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Seminar Series Supported by Jeffrey and Holly Ullman

Workshop on Constrained Search by Multi-Agents in Honor of Prof. Amnon Meisels

December 22, 2016

9:30 Gathering and Registration

10:00 Greetings
Prof. Ehud Gudes, Ben-Gurion University

10:10 Modeling and Solving the Nurse Rostering Problem
Prof. Andrea Schaerf, University of Udine
Abstract: Nurse rostering is an important staff scheduling problem in healthcare management. In this talk, we illustrate different formulations of the problem and alternative search methods. In particular, we discuss the dynamic setting in which the information is not completely available at the beginning of the planning period, and so the solver must deal with uncertainty in the service level requirements and the availabilities of nurses.

10:50 Learning Weakness Models of Opponent Agents
Prof. Shaul Markovitch, Technion
Abstract: Acquiring an accurate model of a complex opponent strategy may be computationally infeasible. We show that even exact models are problematic for resource-bounded agents and present an alternative approach that simplifies the task by inducing only one aspect of the opponent strategy - its weakness. We formulate the modeling task as a concept learning problem and present a method for obtaining labeled examples and use them for inferring a weakness model using traditional induction techniques. We then show how the models can be combined with the agent's strategy during search to push the opponent towards positions where it is estimated to be weak. This work was done in cooperation with Ronit Reger.

11:20 Privacy Preserving Task Planning
Prof. Ronen Brafman, Ben-Gurion University
Abstract: Amnon and his students have been major players in the area of distributed and privacy preserving algorithms for constraint satisfaction problems. Following in their footsteps, we have been developing distributed, privacy preserving algorithms for automated planning. In fact, some of these algorithms use distributed CSPs as one of their components. In this talk, I will give some background on automated planning, present the two main classes of algorithms for distributed planning, and how they address the issue of privacy.

11:50 Coffee break

12:10 Incomplete Inference for Asymmetric Distributed Constraint Optimization
Dr. Roie Zivan, Ben-Gurion University
Abstract: Max-sum is a version of Belief Propagation, used for solving distributed constraint optimization problems (DCOPs). On tree-structured problems, Max-sum converges to the optimal solution in linear time. Unfortunately on cyclic problems Max-sum does not converge and explores low quality solutions. Recent attempts to address this limitation proposed versions of Max-sum that guarantee convergence, while ignoring some of the problem's constraints. We show that on symmetric problems a version of Max-sum that guarantees convergence produces results that are similar to local search algorithms. However, when problems are asymmetric, Max-sum versions are the only known DCOP algorithms that maintain their quality, and therefore our version of the algorithm has a large advantage over local search algorithms.

12:40 Constraint Programming in IBM
Yael Ben-Haim, IBM
Abstract: Over the past twenty years, we have developed a constraint solver tailored specifically for hardware verification. I will describe the solver's unique features, along with the test generators that have used it to verify all major IBM processors. In addition, since it is a general purpose constraint solver, it has been used in several applications beyond those of hardware verification. I will mention a few of these applications that became IBM products.

13:10 Lunch break

14:00 Global Constraints and Decompositions
Prof. Christian Bessiere, University of Montpelier
Abstract: Constraint propagation is an essential component of constraint programming. Many of the success stories of constraint programming are due to global constraints because they often allow strong propagation. We will analyse the inherent properties of global constraints. We will see that some global constraints can be decomposed in small pieces without hindering propagation whereas others cannot. This last category explains why constraint programming succeeds in solving some problems SAT and MIP cannot.

14:40 The Many Facets of Chordal Graphs
Prof. Martin Golumbic, University of Haifa
Abstract: In this brief talk, marking the elevation of Amnon Meisels to the esteemed rank of Emeritus Professor, I will give a few highlights on the theory and applications of chordal graphs, with an emphasis on algorithms. Chordal graphs are perhaps the second most interesting and important family of graphs, after trees and before planar graphs. Their fundamental role can be seen in their classical characterizations and their relevance to combinatorial optimization, linear algebra, statistics, constraint programming, relational databases, signal processing, machine learning, and nonlinear optimization and techniques for exploiting sparsity in large positive semidefinite matrices.

15:10 Coffee break

15:30 Human-Agent Decision-making: Combining Theory and Practice
Prof. Sarit Kraus, Bar-Ilan University
Abstract: Extensive work has been conducted both in game theory and logic to model strategic interaction. An important question is whether we can use these theories to design agents for interacting with people?
On the one hand, they provide a formal design specification for agent strategies. On the other hand, people do not necessarily adhere to playing in accordance with these strategies, and their behavior is affected by a multitude of social and psychological factors. In this talk we will consider the question of whether strategies implied by theories of strategic behavior can be used by automated agents that interact proficiently with people.

16:00 Distributed Search by Selfish Agents
Prof. Amnon Meisels, Ben-Gurion University
Abstract: Network problems where agents have personal preferences over outcomes and are selfish, attempting to maximize their personal gains, can be thought of as multi-agents games. The natural and common solution concept for such selfish interactions is the Nash equilibrium - a stable state in which no participant can gain by a unilateral change of strategy. Most strategic games contain a structured tradeoff between stability and efficiency. Therefore, one would be interested in stable solutions of high efficiency.
We propose a distributed search algorithm that uses transfer of funds among selfish agents and guarantees improved efficiency for any initial outcome. The final outcome of the algorithm can be stabilized by transfer of funds among the agents, where the transfer function that stabilizes the improved outcome is produced by the algorithm.

16:30 End of Workshop in Honor of Prof. Amnon Meisels