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香港中文大學
The Chinese University of Hong Kong

Institute of Theoretical Computer Science and Communications

CSE-ITCSC Joint Seminar

The Electric Vehicle Touring Problem

By

Prof. Chung-Shou Liao

Associate Professor, Dept. Industrial Engineering and Engineering Management, National Tsing Hua University

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2:00 pm – 3:00 pm

Room ERB1009 William M. W. Mong Engineering Building, CUHK

Abstract:

The increasing concern over global warming has led to the rapid development of the electric vehicle industry. Electric vehicles (EVs) have the potential to reduce the greenhouse effect and facilitate more efficient use of energy resources. In this talk, we investigate some optimal EV route planning problems that take into consideration of possible battery charging or swapping operations. Given a road network, the objective is to determine the shortest route that a vehicle with a given battery capacity can take to travel between a pair of vertices or to visit a set of vertices with several stops, if necessary, at battery switch stations. We present polynomial time algorithms for the EV shortest path problem and a fixed tour EV touring problem, where the fixed tour problem requires visiting a set of vertices in a given order. Based on the result, we also propose constant factor approximation algorithms for the EV touring problem, which is a generalization of the traveling salesman problem.

This is joint work with Shang-Hung Lu (NTHU) and Zuo-Jun Max Shen (UC Berkeley) and it has been published in Transportation Research Part B: Methodological.

Biography:

Prof. Liao joined the faculty of Dept. Industrial Engineering and Engineering Management, National Tsing Hua University (NTHU) in February 2010. He has served as an associate professor since August 2014. Before joining NTHU, he had worked at Algorithms and Computation Laboratory in Institute of Information Science, Academia Sinica for eight years. He obtained his Ph.D. degree and M.S. degree from Dept. of Computer Science and Information Engineering National Taiwan University, and the Combinatorial Mathematics group of Dept. Applied Mathematics, National Chiao Tung University, respectively.

Prof. Liao's research mainly focuses on designing efficient algorithms that can be used to solve difficult optimization problems from real applications. He has been interested in problems related primarily to combinatorial optimization and algorithms. His lab has developed approximation algorithms with theoretical analysis for well-known hard problems such as online shortest path, facility location, domination problems, and bin packing. In particular, Prof. Liao has extended his study to systems biology. He has designed graph-theoretic algorithms for global alignment between multiple biological networks and conducted comparative analysis across species to find functionally conserved clusters. The related results are published in the top conferences and journals such as ISMB, PSB, and Bioinformatics. Recently, his lab is exploring the area of online algorithms.

******* ALL ARE WELCOME *******

Hosted & Enquiries : Prof. Zhang Shengyu / Institute of Theoretical Computer Science and Communications
Tel: 3943 8419 / 3943 3452