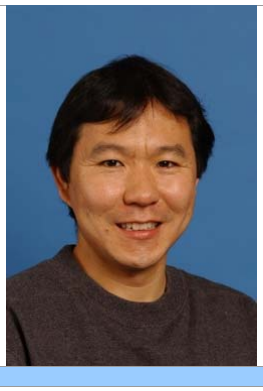
『清华信息大讲堂』第 70 讲

报告题目:	**The Laplacian Paradigm: Emerging Algorithms for Massive Graphs**
报 告 人:	**Prof. Shang-hua Teng (滕尚华)**
	University of Southern California, USA
报告时间:	2011-1-5，14:00-15:30 (会后与申请 USC 学生见面)
报告地点:	FIT 1-415



Abstract:

This presentation describes an emerging paradigm for the design of efficient algorithms for massive graphs. This paradigm, which we will refer to as the Laplacian Paradigm, is built on a recent suite of nearly-linear time primitives in spectral graph theory developed by Spielman and Teng, especially their solver for linear systems Ax = b, where A is the Laplacian matrix of a weighted, undirected n-vertex graph and b is an n-place vector. In the Laplacian Paradigm for solving a problem (on a massive graph), we reduce the optimization or computational problem to one or multiple linear algebraic problems that can be solved efficiently by applying the nearly-linear time Laplacian solver. So far, the Laplacian paradigm already has some successes. It has been applied to obtain nearly-linear-time algorithms for applications in semi-supervised learning, image process, web-spam detection, eigenvalue approximation, and for solving elliptic finite element systems. It has also been used to design faster algorithms for generalized lossy flow computation and for random sampling of spanning trees.

The goal of this presentation is to encourage more researchers to consider the use of the Laplacian Paradigm to develop faster algorithms for solving fundamental problems in combinatorial optimization (e.g., the computation of matchings, flows and cuts), in scientific computing (e.g., spectral approximation), in machine learning, and data analysis (such as for web-spam detection and social network analysis), and in other applications that involve massive graphs.

Biography:

Shang-Hua Teng is the Seeley G. Mudd Professor and the Chairman of the Computer Science Department at USC Viterbi School of Engineering. He taught as a faculty in the Department of Mathematics of MIT and in the Computer Science Departments of Boston University, the University of Minnesota and UIUC. He has worked and consulted for Microsoft Research, Akamai, IBM Almaden Research Center, Intel Corporation, Xerox PARC, Cray Research/SGI, Thinking Machine Corporation, and NASA Ames Research Center. He received a dual B.S. degree in computer science and in electrical engineering from Shanghai Jiao Tong University in 1985, a M.S. degree in computer science from University of Southern California (USC) in 1988, and a Ph.D. degree in computer science from Carnegie Mellon University (CMU) in 1991.

He is a recipient of the 2009 Fulkerson Prize (AMS-MPS) and the 2008 Gödel Prize (ACM-EATCS) for his joint work on Smoothed Analysis of Algorithms with Daniel Spielman. He is also an ACM Fellow, Alfred P. Sloan Fellow, winner of Senior Xerox Award for Outstanding Faculty Research (UIUC), and has received NSF Faculty Early Career Development Award. His recent research interests include computational game and economics theory, spectral graph theory, scientific computing, and mathematical programming. He has received more than ten US Patents for his work on compiler optimization and Internet technology.

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