperation with M.ZERGAOUI the head of the INNOVIMAX company. The software development in this context is supported by T. SEBASTIAN.

MAGNET Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. KeyCoopt (2015)

Participants: Rémi Gilleron [correspondent], François Noyez, Fabien Torre.

We have a bilateral contract with the KEYCOOPT company. The goal of the company is to suggest candidates for job offers. For this, the company has a large pool of referrers, also named coopters. The process is: given a job offer, some coopters are selected, each coopter may suggest a candidate, the proposed candidates are selected by KEYCOOPT and some candidates are proposed in answer to the job offer. We propose a machine learning based method for selecting coopters given a job offer. The method is a ranking algorithm using support vector machines (SVMRank). It has been developed and tested and can be integrated in the information system of KEYCOOPT. Possible improvements are to use natural language processing methods in order to use texts as texts for job offers, and to use the network of coopters.

8.2. Bilateral Grants with Industry

8.2.1. Cifre Clic and Walk (2013-2016)

Participants: Mikaela Keller [correspondent], Pauline Wauquier, Marc Tommasi.

We have a one to one cooperation with the CLIC AND WALK company that makes marketing surveys by consumers (called clicwalkers). The goal of the company is to understand the community of clicwalkers (40 thousands in one year) and its evolution with two objectives: the first one is to optimize the attribution of surveys to clicwalkers, and the second is to expand company's market to foreign countries. Social data can be obtained from social networks (G+, Facebook, ...) but there is no explicit network to describe the clicwalkers community. But users activity in answering surveys as well as server logs can provide traces of information diffusion, geolocation data, temporal data, sponsorship, etc. We will study the problem of adaptive graph construction from the clicwalkers network. Node (users) classification and clustering algorithms will be applied. For the problem of survey recommendations, the problem of teams constitution in a bipartite graphs of users and surveys will be studied. Random graph modeling and generative models of random graphs will be one step towards the prediction of the evolution of clicwalkers community.

8.2.2. Cifre SAP (2011-2014)

Participants: Rémi Gilleron [correspondent], Marc Tommasi, Thomas Ricatte.

The PhD defense of Thomas Ricatte was held in Lille on January 23th 2015.

OAK Project-Team (section vide)

ORPAILLEUR Project-Team (section vide)

SMIS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

The SMIS project has a long lasting cooperation with Gemalto, the world's leading providers of microprocessor cards. Gemalto provides SMIS with advanced hardware and software smart card platforms which are used to validate numbers of our research results. In return, SMIS provides Gemalto with requirements and technical feedbacks that help them adapting their future platforms towards data intensive applications. While no bilateral contract exists between Gemalto and SMIS, we are partners in several projects. Meanwhile, we are developing partnerships with SMEs capable of building ad-hoc hardware prototypes conforming to our own design.

7.1.1. Cozy Cloud bilateral contract (Dec 2014 - Nov. 2015)

Partners: Cozy Cloud, Inria-SMIS
SMIS funding: 50k€.
Many personal data end up today on servers where they can be scrutinized by companies and governmental agencies. To face this situation, the most emblematic initiative is the Personal Cloud paradigm. Roughly speaking, the Personal Cloud is an architecture which gives users the ability to store their complete digital environment, synchronize it among various devices and share it with other users and applications under their control. It reflects the expectation of the individuals for the emergence of privacy-by-design next-generation storage and computing services. Cozy Cloud is a French startup providing such a personal Cloud platform. The Cozy product is a software stack that anyone can deploy to run his personal server in order to host his personal data and web services. Cozy defines itself as the "Android of personal servers". While centralizing all personal data in the holder's hand is a natural way to reestablish his control on his privacy, this represents an unprecedented threat in case of attacks by an intruder, especially for individuals who are not security experts. The objective of this bilateral contract is typically to address this issue by integrating the PlugDB solution into the Cozy stack. Roughly speaking, the Cozy data system will be modified in such a way to store only encrypted files and each file access will be intercepted and routed to PlugDB. PlugDB will act as a doorkeeper for the whole individual dataspace by managing the files' metadata, the access control rules defined on these metadata, the decryption keys and the user/application authentication.

7.1.2. Cozy Cloud CIFRE contract (Oct 2014 - Sept 2017)

Partners: Cozy Cloud, Inria-SMIS
SMIS funding: 30k€.
In relation with the bilateral contract mentioned above, a CIFRE PhD thesis has been started by Paul Tran Van. The objective is to capitalize on the Cozy-PlugDB platform to devise new access and usage control models to exchange data among devices of the same user (devices may have different levels of trustworthiness) and among different users. A particular focus will be put on the enforcement of the access and usage control rules in this thesis.

TYREX Project-Team (section vide)

WIMMICS Project-Team (section vide)

ZENITH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Microsoft (2013-2017)

Participants: Ji Liu, Esther Pacitti, Patrick Valduriez.

This joint project is on advanced data storage and processing for cloud workflows with the Kerdata team in the context of the Joint Inria – Microsoft Research Centre. The project 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 h will be performed using synthetic benchmarks and real-life applications from bioinformatics: first on the Grid5000 platform in a preliminary phase, then on the Microsoft Azure cloud environment.

8.2. Triton I-lab (2014-2016)

Participants: David Fernandez, Houssem-Eddine Chihoud, Didier Parigot.

Triton is a new common lab. (i-lab) created between Zenith and Beepeers (http://beepeers.com) to work on a 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 move to the scale. This new architecture will build on our SON middleware and new NoSQL database technologies, especially graph databases.

ALICE Project-Team (section vide)

AVIZ Project-Team (section vide)

EX-SITU Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

MultiHub (Microsoft donation, 2015-2016) – ExSitu was one of the ten academic institutions world wide awarded a hardware and monetary grant by Microsoft Research as part of its request for proposal to expand the potential applications of the Surface Hub across all aspects of society (http://research.microsoft.com/en-us/projects/surface-hub/). The goal of the MultiHub project is to enable interaction in the large, where groups of experts can interact with rich content and complex data while collaborating both locally and remotely in interactive, multi-surface environments. ExSitu was awarded two 55" Surface Hubs and $19,000 in cash.

GRAPHDECO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

We received a donation from Adobe research in the context of the collaboration with W. Li and a donation from Technicolor for a new collaboration which will start in 2016 on image manipulation.

We collaborate extensively with Testaluna SA, and other game companies in the context of the CR-PLAY EU project.

We have started a Regional Ph.D. these with the local company Kaleidoscope (Toulon).

HYBRID Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Mensia Technologies

Participants: Anatole Lécuyer, Jussi Lindgren.

Mensia Technologies is an Inria start-up company created in November 2012 as a spin-off of Hybrid team. Mensia is focused on wellness and healthcare applications emerging from the BCI and Neurofeedback technologies. The Mensia startup should benefit from the team's expertise and of valuable and proprietary BCI research results. Mensia is based in Rennes and Paris. Anatole Lécuyer and Yann Renard (former Inria expert engineer who designed the OpenViBE software architecture and was involved in team projects for 5 years) are co-founders of Mensia Technologies together with CEO Jean-Yves Quentel.

The on-going contract between Hybrid and Mensia started in November 2013 and supported the transfer of several softwares designed by Hybrid team ("OpenViBE", "StateFinder") related to our BCI activity and our OpenViBE software (section 6.1) to Mensia Technologies for 5 years, for future multimedia or medical applications of Mensia.

8.1.2. MBA Multimedia

Participants: Ferran Argelaguet Sanz, Maud Marchal, Anatole Lécuyer.

This on-going contract started in June 2013 and supported the transfer of several softwares designed by Hybrid team (e.g., "Elastic Images") in the frame of the W3D project to MBA Multimédia company for future applications in the field of multimedia and web design based mainly on HTML5 and Word Press software.

8.1.3. Polymorph Studio

Participants: Ferran Argelaguet Sanz, Maud Marchal, Anatole Lécuyer.

This on-going contract started in June 2013 and supported the transfer of several softwares designed by Hybrid team (e.g., "Pseudo-haptik", "Elastic Images") in the frame of the W3D project to Polymorph Studio company for future applications in the field of multimedia and web design based mainly on Unity3D software.

8.2. Bilateral Grants with Industry

8.2.1. Technicolor

Participants: Antoine Costes, Anatole Lécuyer, Ferran Argelaguet.

This grant started in December 2015. It supports Antoine Costes's CIFRE PhD program with Technicolor company on "Haptic Texturing".

8.2.2. Realyz

Participants: Guillaume Cortes, Anatole Lécuyer.

This grant started in December 2015. It supports Guillaume Cortes's CIFRE PhD program with Realyz company on "Improving tracking in VR".

8.2.3. VINCI

Participants: Anne-Solène Dris-Kerdreux, Bruno Arnaldi, Valérie Gouranton.

This grant started in November 2015. It supports Anne-Solene Dris-Kerdreux's CIFRE PhD program with Vinci company on "Training in VR for construction applications".

ILDA Team (section vide)

IMAGINE Project-Team (section vide)

MANAO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- CIFRE PhD contract with Technicolor 2 (2014-2018)
  Participants: A. Dufay, X. Granier, and R. Pacanowski
  For this project, we aim at providing interactive previsualization of complex lighting with a smooth transition to the final solution.

MAVERICK Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

WetaFX (New-Zealand) has given us 30,000 euros in 2015, as a unilateral gift.

MIMETIC Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Visual Analytics for Cinematographic Data

Participant: Marc Christie [contact].

The contract has two objectives: first developping a film annotation tool that integrates cinematographic image and editing features such as visual composition, shot type, balance, depth, shot transition, etc. While existing annotation tools such as Anvil and Elan are are largely used for film annotation, the specificities of cinematographic and editing features requires the design of dedicated tools which mix automated and manual annotation stages. The work builds on the Insight annotation tool developed in our group (see [29]).

The second objective is to provide means to visualize and interact with the data, following the general trend of Visual Analytics. Different representations are currently explored and developped inside Technicolor's internal tools.

8.2. Bilateral Grants with Industry

8.2.1. Cifre Faurecia

Participant: Franck Multon [contact].

This contract aims at developing new ergonomics assessments based on inaccurate Kinect measurements in manufactures on real workers. The main challenges are:

- being able to improve the Microsoft Kinect measurement in order to extract accurate poses from depth images while occlusions may occur,
- developing new inverse dynamics methods based on such inaccurate kinematic data in order to estimate the joint torques required to perform the observed task,
- and proposing a new assessment tool to translate joint torques and poses into potential musculoskeletal disorders risks.

Faurecia has developed its own assessment tool but it requires tedious and subjective tasks for the user, at specific times in the work cycle. By using Kinect information we aim at providing more objective data over the whole cycle not only for specific times. We also wish to make the user focus on the interpretation and understanding of the operator's tasks instead of taking time estimating joint angles in images.

This work is performed in close collaboration with an ergonomist in Faurecia together with the software development service of the company to design the new version of their assessment tool. This tool will be first evaluated on a selection of manufacture sites and will then be spread worldwide among the 300 Faurecia sites in 33 countries.

This contract enabled us to hire Pierre Plantard as a PhD student to carry-out this work in MimeTIC and M2S Lab. He started in January 2013 and will finish in January 2016.

MINT Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Ayodyo (10 Keuros) (sept. 2015-mar 2016)

Embedded software tools for movement-enriched musical instrument. 10 Keuros contract.

7.1.2. Holusion (15 Keuros) (jan-mar 2015)

STAR on holographic displays, and methodological recommendations for interaction design and HCI principles.

7.1.3. Bipolar-production (3 Keuros), nov. 2015-fev. 2016

Licence for a software result issued from Y. Rekik thesis (multi-touch public interaction, software aiming at strengthening tactile interaction)

Mjolnir Team (section vide)

POTIOC Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Interactive Collaboration in Virtual Reality for Aerospace Scenarii:

- duration: 2014-2017
- PhD Thesis of Damien Clergeaud
- partners: Airbus Group
- The Airbus company regularly uses virtual reality for design, manufacturing and maintenance (see Figure 14). We work with them on collaborative interaction in order to enable an efficient collaboration between operators immersed in the virtual environment from remote locations and with heterogeneous equipment. More precisely, we have developped tools to point and manipulate objects, to remotely visualize the virtual environment, to be aware of remote manipulations and to describe tools and components trajectories.

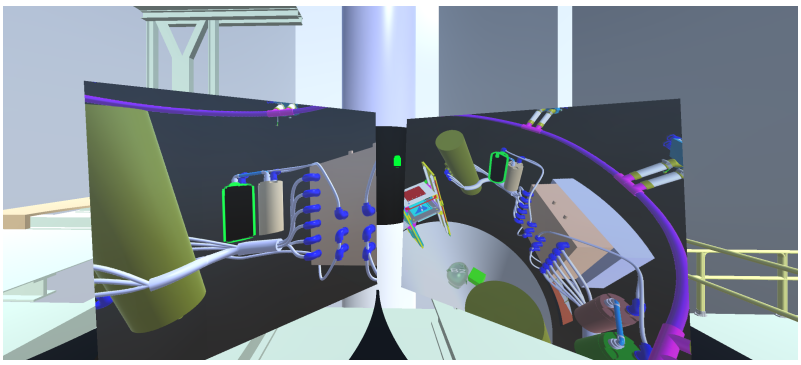

Figure 14. Example of a tool which allows to be aware of a remote place in a virtual reality application (Airbus collaboration)

TITANE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Astrium

Participants: Sven Oesau, Florent Lafarge, Pierre Alliez.

The main goal of this collaboration is to devise new algorithms for reconstructing 3D indoor models that are more accurate, meaningful and complete than existing methods. The conventional way for modeling indoor scenes is based on plane arrangements. This type of representation is particularly limited and must be improved by devising more complex geometric entities adapted to a detailed and semantized description of scenes.

- Starting date: April 2012

- Duration: 3 years

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 DEMs. A key direction consists in incorporating semantic information directly during the image matching process. This 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: 3 years

8.1.3. CSTB

Participants: Sven Oesau, Florent Lafarge.

The goal of this collaboration is to consolidate and integrate research codes implemented in Titane for urban semantization and reconstruction, into the CSTB reconstruction framework.

- Starting date: September 2015

- Duration: 6 months

8.2. Bilateral Grants with Industry

8.2.1. CNES Toulouse

Participants: Emmanuel Maggiori, Yuliya Tarabalka [PI].

Hierarchical approaches for object-oriented classification of multi-source images. Contract 150490/00.

- Starting date: November 2015

- Duration: 2 years

ALPAGE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Contracts with Industry

Alpage has developed several collaborations with industrial partners. Apart from grants described in the next section, specific collaboration agreements have been set up with the following companies:

- Verbatim Analysis (license agreement, transfer agreement, “CIFRE” PhD (contract ended in Dec 2014), see section 4.3),
- Lingua et Machina (DTI-funded engineer, see section 4.4),
- viavoo (PhD of Marion Baranes, employed at viavoo, started in 2012 and defended in Oct 2015 about the automatic normalisation of noisy texts),
- Yseop (“CIFRE” PhD of Raphael Salmon started in 2012 about automatic text generation)
- CEA-List (PhD of Quentin Pradet on the annotation of semantic roles in specific domains (defense in Feb 2015).
- Proxem (consulting)

MULTISPEECH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. MAIA

Company: Studio MAIA

Duration: September 2014 - August 2015

Supported by: Bpifrance

Abstract: A pre-study contract was signed to investigate speech processing tools that could eventually be transferred as plugins for audio mixing software. Prosody modification, noise reduction, and voice conversion are of special interest.

8.1.2. Venathec

Company: Venathec SAS

Other partners: ACOEM Group, GE Intelligent Platforms (contracted directly with Venathec)

Duration: June 2014 - August 2017

Supported by: Bpifrance

Abstract: The project aims to design a real-time control system for wind farms that will maximize energy production while limiting sound nuisance. This will leverage our know-how on audio source separation and uncertainty modeling and propagation.

PANAMA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Research contract with TDF

Participants: Nancy Bertin, Ewen Camberlein, Rémi Gribonval.

Duration: 6 weeks

Partners: TDF

This contract aimed at conceiving an algorithm to estimate the time offset between to identical or similar audio streams, to implement this algorithm in a prototype and to benchmark it on test files provided by the partner.

8.2. Bilateral Grants with Industry

8.2.1. CIFRE contract with Technicolor R&I France on Very large scale visual comparison

Participants: Rémi Gribonval, Himalaya Jain.

Duration: 3 years (2015-2018)

Research axis: 3.1.2

Partners: Technicolor R&I France, Inria-Rennes

Funding: Technicolor R&I France, ANRT

The grand goal of this thesis is to design, analyze and test new tools to allow large-scale comparison of high-dimensional visual signatures. Leveraging state of the art visual descriptors, the objective is to obtain new compact codes for visual representations, exploiting sparsity and learning, so that they can be stored and compared in an efficient, yet meaningful, way.

SEMAGRAMME Project-Team (section vide)

Chroma Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Toyota Motors Europe

[Feb 2006 - Feb 2009] [Dec 2010 - Dec 2015]

The contract with Toyota Motors Europe is a joint collaboration involving Toyota Motors Europe, Inria and ProBayes. It follows a first successful short term collaboration with Toyota in 2005.

This contract aims at developing innovative technologies in the context of automotive safety. The idea is to improve road safety in driving situations by equipping vehicles with the technology to model on the fly the dynamic environment, to sense and identify potentially dangerous traffic participants or road obstacles, and to evaluate the collision risk. The sensing is performed using sensors commonly used in automotive applications such as cameras and lidar.

This collaboration has been extended for 4 years and Toyota provides us with an experimental vehicle Lexus equipped with various sensing and control capabilities. Several additional connected technical contracts have been signed also.

8.1.2. Renault

[Jan 2010 - Feb 2013]

This contract was linked to the PhD Thesis of Stephanie Lefèvre. The objective is to develop technologies for collaborative driving as part of a Driving Assistance Systems for improving car safety. Both vehicle perception and communications are considered in the scope of this study. An additional short-term contract (3 months) has also been signed in november 2012.

8.1.3. IRT-Nano Perfect (2012-2014, and 2015-2017)

Perfect is a project supported by ANR in the scope of the IRT (Technological Research Institute) Nano-electronic driven by the CEA (Nuclear Energy Agency). The partners of the project are the CEA-LETI LIALP laboratory, ST-Microelectronics and Inria. The goal of this project is to propose integrated solutions for “Embeeded Bayesian Perception for dynamic environments” and to develop integrated open platforms. During the first phase of the project (2012-2014), the focus is on the domain of transportation (both vehicle and infrastructure); health and smart home sectors will also be considered in the second phase (2015-2017).

DEFROST Team (section vide)

FLOWERS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Advanced platform for Urban Mobility (PAMU)

Participants: David Filliat [correspondant], Emmanuel Battesti.

We further developed a planning algorithm for a autonomous electric car for Renault SAS. We improved a planning module in order to produce global plans to reach a goal specified in a digital map and to perform local reactive planning to avoid dynamic obstacles. This module is integrated in the PAMU autonomous vallet parking developed by Renault with several academic partners. A milestone demonstration of the system was made at the 22nd ITS World Congress, in Bordeaux, on the 5-9 October 2015.

8.2. Bilateral Grants with Industry

8.2.1. Development of an Contextual electronic copilot for driving assistance

Participants: David Filliat [correspondant], Alexandre Armand.

Financing of the CIFRE PhD grant of Alexandre Armand by Renault SAS with the goal of developping an Contextual electronic copilot for driving assistance based on the learning of the behavior of the driver.

8.2.2. Curiosity and visual attention

Participants: David Filliat [correspondant], Celine Craye.

Financing of the CIFRE PhD grant of Celine Craye by Thales S.A. with the goal of developing a mechanism of visual attention guiding the exploration of a robot.

8.2.3. Auto-Apprentissage Auto-Adaptable pour la compliance au traitement

Participants: Manuel Lopes [correspondant], Alexandra Delmas, Pierre-Yves Oudeyer, Benjamin Clement.

Financing of the CIFRE PhD grant of Alexandra Delmas by Itwell with the goal of developing a tool for self-learning for patients to improve their compliance to treatment.

HEPHAISTOS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Participant: Yves Papegay.

We had a short-term collaboration with the Exelsius company devoted to innovative solutions in processes of electronic business and namely conformal coating. Path-planning algorithms have been designed for inclusion in a new machine for selective surface activation based on atmospheric pressure plasma. Transfer of know-how has been covered by a research contract, and by a technology cession.

8.2. Bilateral Grants with Industry

Participant: Jean-Pierre Merlet.

We have got a grant from the company GénérationRobot to develop a pedagogical cable-driven parallel robot

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 8492, duration: 22 months.

This contract with the Inria spin off company Robocortex started in March 2014. It is devoted to the visual tracking and 3D localization of some particular targets.

8.2. Bilateral Grants with Industry

8.2.1. Astrium EADS

Participants: Tawsif Gokhool, Patrick Rives.

no. Inria Sophia 7128, duration: 36 months.

The objective of this project that started in February 2012 was to investigate the general problem of visual mapping of complex 3D environments that evolve over time. This contract supported Tawsif Gokhool's Ph.D. (see Section 7.4.3).

8.2.2. ECA Robotics

Participants: Romain Drouilly, Patrick Rives.

no. Inria Sophia 7030, duration: 36 months.

This project started in May 2012. It aimed at specifying a semantic representation well adapted to the problem of navigation in structured environment (indoors or outdoors). This contract was devoted to support the Cifre Convention between ECA Robotics and Inria Sophia Antipolis regarding Romain Drouilly's Ph.D. (see Section 7.4.5).

8.2.3. Technicolor

Participants: Salma Jiddi, Eric Marchand.

Univ. Rennes 1, duration: 36 months.

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

8.2.4. Pôle Saint Hélier

Participants: Louise Devigne, Marie Babel.

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

This project started in November 2015. It will address 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.

LARSEN Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Emiota

Participant: Jean-Baptiste Mouret.

- Company: Emiota (http://www.wearbelty.com/ / http://www.emiota.fr/)
- Duration: 03/2015 – 12/2015
- Abstract: Emiota is a startup that works on a "smart" belt: a motorized and sensorized belt that both senses bio-medical data and adapts its length to the activity of its holder. For instance, the belt could tighten if it detects that its holder is getting up and relax if he sits down. In this contract, the Larsen team demonstrated how Bayesian optimization and Gaussian processes, two machine learning techniques used in our recent Nature paper [11], can be used to achieve this adaptation.

RITS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Valeo Group: a very strong partnership is under reinforcement between Valeo and Inria. Several bilateral contracts were signed to conduct joint works on Driving Assistance. Valeo financed the PhD thesis of G. Trehard under the framework of Valeo internal project “V50” and is currently a major financing partner of the “GAT” international Chaire / JointLab. Technology transfer is also a major collaboration topic between RITS and Valeo.

AYIN Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Airbus D&S

Participants: Paula Craciun, Josiane Zerubia [contact].

Automatic object tracking on a sequence of images taken from a geostationary satellite. Contract #7363.

8.1.2. L'OREAL Cosmétique Active International

Participants: Zhao Liu, Josiane Zerubia [contact].

Acne detection on images using a Markov random field model and chromophore descriptors extracted by bilateral decomposition. Contract #201514035.

8.2. Bilateral Grants with Industry

8.2.1. CNES Toulouse

Participants: Aurélie Boisbunon, Josiane Zerubia [contact].

Parameter estimation for automatic object change detection in a sequence of very high resolution optical images. Full post-doctoral grant funded by CNES, given to Aurélie Boisbunon during her 16 month stay in AYIN team.

LEAR Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. MBDA

Participants: Jakob Verbeek, Julien Bardonnet.

Since 2004 we have collaborated with MBDA on a variety of subjects, namely object detection, tracking and matching. Several PhD students have been funded by MBDA, and code has been transferred which is integrated in products. Our collaboration resulted in 2010 in the award of the MBDA prize for innovation. Since May 2015 we have one engineer funded by MBDA working on incremental learning of object detection models. The goal is to take pre-existing vehicle models, and to quickly adapt them to new images of these vehicles when they are acquired in the field.

8.2. Google

Participants: Karteek Alahari, Cordelia Schmid.

We received a Google Faculty Research Award in 2015. The objective is to interpret video semantically in the presence of weak supervision. We will focus on answering questions such as *who* is in the scene, *what* they are doing, and *when* exactly did they perform their action(s). We propose to develop models for detection and recognition of objects and actions learned from minimally annotated training data.

8.3. Facebook

Participants: Cordelia Schmid, Jakob Verbeek, Karteek Alahari, Julien Mairal.

End of 2015 we received a gift from Facebook. The collaboration will start in 2016. The topics include image retrieval with CNN based descriptors, weakly supervised semantic segmentation, and learning structure models for action recognition in videos.

8.4. MSR-Inria joint lab: scientific image and video mining

Participants: Anoop Cherian, Zaid Harchaoui, Yang Hua, Cordelia Schmid, Karteek Alahari.

This collaborative project, which started in September 2008, brings together the WILLOW and LEAR project-teams with researchers at Microsoft Research Cambridge and elsewhere. It builds on several ideas articulated in the "2020 Science" report, including the importance of data mining and machine learning in computational science. Rather than focusing only on natural sciences, however, we propose here to expand the breadth of e-science to include humanities and social sciences. The project focuses on fundamental computer science research in computer vision and machine learning, and its application to archeology, cultural heritage preservation, environmental science, and sociology. Yang Hua is funded by this project.

8.5. MSR-Inria joint lab: structured large-scale machine learning

Participants: Julien Mairal, Zaid Harchaoui.

Machine learning is now ubiquitous in industry, science, engineering, and personal life. While early successes were obtained by applying off-the-shelf techniques, there are two main challeges faced by machine learning in the « big data » era : structure and scale. The project proposes to explore three axes, from theoretical, algorithmic and practical perspectives: (1) large-scale convex optimization, (2) large-scale combinatorial optimization and (3) sequential decision making for structured data. The project involves two Inria sites and four MSR sites and started at the end of 2013.

8.6. Xerox Research Center Europe

Participants: Zaid Harchaoui, Mattis Paulin, Karteek Alahari, Vladyslav Sydorov, Cordelia Schmid.

The collaboration with Xerox has been on-going since October 2009 with two co-supervised CIFRE scholarships (2009–2012; 2011-2014). Starting June 2014 we signed a third collaborative agreement for a duration of three years. The goal is to develop approaches for deep learning based image description and pose estimation in videos.

LINKMEDIA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Teddy Furon spent 20 % of his time during 6 months to transfer research result to IRT B-com

CIFRE Ph. D. contract with Institut National de l'Audiovisuel (Bingqing Qu)

CIFRE Ph. D. contract with Technicolor (Himalaya Jain)

Ph. D. contract with Alcatel-Lucent Bell Labs (Raghavendran Balu) in the framework of the joint Inria-Alcatel Lucent lab.

MAGRIT Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

The partnership with GE Healthcare started in 1993. In the past few years, it bore on the supervision of CIFRE PhD fellows on the topic of using a multi-modal framework and augmented reality in interventional neuroradiology. The PhD thesis of Charlotte Delmas started in April 2013 with the aim to perform 3D reconstruction of tools in interventional neuroradiology. Our goal is to help clinical gesture by providing the physician with a better understanding of the relative positions of the tools and of the pathology.

MORPHEO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. QuickCSG Contract with undisclosed industrial partner

QuickCSG software was licensed in october 2015 to an industrial partner whose name is contractually kept undisclosed for a finite time period. QuickCSG is being integrated into the partner's software and is scheduled to be sold with this industrial partner's products during the year of 2016. An additional support contract has been signed with this partner for the purpose of the transfer.

PERCEPTION Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

In 2015 we started a collaboration with Xerox Research Center India (XRCI), Bangalore. This three-year collaboration (2015-2017) is funded by a grant awarded by the **Xerox Foundation University Affairs Committee (UAC)** and the topic of the project is *Advanced and Scalable Graph Signal Processing Techniques*. The work is done in collaboration with EPI MISTIS and our Indian collaborators are Arijit Biswas and Anirban Mondal.

PRIMA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Far-Infrared Visual Sensors

PRIMA has worked with Schneider Electric on embedded image analysis algorithms for a new generation of far-infrared visual sensors. The objective is to develop an integrated visual sensor with very low power consumption. Such systems can be used to estimate temperature in different parts of a room, as well as to provide information about human presence and human activity.

7.1.2. Learning Routines in a Smart Home

PRIMA is working with Orange Labs on techniques for observing activity and learning routines in a smart home. Activity is observed by monitoring use of electrical appliances and Communications media (Telephone, Television, Internet). Activities are described using Bayesian Situation Modelling techniques demonstrated in earlier projects. A log of daily activities is used to discover daily routines expressed as temporal sequences of contexts, where each context is expressed as a network of situations.

Experiments will be performed using the LovelyLoft Smart home living lab that has been constructed as part of the EquipEx Amiqual4home.

SIROCCO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

8.1.1. CIFRE contract with Orange on Generalized lifting for video compression

Participants: Christine Guillemot, Bihong Huang.

- Title : Generalized lifting for video compression.
- Research axis : § 7.3.2 .
- Partners : Orange Labs, Inria-Rennes, UPC-Barcelona.
- Funding : Orange Labs.
- Period : Apr.2012-Mar.2015.

This contract with Orange labs. (started in April. 2012) concerns the PhD of Bihong Huang and aims at modelling the redundancy which remains in spatial and temporal prediction residues. The analysis carried out in the first year of the PhD has shown that this redundancy (hence the potential rate saving) is high. In 2013, different methods have been investigated to remove this redundancy, such as generalized lifting and different types of predictors. The generalized lifting is an extension of the lifting scheme of classical wavelet transforms which permits the creation of nonlinear and signal probability density function (pdf) dependent and adaptive transforms. This study is also carried out in collaboration with UPC (Prof. Philippe Salembier) in Barcelona.

8.1.2. CIFRE contract with Technicolor on High Dynamic Range (HDR) video compression

Participants: Mikael Le Pendu, Christine Guillemot.

- Title : Floating point high dynamic range (HDR) video compression
- Research axis : § 7.3.4 .
- Partners : Technicolor, Inria-Rennes.
- Funding : Technicolor, ANRT.
- Period : Dec.2012-Nov.2015.

High Dynamic Range (HDR) images contain more intensity levels than traditional image formats, leading to higher volumes of data. HDR images can represent more accurately the range of intensity levels found in real scenes, from direct sunlight to faint starlight. The goal of the thesis is to design a visually lossless compression algorithm for HDR floating-point imaging data. The first year of the thesis has been dedicated to the design of a quantization method converting the floating point data into a reduced bit depth representation, with minimal loss. The method leads to a bit rate saving of 50% compared to the existing Adaptive LogLuv transform.

8.1.3. CIFRE contract with Technicolor on sparse modelling of spatio-temporal scenes

Participants: Martin Alain, Christine Guillemot.

- Title : Spatio-temporal analysis and characterization of video scenes
- Research axis : § 7.1.2 .
- Partners : Technicolor, Inria-Rennes.
- Funding : Technicolor, ANRT.
- Period : Oct.2012-Sept.2015.

A first CIFRE contract has concerned the Ph.D of Safa Cherigui from Nov.2009 to Oct.2012, in collaboration with Dominique Thoreau (Technicolor). The objective was to investigate texture and video scene characterization using models based on sparse and data dimensionality reduction techniques, as well as based on epitomes. The objective was then to use these models and methods in different image processing problems focusing in particular on video compression. While, the first PhD thesis has focused on spatial analysis, processing, and prediction of image texture, a second CIFRE contract (PhD thesis of Martin Alain) has started in Oct. 2012 to push further the study by addressing issues of spatio-temporal analysis and epitome construction, with applications to temporal prediction, as well as to other video processing problems such as denoising and super-resolution.

8.1.4. CIFRE contract with Thomson Video Networks (TVN) on Video analysis for HEVC based video coding

Participants: Nicolas Dhollande, Christine Guillemot, Olivier Le Meur.

- Title : Coding optimization of HEVC by using pre-analysis approaches.
- Research axis : § 7.3.5 .
- Partners : Thomson Video Networks, Univ. Rennes 1.
- Funding : Thomson Video Networks (TVN).
- Period : Nov.2012-Sept.2015.

This contract with TVN (started in Oct. 2012) concerns the PhD of Nicolas Dhollande and aims at performing a coding mode analysis and developing a pre-analysis software. HEVC standard is a new standard of compression including new tools such as advanced prediction modes. Compared to the previous standard H.264, HEVC's complexity is three to four times higher. The goal of this thesis is to infer the best coding decisions (prediction modes...) in order to reduce the computational complexity of HEVC thanks to a pre-analysis step. The pre-analysis is expected to provide useful estimates of local video characteristics which will then help selecting the prediction and transform partitions as well as a number of other parameters such as the quantization parameters or the prediction modes.

8.1.5. CIFRE contract with Envivio on LDR compatible HDR video coding

Participants: Christine Guillemot, David Gommelet, Aline Roumy.

- Title : LDR-compatible coding of HDR video signals.
- Research axis : § 7.3.3 .
- Partners : Envivio.
- Funding : Cifre Envivio.
- Period : Oct.2014-Sept.2017.

The goal of this Cifre contract is to design solutions for LDR-compatible coding of HDR videos. This involves the study of rate-distortion optimized tone mapping operators taking into account constraints of temporal coherency to avoid the temporal flickering which results from a direct frame-by-frame application of classical tone mapping operators. The goal is also to design a coding architecture which will build upon these operators, integrating coding tools tailored to the statistics of the HDR refinement signals.

8.1.6. CIFRE contract with Technicolor on light fields editing

Participants: Christine Guillemot, Matthieu Hog.

- Title : Light fields editing
- Research axis : *just started*
- Partners : Technicolor, Inria-Rennes.
- Funding : Technicolor, ANRT.
- Period : Oct.2015-Sept.2018.

Editing is quite common with classical imaging. Now, if we want light-fields cameras to be in the future as common as traditional cameras, this functionality should also be enabled with light-fields. The goal of the PhD will therefore be to develop methods for light-field editing focusing first on object removal thanks to light-fields inpainting and for constructing panoramic images based on light-fields stitching. This objective also includes the development of algorithms for dynamic light fields spatio-temporal segmentation with spatio-temporal coherence constraints across sub-aperture images.

8.1.7. CIFRE contract with Technicolor on cloud-based video compression

Participants: Jean Begaint, Christine Guillemot.

- Title : Cloud-based video compression
- Research axis : *just started*
- Partners : Technicolor, Inria-Rennes.
- Funding : Technicolor, ANRT.
- Period : Nov.2015-Oct.2018.

The goal of this Cifre contract is to develop a novel image compression scheme exploiting similarity between images in a cloud. The objective will therefore be to develop rate-distortion optimized affine or homographic estimation and compensation methods which will allow us to construct prediction schemes and learn adapted bases from most similar images retrieved by image descriptors. One issue to be addressed is the rate-distortion trade-off induced by the need for transmitting image descriptors.

STARS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- **Toyota Europ**: this project with Toyota runs 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 we want to develop 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.
- **LinkCareServices**: this project with Link Care Services runs from 2010 upto 2015. It aims at designing a novel system for Fall Detection. This study consists in evaluating the performance of video-based systems for Fall Detection in a large variety of situations. Another goal is to design a novel approach based on RGBD sensors with very low rate of false alarms.

WILLOW Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Facebook AI Research Paris: Weakly-supervised interpretation of image and video data (Inria)

Participants: Jean Ponce, Minsu Cho, Ivan Laptev, Josef Sivic.

We will develop in this project (Facebook gift) new models of image and video content, as well as new recognition architectures and algorithms, to address the problem of understanding the visual content of images and videos using weak forms of supervision, such as the fact that multiple images contain instances of the same objects, or the textual information available in television or film scripts.

8.2. Google: Learning to annotate videos from movie scripts (Inria)

Participants: Josef Sivic, Ivan Laptev, Jean Ponce.

The goal of this project is to automatically generate annotations of complex dynamic events in video. We wish to deal with events involving multiple people interacting with each other, objects and the scene, for example people at a party in a house. The goal is to generate structured annotations going beyond simple text tags. Examples include entire text sentences describing the video content as well as bounding boxes or segmentations spatially and temporally localizing the described objects and people in video. This is an extremely challenging task due to large intra-class variation of human actions. We propose to learn joint video and text representations enabling such annotation capabilities from feature length movies with coarsely aligned shooting scripts. Building on our previous work in this area, we aim to develop structured representations of video and associated text enabling to reason both spatially and temporally about scenes, objects and people as well as their interactions. Automatic understanding and interpretation of video content is a key-enabling factor for a range of practical applications such as content-aware advertising or search. Novel video and text representations are needed to enable breakthrough in this area.

8.3. Google: Structured learning from video and natural language (Inria)

Participants: Simon Lacoste-Julien, Ivan Laptev, Josef Sivic.

People can easily learn how to change a flat tire of a car or assemble an IKEA shelve by observing other people doing the same task, for example, by watching a narrated instruction video. In addition, they can easily perform the same task in a different context, for example, at their home. This involves advanced visual intelligence abilities such as recognition of objects and their function as well as interpreting sequences of human actions that achieve a specific task. However, currently there is no artificial system with a similar cognitive visual competence. The goal of this proposal is to develop models, representations and learning algorithms for automatic understanding of complex human activities from videos narrated with natural language.

8.4. MSR-Inria joint lab: Image and video mining for science and humanities (Inria)

Participants: Leon Bottou [Facebook], Ivan Laptev, Maxime Oquab, Jean Ponce, Josef Sivic, Cordelia Schmid [Inria Lear].

This collaborative project brings together the WILLOW and LEAR project-teams with MSR researchers in Cambridge and elsewhere. The concept builds on several ideas articulated in the “2020 Science” report, including the importance of data mining and machine learning in computational science. Rather than focusing only on natural sciences, however, we propose here to expand the breadth of e-science to include humanities and social sciences. The project we propose will focus on fundamental computer science research in computer vision and machine learning, and its application to archaeology, cultural heritage preservation, environmental science, and sociology, and it will be validated by collaborations with researchers and practitioners in these fields.

In October 2013 a new agreement has been signed for 2013-2016 with the research focus on automatic understanding of dynamic video content. Recent studies predict that by 2018 video will account for 80-90% of traffic on the Internet. Automatic understanding and interpretation of video content is a key enabling factor for a range of practical applications such as organizing and searching home videos or content aware video advertising. For example, interpreting videos of “making a birthday cake" or “planting a tree" could provide effective means for advertising products in local grocery stores or garden centers. The goal of this project is to perform fundamental computer science research in computer vision and machine learning in order to enhance the current capabilities to automatically understand, search and organize dynamic video content.