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"An Honorary Day for Robert L. Constable"

Celebrating 10 years as dean of the Faculty of Computing & Information Science at Cornell University
with a special seminar on:

Verification, Distributed Computing, and Computing Sciences
Tuesday June 16, 2009

10:30 Coffee & Tagging

10:40 Opening Remarks
Shlomi Dolev, Ben-Gurion University of the Negev

10:45 Celebratory Lecture
Creating Knowledge in the Age of Digital Information
Robert L. Constable, Cornell University

Abstract: My perspective on computer science changed when I served as CS department chair, and changed again as CIS dean. I will discuss these changes and illustrate them with examples of discoveries at the intersection of computing with other disciplines that enrich the core of computer science. I will discuss these changes and illustrate them with examples at the intersection of computing with other disciplines, concluding with a viewpoint not yet widely accepted -- but related to the title of the talk.

11:45 Coffee Break

11:55 Scharff Awards Ceremony

12:00 Distinguished Guest Lecture
Cluster Based Computation of Relational Joins
Jeffrey D. Ullman, Stanford University

Abstract: The prevalence of large racks of interconnected processor nodes forces us to take another look at how to exploit parallelism when taking the join of large relations. Sometimes, there is a gain in total cost to be had by distributing pieces of each relation to several different nodes and computing the join of several large relations at once. The optimization problem is to pick the degree of replication of each relation, under the constraint that the total number of compute-nodes is fixed. We set up this problem as a nonlinear optimization and show that there is always a solution (which must be approximated by rounding to the nearest integers). For some of the most common types of join -- star joins and chain joins -- we give closed-form solutions to the optimization problem. Finally, we point out that the join algorithm we propose can be implemented using features already present in Hadoop, the open-source implementation of map-reduce.

12:45 Lexical Cohesion in Texts - Extraction Methods and Applications
Eli Shamir, Hebrew University of Jerusalem

*Abstract:What makes texts cohesive (beyond being random word-sets), fit to communicate ideas, emotions, descriptions, instructions? Grammatical cohesion bonds are easy to explicate (agreement rules, pronouns, conjunctions, syntax...). Lexical cohesion is hard. It draws upon semantics and world-knowledge in millions minds. Alternatively, civilization created repositories: dictionaries, data-corpora, etc, and modern technologies to process them quickly. We designed an annotation task (experimented on 22 readers, 10 texts, 600-1200 words each), to give each new text word **an anchor link** to a previous word, **if** the pair is semantically related under general common knowledge. Results of this experiment were analyzed in statistically novel way to extract a core of 1261 lexically cohesive pairs, on which there is a very high agreement. This sizable text-based core proved useful, as Teacher's "gold standard", for designing **automatic** extraction of lexically cohesive pairs from texts, based on relevant features drawn from the text and the repositories together. Supervised Learning is evoked to build decision trees on these features, calibrated by the experimental core. Several other correlations and applications include (BBK et al.) studies of political texts, speeches of prominent leaders, to extracts dominant themes, beliefs, creeds and even typical metaphoric styles*

13:15 Lunch

14:00 Constraints, Graphs, Algebra, Logic, and Complexity
Moshe Vardi, Rice University

Abstract: A large class of problems in AI and other areas of computer science can be viewed as constraint-satisfaction problems. This includes problems in database query optimization, machine vision, belief maintenance, scheduling, temporal reasoning, type reconstruction, graph theory, and satisfiability. All of these problems can be recast as questions regarding the existence of homomorphisms between two directed graphs. It is well-known that the constraint-satisfaction problem is NP-complete. This motivated an extensive research program into identify tractable cases of constraint satisfaction. This research proceeds along two major lines. The first line of research focuses on non-uniform constraint satisfaction, where the target graph is fixed. The goal is to identify those traget graphs that give rise to a tractable constraint-satisfaction problem. The second line of research focuses on identifying large classes of source graphs for which constraint-satisfaction is tractable. We show in this talk how tools from graph theory, universal algebra, logic, and complexity theory, shed light on the tractability of constraint satisfaction

14:40 Modular Approach for Developing Robust Protocols
Danny Dolev, Hebrew University of Jerusalem

Abstract: A decade ago Robert L. Constable and his team proved the correctness of Ensamble, a multi layer group communication system using the Nuprl formal system. In the talk we will present an expected constant number of rounds protocol to synchronize nodes, despite Byzantine and transient faults. The protocol is composed of a stack of modules that were developed in several fields of Computer Science in the last couple of decades. Proving in a formal way the correctness of the construction or of some components in it will be the next challenge for Constable's team.

15:20 Coffee

15:30 TBA
Amir Pnueli, Weizmann Institute of Science, NYU

Abstract: TBA

16:10 Proving Church's Thesis
Nachum Dershowitz, Tel-Aviv University

Abstract: Church's Thesis asserts that the only numeric functions that can be calculated by effective means are the recursive ones, which are the same (extensionally) as the Turing-computable numeric functions. Yuri Gurevich's Abstract State Machine Theorem states that every classical algorithm is emulated (step for step) by an abstract state machine, which is a most generic model of sequential computation. That theorem presupposes three natural postulates about algorithmic computation. By augmenting those postulates with an additional requirement regarding basic operations, a natural axiomatization of computability and a proof of Church's Thesis obtain, as Godel and others suggested may be possible. (Joint work with Yuri Gurevich.)

16:50 Round Table Discussion:
The Future of Computing Science