



Department of Mathematics
The Chinese University of Hong Kong

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數學系
香港中文大學

Phone: (852) 3943 7988 • Fax: (852) 2603 5154 • Email: dept@math.cuhk.edu.hk (Math. Dept.)
Room 220, Lady Shaw Building, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

SIAM Student Chapter Seminar Series

Knapsack Problem: Connection to Computational Complexity and Some Recent Generalizations

Dr. Kameng Nip

Associate Research Fellow

School of Mathematics (Zhuhai), Sun Yat-sen University

Abstract: The knapsack problem is one of the most fundamental and important problems in combinatorial optimization. The problem is given a set of items, each with a profit and a size, and a knapsack with a certain capacity, to determine the maximum total profit subset of items which can be packed into the knapsack. The study of knapsack problem can be traced back to 1897, and is still a popular research area and frequently studied in applied mathematics, computer science, complexity theory, cryptography. It appears in a wide variety of real-world decision-making processes, such as resource allocation with financial constraints, selection of investments and portfolios, generating keys for the knapsack cryptosystems, and often occurs as subproblems on solving some more complicated combinatorial optimization problems. In this talk, we will focus on the algorithmic side of this problem. Meanwhile, we will go through a few basic concept and knowledge on algorithm design and computational complexity, such as P, NP, approximation algorithms, linear and integer programming, which are crucial in designing algorithms for the knapsack problem. We will also discuss why this seemingly simple and basic algorithmic problem, is in fact highly related to a Millennium Prize problem — “P v.s. NP” problem, one of the core open questions in mathematics and theoretical computer science. At the end of the talk, I will briefly introduce some of my recent work with some co-authors on the generalizations of the knapsack problem, as well as several unsolved questions and possible future research directions.

Date: June 1, 2018 (Friday)
Venue: Room 219, Lady Shaw Building,
The Chinese University of Hong Kong, Shatin
Time: 3:30pm – 4:30pm

All are Welcome