6th International Oberseminar

Groningen, The Netherlands, 10-13 May 2013

Seminars: Program

Oberseminar Program, 10-13 May, 2013

Friday, May 10, 2013		
Session 1, Chair: Malte Helmert		
Time	Speaker	Title
9:00-9:30	Patrick Eyerich, UF	Stronger Abstraction Heuristics Through Perimeter Search
9:30-10:00	Florian Pommerening, UB	Incremental LM-cut
10:00-10:30	Vittorio Amos Ziparo, UR	ROVINA
10:30-11:00	Coffee Break	
Session 2, Chair: Esra Erdem		
Time	Speaker	Title
11:00-11:30	Farhad Arbab, CWI & LU	Protocols as Tangible Artifacts
11:30-12:00	Gabriele Röger, UB	Getting the Most Out of Pattern Databases for Classical Planning
12:00-11:30	Eirini Kaldeli, UG	Domain-Independent Planning at the service of Services Applications in Uncertain and Dynamic Domains

Saturday, May 11, 2013		
Session 1, Chair: Bernard Nebel		
Time	Speaker	Title
9:00-9:30	Thomas Keller, UF	Trial-based Heuristic Tree Search
9:30-10:00	Jendrik Seipp, UB	Counterexample-guided Abstraction Refinement for Classical Planning
10:00-10:30	Peter Schüller, SU	A Systematic Analysis of Levels of Integration between Low-Level Reasoning and Task Planning
10:30-11:00	Coffee Break	
Session 2, Chair: Daniele Nardi		
Time	Speaker	Title
11:00-11:20	Andrea Pagani, UG	Modeling the Last Mile of the Smart Grid
11:20-11:40	Tuan Anh Nguyen, UG	Towards Context Consistency in a Rule-Based Activity Recognition Architecture
11:40-12:00	Faris Nizamic, UG	Automated Deployment of Virtualized Services based on Functional, Performance and Data Aspects
12:00-12:20	Ando Emerencia, UG	Applying Artificial Intelligence in Schizophrenia Management
Session 3, Chair: Vittorio Amos Ziparo		
Time	Speaker	Title
14:00-14:30	Johannes Löhr, UF	Domain Predictive Control Under Uncertain Numerical State Information

14:30-15:00	Martin Wehrle, UB	The Relative Pruning Power of Strong Stubborn Sets and Expansion Core
15:00-15:30	Zeynep G. Saribatur, SU	Finding Optimal Plans for Multiple Teams of Robots through a Mediator

Saturday, May 11, 2013	
Poster Session (12:30-14:00 and 16:00-17:00)	
Speaker	Title
Silvan Sievers, UB	Efficient Implementation of Pattern Database Heuristics for Classical Planning
Viktoriya Degeler, UG	Probabilistic Rule-Based Activity Recognition
Luca Iocchi, UR	Variable Zoom Camera Calibration for Virtual Advertising
Ilche Georgievski, UG	Planning for Coordination of Devices in Energy-Smart Environments
Domenico Bloisi, UR	Human-Robot Collaboration for Semantic Labeling of the Environment

Monday, May 13, 2013		
Session 1, Chair: Alexander Lazovik		
Time	Speaker	Title
9:00-9:30	Andreas Herlte, UF	Integrated Symbolic Planning in the Tidyup-Robot Project
9:30-10:00	Frank Hutter, UF	Learning and Optimization of Empirical Algorithm Performance
10:00-10:30	Julien Hué, UF	Revising Qualitative Constraint Network
10:30-11:00	Coffee Break	
Session 2, Chair: Ilche Georgievski		
Time	Speaker	Title
11:00-11:30	Christian Dornhege, UF	Integrated Task and Motion Planning on Partially Grounded Domains
11:30-12:00	Heerko Groefsema, UG	Business Process Verification – a Survey
12:00-12:30	Taigo Maria Bonanni, UR	Towards SLAM Unification
Session 3, Chair: Doina Bucur		
Time	Speaker	Title
14:00-14:30	Emanuele Bastianelli, UR	Structured Kernel-based learning for Spatial Role Labeling
14:30-15:00	Fabio Previtali, UR	PTracking: a distributed opensource library that exploits a clustering technique to tracks multiple objects
15:00-15:30	Guglielmo Gemignani, UR	Disambiguating Localization Symmetry Exploiting a Multi-Clustered Particle Filtering

Oberseminar 2013
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Friday, May 10, 2013	
Session 1, Chair: Malte Helmert	
Time	Presentation
9:00-9:30	Patrick Eyerich, UF
	Stronger Abstraction Heuristics Through Perimeter Search
	Perimeter search is a bidirectional search algorithm consisting of two phases. In the first phase, a limited regression search computes the perimeter, a region which must necessarily be passed in every solution. In the second phase, a heuristic forward search finds an optimal plan from the initial state to the perimeter. The drawback of perimeter search is the need to compute heuristic estimates towards every state on the perimeter in the forward phase. We show that this limitation can be effectively overcome when using pattern database (PDB) heuristics in the forward phase. The combination of perimeter search and PDB heuristics has been considered previously by Felner and Ofek for solving combinatorial puzzles. They claimed that, based on theoretical considerations and experimental evidence, the use of perimeter search in this context offers "limited or no benefits". Our theoretical and experimental results show that this assessment should be revisited.
9:30-10:00	Florian Pommerening, UB
	Incremental LM-cut
	Optimal plans of delete-free planning tasks are interesting both in domains that have no delete effects and as the relaxation heuristic h+ in general planning. Many heuristics for optimal and satisficing planning approximate the h+ heuristic, which is well-informed and admissible but intractable to compute. In this work, branch-and-bound and IDA* search are used in a search space tailored to delete-free planning together with an incrementally computed version of the LM-cut heuristic. The resulting algorithm for optimal delete-free planning exceeds the performance of A* with the LM-cut heuristic in the state-of-the-art planner Fast Downward.
10:00-10:30	Vittorio Amos Ziparo, UR
	ROVINA
	Mapping and digitizing archeological sites is an important task to preserve cultural heritage and to make it accessible to the public. Current systems for digitizing sites typically build upon static 3D laser scanning technology that is brought into archeological sites by humans. This is acceptable in general, but prevents the digitization of sites that are inaccessible by humans. In the field of robotics, however, there has recently been a tremendous progress in the development of autonomous robots that can access hazardous areas. ROVINA aims at extending this line of research with respect to reliability, accuracy and autonomy to enable the novel application scenario of autonomously mapping of areas of high archeological value that are hardly accessible.
10:30-11:00	*Coffee Break*
Session 2, Chair: Esra Erdem	
Time	Presentation
11:00-11:30	Farhad Arbab, CWI & LU
	Protocols as Tangible Artifacts
	Many aspects of daily life, from finance and economy to health, safety, and security, to transportation and entertainment, today rely on a backbone of ICT. The distributed nature of this infrastructure increasingly makes protocols that engage various (human and/or automated) actors to accomplish some goal, more important than the actors themselves: the protocols must ensure certain required properties hold for the interactions among their engaged actors, regardless of the intentions, functionality, or behavior of those actors. Concurrency theory studies interaction protocols. However, all traditional models of concurrency (e.g., process algebras) are action-based models for direct specification of things that interact, rather than a direct specification of interaction protocols. Consequently, interaction in these formalisms becomes a derived, secondary concept whose properties can be studied only indirectly, as the side-effects of the unfoldings of the actions of their actors. Protocols specified in action-based models are generally not scalable and cannot be composed. Treating interaction as an explicit first-class concept, complete with its own composition operators, allows specifying more complex interaction protocols by combining simpler, and eventually primitive, protocols. Reo serves as a premier example of such an interaction-based model of concurrency. In this talk, we describe Reo and its support tools. We show how in this setting, interaction protocols become explicit, concrete, tangible (software) constructs that can be specified, verified, composed, and reused, independently of the actors that they may engage in disparate applications.

11:30-12:00	Gabriele Röger, UB
	Getting the Most Out of Pattern Databases for Classical Planning
	The iPDB procedure by Haslum et al. is the state-of-the-art method for computing additive abstraction heuristics for domain-independent planning. It performs a hill-climbing search in the space of pattern collections, combining information from multiple patterns in the so-called canonical heuristic. We present a new heuristic that also combines the information of several patterns. This post-hoc optimization heuristic is based on linear programming and provably dominates the canonical heuristic for the same set of patterns. In a theoretical analysis, we reveal an interesting relationship between the post-hoc optimization heuristic and a certain class of cost-partitioning. An experimental analysis demonstrates the strength of the heuristic on the IPC benchmark suite.
12:00-11:30	Eirini Kaldeli, UG
	Domain-Independent Planning at the service of Services Applications in Uncertain and Dynamic Domains
	Service domains constitute an application field where AI planning can significantly contribute towards achieving automatic and adaptable compositions. Within the last years, several approaches have addressed the problem of Web Service composition as a planning task. Most of these approaches, however, suffer from one or more of the following main limitations: they restrict the applicability of the domain to a set of predefined procedural templates; cannot efficiently deal with numeric-valued variables, especially when these regard sensing outcomes or operator inputs; and disregard recovery from runtime contingencies due to erroneous service behaviour or exogenous events that interfere with plan execution. To address these issues, we propose to use a domain-independent planning framework, called the RuG planner, which is based on modelling the planning task as a Constraint Satisfaction Problem. This planning system is used to meet the requirements posed by three different service-oriented platforms: a domain consisting of services publicly available on the Web, a Smart Home with intelligent devices, and a framework for Business Process recovery.

Saturday, May 11, 2013	
Session 1, Chair: Bernhard Nebel	
Time	Presentation
9:00-9:30	Thomas Keller, UF
	Trial-based Heuristic Tree Search
	Dynamic programming is a well-known approach for solving MDPs. In large state spaces, asynchronous versions like Real-Time Dynamic Programming have been applied successfully. If unfolded into equivalent trees, Monte-Carlo Tree Search algorithms are a valid alternative. UCT, the most popular representative, obtains good anytime behavior by guiding the search towards promising areas of the search tree. The Heuristic Search algorithm AO$*$ finds optimal solutions for MDPs that can be represented as acyclic AND/OR graphs. We introduce a common framework, Trial-based Heuristic Tree Search, which subsumes these approaches and distinguishes them based on five ingredients: heuristic function, backup function, action selection, outcome selection, and trial length. Using this framework, we describe three new algorithms which mix these ingredients in novel ways in an attempt to combine their different strengths. Our evaluation shows that two of our algorithms not only provide superior theoretical properties to UCT, but also outperform state-of-the-art approaches experimentally.
9:30-10:00	Jendrik Seipp, UB
	Counterexample-guided Abstraction Refinement for Classical Planning
	Counterexample-guided abstraction refinement (CEGAR) is a methodological framework for incrementally computing abstractions of transition systems. We propose a CEGAR algorithm for computing abstraction heuristics for optimal classical planning. Starting from a coarse abstraction of the planning task, we iteratively compute an optimal abstract solution, check if and why it fails for the concrete planning task and refine the abstraction so that the same failure cannot occur in future iterations. A key ingredient of our approach is a novel class of abstractions for classical planning tasks that admits efficient and very fine-grained refinement. Our implementation performs tens of thousands of refinement steps in a few minutes and produces heuristics that are often significantly more accurate than pattern database heuristics of the same size.

10:00-10:30	Peter Schüller, SU
	A Systematic Analysis of Levels of Integration between Low-Level Reasoning and Task Planning
	We provide a systematic analysis of levels of integration between discrete high-level reasoning and continuous low-level reasoning to address hybrid planning problems in robotics. We identify four distinct strategies for such an integration: (i) low-level checks are done for all possible cases in advance and then this information is used during plan generation, (ii) low-level checks are done exactly when they are needed during the search for a plan, (iii) first all plans are computed and then infeasible ones are filtered, and (iv) by means of replanning, after finding a plan, low-level checks identify whether the plan is infeasible or not; if it is infeasible, a new plan is computed considering the results of previous low-level checks. We perform experiments on hybrid planning problems in housekeeping and legged locomotion domains considering these four methods of integration, as well as some of their combinations. We analyze the usefulness of different levels of integration in these domains, both from the point of view of computational efficiency and from the point of view of plan quality relative to its feasibility. We discuss advantages and disadvantages of each strategy in the light of experimental results and provide some guidelines on choosing proper strategies for a given domain.
10:30-11:00	*Coffee Break*
Session 2, Chair: Daniele Nardi	
Time	Presentation
11:00-11:20	Andrea Pagani, UG
	Modeling the Last Mile of the Smart Grid
	The energy market is changing as it is undergoing unbundling, accommodating renewable sources in the grid and allowing for micro-production to be part of the smart grid. Such changes will have a major impact on the underlying transport and distribution infrastructures. These have been traditionally hierarchical, unidirectional and capillary, though the new smart grid scenario calls for an infrastructure that has higher connectivity, that is bidirectional and naturally complex. In this paper, we look at ways of modeling the distribution grid as a complex network taking into account all voltage levels, that is, including the last mile of the grid reaching the end user. We provide and argue for design principles for such smart grid models and present results that call for a denser Medium and Low Voltage power grid. The design principles come from an analysis of an existing grid portion and consider its evolution into a smart grid.
11:20-11:40	Tuan Anh Nguyen, UG
	Towards Context Consistency in a Rule-Based Activity Recognition Architecture
	Human activity recognition (AR) is a crucial research area for intelligent pervasive environments such as energy-smart buildings. In order to gain precise and fine-grained AR results, a system must overcome partial observability of the environment and noisy, imprecise, and corrupted sensor data. In this work, we propose a rule-based AR architecture that effectively handles multiple-user, multiple-area situations, recognizing real-time office activities. The proposed solution is based on an ontological approach, using low-cost, binary, and wireless sensors. We employ context consistency diagrams (CCD) as the key component for fault corrections. CCD is a data structure that provides a mechanism for probabilistical reasoning about the current situation and calculates the most probable situation at each moment of time even with the presence of inconsistencies, conflicts, and ambiguities in available sensor readings. The implementation of the system and its testing in a living lab environment show that CCD corrects at least 26% and up to 56.88% of faults in sensor readings, improving overall recognition accuracy by at least 6% and up to 15%, thus producing reliable recognition results from unreliable sensor data. The results also show that our system can run online, in a distributed manner, with the execution times of less than 5ms.
11:40-12:00	Faris Nizamic, UG
	Automated Deployment of Virtual Services based on Functional, Performance and Data Aspects
	Test automation is a crucial activity that supports reduction of time within software development process. In highly distributed service-oriented systems complexity of development process is increased due to emerging constraints regarding ownership, costs, data limitations, conflicting schedules and availability. To overcome these constraints, we suggest the middleware architecture which tackles each constraint separately. In this presentation, we will especially focus on components which use Virtual Services to remove constraints, and that way enable availability and management of performance, functionality and data parameters, as well as grant ownership. In this work, we show how not only tests can be automated, but also how dependable back-end services can be automatically provisioned and that way complete time of development process for software as a service reduced.

12:00-12:20	Ando Emerencia, UG
	Applying Artificial Intelligence in Schizophrenia Management
	The presentation gives an overview of two of our research projects (Wegweis and AutoVAR) that are concerned with automating aspects of the treatment of patients with severe mental illnesses such as schizophrenia. We consider how these projects fit in the schizophrenia management lifecycle, and how they improve patient care. Our first project, Wegweis, is a web application that generates personalized advice for schizophrenia patients based on electronic medical records. I will present some of the conclusions and lessons learned from this project. The second project, AutoVAR, is a web application designed to automate and simplify the creation of vector autoregression models on patient diary data. I will discuss our approach for automating this process and the functionality implemented thus far.
Session 3, Chair: Vittorio Amos Ziparo	
Time	Presentation
14:00-14:30	Johannes Löhr, UF
	Domain Predictive Control Under Uncertain Numerical State Information
	In planning, hybrid system states consisting of logical and numerical variables are usually assumed to be completely known. In particular, for numerical state variables full knowledge of their exact values is assumed. However, in real world applications states are results of noisy measurements and imperfect actuators. Therefore, a planned sequence of state transitions might fail to lead a hybrid system to the desired goal. We show how to propagate and reason about uncertain state information directly in the planning process, enabling hybrid systems to find plans that satisfy numerical goals with predefined confidence.
14:30-15:00	Martin Wehrle, UB
	The Relative Pruning Power of Strong Stubborn Sets and Expansion Core
	In the last years, pruning techniques based on partial order reduction have found increasing attention in the planning community. One recent result is that the expansion core method is a special case of the strong stubborn sets method proposed in model checking. However, it is still an open question if there exist efficiently computable strong stubborn sets with strictly higher pruning power than expansion core. In this paper, we prove that the pruning power of strong stubborn sets is strictly higher than the pruning power of expansion core even for a straight-forward instantiation of strong stubborn sets. This instantiation is as efficiently computable as expansion core. Hence, our theoretical results suggest that strong stubborn sets should be preferred to expansion core. Our empirical evaluation on all optimal benchmarks from the international planning competitions up to 2011 supports the theoretical results.
15:00-15:30	Zeynep G. Saribatur, SU
	Finding Optimal Plans for Multiple Teams of Robots through a Mediator
	We study the problem of finding optimal plans for multiple teams of robots through a mediator, where each team is given a task to complete in its workspace on its own and where teams are allowed to transfer robots between each other, subject to the following constraints: 1) teams (and the mediator) do not know about each other's workspace or tasks (e.g., for privacy purposes); 2) every team can lend or borrow robots, but not both (e.g., transportation/calibration of robots between/for different workspaces is usually costly). We introduce a novel method to solve this problem using state-of-the-art SAT solvers and ASP solvers. We show applicability and usefulness of our approach by experiments on various scenarios of responsive and energy-efficient cognitive factories.
Saturday, May 11, 2013	
Poster Session (12:30-14:00 and 16:00-17:00)	
Silvan Sievers, UB	
	Efficient Implementation of Pattern Database Heuristics for Classical Planning
	Despite their general success in the heuristic search community, pattern database (PDB) heuristics have, until very recently, not been used by the most successful classical planning systems. We describe a new efficient implementation of pattern database heuristics within the Fast Downward planner. A planning system using this implementation is competitive with the state of the art in optimal planning, significantly improving over results from the previous best PDB heuristic implementation in planning.
Viktoriya Degeler, UG	
	Probabilistic Rule-Based Activity Recognition
	Activity Recognition (AR) is one of the most important components of any smart building. Context Consistency Diagrams (CCD) have proved themselves in the field of fixing sensor errors, which improves the recognition rate after feeding the fixed results to a rule-based AR component. In this work we investigate the ability of CCD to produce activity recognition results directly, by combining the sensor dependency rules and activity recognition rules in a single CCD. As an outcome we obtain a recognized situation or, in the presence of erroneous readings, several situations with their probability levels.

Luca Iocchi, UR

Variable Zoom Camera Calibration for Virtual Advertising

Camera calibration is a necessary step in order to develop applications that need to establish a relationship between image pixels and real world points. Usually, for non-zooming cameras, the calibration is carried out by using a grid pattern of known dimensions (e.g., a chessboard). However, for cameras with zoom functions, the use of a grid pattern only is not sufficient, because the calibration has to be effective at multiple zoom levels and some features (e.g., corners) could not be detectable. In this poster, we present a novel calibration method based on two novel patterns, specifically designed for zooming cameras. As an application example, on-line virtual advertising in sport events, where the objective is to superimpose virtual advertisements on real billboards that are present in the scene, is considered.

Ilche Georgievski, UG

Planning for Coordination of Devices in Smart Spaces

As a sustainability property, energy efficiency is of an extreme importance, especially in environments that are heavy energy consumers, such as homes and buildings. Nowadays, homes and buildings are equipped with many devices that could be exploited in order to make them smart and energy-efficient. Our vision is to bring convergence of smart environments, energy efficiency and automated planning by proposing a planning framework for energy-efficient coordination of devices in smart environments. We establish a proof of concept confirming that automated monitoring and control of devices can lead to significant savings not only on energy, but also on the amount paid for that energy. We envision use of Hierarchical Task Network (HTN) planning due to several reasons identified in our profound overview of the most popular HTN planners. We strive to answer several research questions relating to the general design of the planning framework, the use and improvement of HTN planning, the support for users to interact with the planning framework, and the evaluation of the framework in a living-lab set up at the University of Groningen.

Domenico Bloisi, UR

Human-Robot Collaboration for Semantic Labeling of the Environment

Today's robots are able to perform more and more complex tasks, which usually require a high degree of interaction with the environment they have to operate in. This implies robotic systems should have a deep and specific knowledge of their work spaces, which goes far beyond a simple metric representation a robotic system can build up through SLAM (Simultaneous Localization and Mapping). Since robots capabilities in capturing the complexity of an environment are still rather limited, human operators can support robots in
building this type of knowledge, providing high-level information. In this paper, we present a human-robot collaboration approach designed to extract 3D models associated to objects of interest the robot has to be aware of, in order to execute task-oriented goals. All the extracted models are then integrated into a metric map, built by the robot, providing a high-level representation of the environment that embodies all the knowledge required by a robot to actually execute complex tasks.

Stefan Wölfl, UF

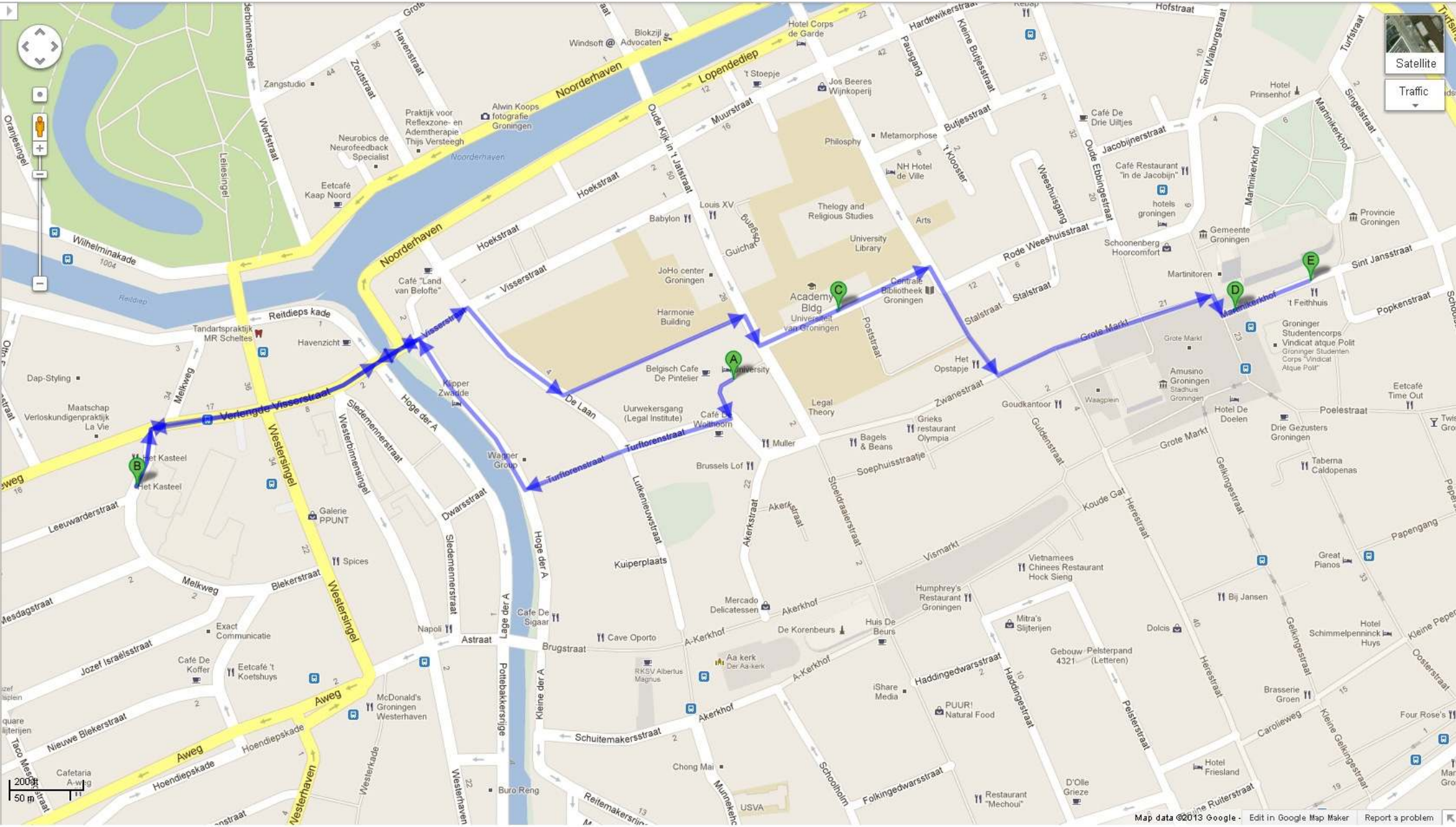
Nonmonotonic Reasoning in Humans and Formal Systems

A main motivation for the study of nonmonotonic logics is that these logics seem closer to how humans reason in everyday situations than classical, monotonic logics. From a formal point of view, systems of cumulative reasoning, such as system P, are quite attractive for various reasons. For example, it has been shown that system P is sound and complete for different semantics (preferential models, plausibility models, etc.); that is, system P is stable in the sense that different reasonable approaches to define the semantics of conditionals result in the same logic. Moreover, there are cognitive studies that support the thesis that human reasoning can be described by system P, when conditionals are understood in a probabilistic way.
In the poster we report on results of a recent cognitive study in which participants were asked to draw conclusions from a set of conditionals, where no particular semantic interpretation of conditionals was suggested to the participants.

Monday, May 13, 2013	
Session 1, Chair: Alexander Lazovik	
Time	Presentation
9:00-9:30	Andreas Herlte, UF
	Integrated Symbolic Planning in the Tidyup-Robot Project
	We present the integration of our symbolic planner as the high-level executive in the Tidyup-Robot project. Tidyup-Robot deals with mobile manipulation scenarios in a household setting. We introduce our system architecture and report on issues and advantages observed during development and deployment.
9:30-10:00	Frank Hutter, UF
	Learning and Optimization of Empirical Algorithm Performance
	Algorithm developers and end users in a wide variety of areas often face questions like the following: Which parameter setting should I use to optimize my algorithm's empirical performance? Which algorithm components are most critical to achieve good performance? What characteristics distinguish easy from hard problem instances? We describe fully formalized domain-independent methods that aim to answer these questions based on machine learning and optimization techniques. We illustrate the power of these automated methods by analyzing and optimizing the performance of state-of-the-art solvers propositional satisfiability (SAT) and mixed integer programming (MIP). With minimal human effort, our methods identified key instance features and parameters that suffice to predict solver performance well. In several cases, they also sped up the best existing solvers by orders of magnitude.
10:00-10:30	Julien Hué, UF
	Revising Qualitative Constraint Network
	Qualitative Spatial and Temporal Reasoning is a central topic in Artificial Intelligence. In particular, it is aimed at application scenarios dealing with uncertain information and thus needs to be able to handle dynamic beliefs. This makes merging and revision of qualitative information important topics. While merging has been studied extensively, revision which describes what is happening when one learns new information about a static world has been overlooked. In this paper, we propose to fill the gap by providing two revision operations for qualitative calculi. In order to implement these operations, we give algorithms for revision and analyze the computational complexity of these problems. Finally, we present an implementation of these algorithms based on a qualitative constraint solver and provide an experimental evaluation.
10:30-11:00	*Coffee Break*
Session 2, Chair: Ilche Georgievski	
Time	Presentation
11:00-11:30	Christian Dornhege, UF
	Integrated Task and Motion Planning on Partially Grounded Domains
	We present a manipulation planner build from a classical AI planner with an interface for integrating motion planners - in this case an RRT motion planner for a robotic manipulator. The actions available to the task planner are to pick up an object and to put down an object on a certain place. Besides knowledge of the objects' positions, which can be gained by perception algorithms, most approaches also require the definition of a set of placement poses to define goals for the manipulation planner. Predetermining this set is necessary as otherwise the symbolic planning task cannot be grounded. Our approach pushes this phase to the planning phase. We present a generic interface that allows to plan on partially grounded domains and ground operators only when needed live during and as part of the planning process. Initial results show the efficiency of the approach in comparison to classical grounding schemes.
11:30-12:00	Heerko Groefsema, UG
	Model Checking Business Processes
	Business Process Modeling (BPM) allows businesses to gain insight into their processes. Formal techniques exist to model, execute, and monitor such processes. Model checking is a technique which verifies a given system model for compliance with a specification of interest. When applied to BPM, goals of verification include basic process soundness, business compliance checking, and process variability. We discuss the different formalisms, goals, and techniques of existing BPM verification approaches, and provide a critical reflection.
12:00-12:30	Taigo Maria Bonanni, UR
	Towards SLAM Unification
	Simultaneous Localization and Mapping is a well-known and deeply studied problem in the Mobile Robotics research field. While the literature is full of platform- or sensor-dependent approaches, in this presentation a new approach, based on the extraction of different features in the environment, potentially usable for a plenty of different platforms, is discussed.

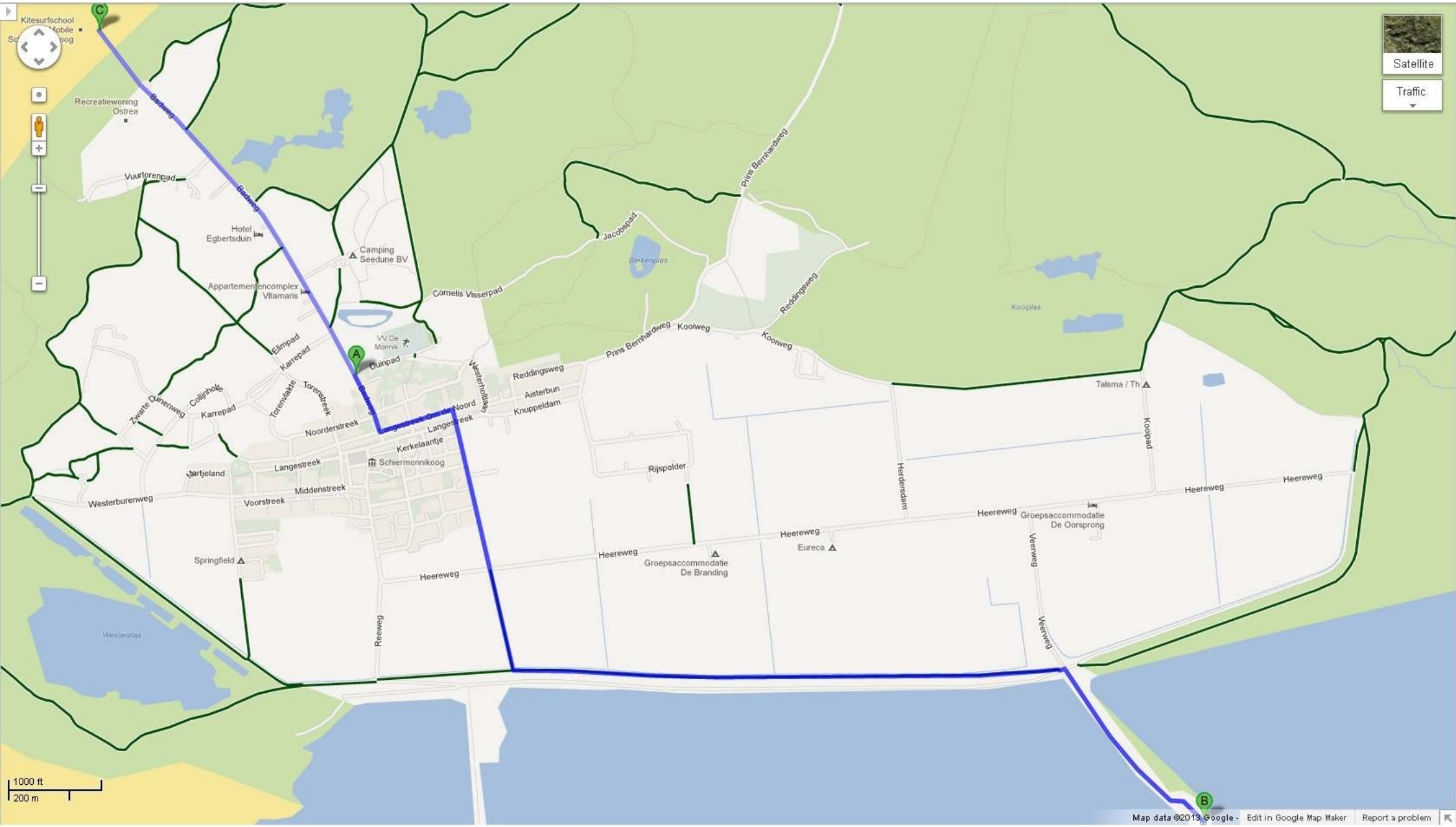
Session 3, Chair: Doina Bucur	
Time	Presentation
14:00-14:30	Emanuele Bastianelli, UR
	Structured Kernel-based learning for Spatial Role Labeling
	Referring to objects or entities in the space, as well as to relations holding among them, is one of the most important functionality in natural language understanding. As a result, the detection of spatial utterances finds many applications, such as in GPS navigation systems, or Human-Robot Interaction (HRI). In this presentation a system that participated to the Spatial Role Labeling SemEval task will be presented. The spatial roles classification is addressed as a sequence-based word classification problem: the SVM-hmm learning algorithm is applied, based on a simple feature modeling and a robust lexical generalization achieved through a Distributional Models of Lexical Semantics. In the identification of spatial relations, all roles found in a sentence are combined to generate candidate relations, later verified by a SVM classifier. The Smoothed Partial Tree Kernel is here applied, i.e. a convolution kernel that enhances both syntactic and lexical properties of the examples.
14:30-15:00	Fabio Previtali, UR
	PTracking: a distributed open source library that exploits a clustering technique to tracks multiple objects
	Distributed Particle filter-based algorithms have been proved to be effective to model non-linear and dynamic processes in Multi-Agent Systems. In complex scenarios, where mobile agents are involved, it is crucial to disseminate reliable beliefs among agents, to avoid degradation on the global estimation. In this paper, we propose a cluster-based data association to boost the performance of a Distributed Particle Filter (DPF). A two-tiered architecture is proposed: a local layer, associated to a single-agent Particle Filter is used to track multiple objects in the local frame; and a global layer where the distributed estimation is performed. The results obtained using both a simulated and a real environment demonstrate the effectiveness of the proposed approach.
15:00-15:30	Guglielmo Gemignani, UR
	Disambiguating Localization Symmetry Exploiting a Multi-Clustered Particle Filtering
	Distributed Particle filter-based algorithms have been proven effective tools to model non-linear and dynamic processes in Multi Agent Systems. In complex scenarios, where mobile agents are involved, it is crucial to disseminate reliable beliefs among agents to avoid the degradation of the global estimations. We present a cluster-based data association to boost the performance of a Distributed Particle Filter. Exploiting such data association, we propose a novel disambiguation method for the RoboCup scenario. The results obtained using both a simulated and a real environment demonstrate the effectiveness of the proposed approaches.

Groningen center map



A: University Hotel **B: Het Kasteel** **C: Academy Building (UR)** **D: Martini Tower** **E: Het Feithhuis**

Schiermonnikoog map



A: Hotel Duinzicht

B: Ferry Station

C: Beach (for kiting, yatch sailing)

Seminars: Participants

Participants - Research Groups

University of Basel (Artificial Intelligence Group)

- *Malte Helmert*
- Gabriele Röger
- Martin Wehrle
- Jendrik Seipp
- Silvan Sievers
- Florian Pommerening

University of Freiburg (Foundations of Artificial Intelligence Group)

- *Bernhard Nebel*
- Julien Hué
- Robert Mattmüller
- Andreas Hertle
- Matthias Westphal
- Christian Dornhege
- Patrick Eyerich
- Thomas Keller
- Johannes Aldinger
- Stefan Wölfl
- Moritz Göbelbecker
- Frank Hutter
- Christian Becker-Asano
- Yusra Alkhazraji
- Johannes Löhr
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- Alexander Kleiner (Collaborative Robotics, Linköping, Sweden)

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- *Marco Aiello*
- Alexander Lazovik
- Doina Bucur
- Fatimah Alsaif
- Viktoriya Degeler
- Ando Emerencia
- Ilche Georgievski
- Heerko Groefsema
- Eirini Kaldeli
- Tuan Anh Nguyen
- Faris Nizamic
- Andrea Pagani
- Ehsan Ullah Warriach

University of Rome (Cognitive Cooperative Robots Group)

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