EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

A Near-Linear-Time Graph-Embedding Algorithm with Applications

ABSTRACT - I will present a new algorithm, called FastMap, for embedding the nodes of a given edge-weighted undirected graph into a Euclidean space. The Euclidean distance between any two nodes in this space approximates the length of the shortest path between them in the given graph. FastMap's novelty is that it preserves a quadratic number of pairwise distances between all the nodes but does not invest quadratic time for doing so. Instead, it runs in time near-linear in the size of the graph. FastMap's efficiency leads to many applications, including but not limited to: (a) speeding up shortest-path computations in goal-directed A* search, (b) solving useful graph-theoretic combinatorial problems using geometric interpretations, (c) embedding directed graphs in potential fields, (d) new algorithms for community detection and block modeling, and (e) new ways of doing machine learning on graphs.

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SPEAKER BIO – Prof. Satish Kumar Thittamaranahalli (T. K. Satish Kumar) leads the Collaboratory for Algorithmic Techniques and Artificial Intelligence at the Information Sciences Institute of the University of Southern California. He has published more than 120 papers on numerous topics in Artificial Intelligence spanning such diverse areas as Constraint Reasoning, Planning and Scheduling, Probabilistic Reasoning, Robotics, Combinatorial Optimization, Approximation and Randomization, Heuristic Search, Model-Based Reasoning, Knowledge Representation and Spatio-Temporal Reasoning. He has served on the Program Committees of many international conferences in Artificial Intelligence and is a winner of three Best Paper Awards in various categories from the International Conference on Automated Planning and Scheduling. Prof. Kumar received his PhD in Computer Science from Stanford University in March 2005. In the past, he has also been a Visiting Student at the NASA Ames Research Center, a Postdoctoral Research Scholar at the University of California, Berkeley, a Research Scientist at the Institute for Human and Machine Cognition, a Visiting Assistant Professor at the University of West Florida, and a Senior Research and Development Scientist at Mission Critical Technologies.

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TUESDAY, OCTOBER 27, 2020
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