香港浸會大學理學院
HKBU Faculty of Science

DEPARTMENT OF COMPUTER SCIENCE

PhD Degree Oral Presentation

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Time:	15 August 2013 (Thursday) 2:30 pm – 4:30 pm (35 mins presentation and 15 mins Q & A)
Venue:	SCT716, Cha Chi Ming Science Tower, HSH Campus

"A Computational Study on Vaccination Decision Making for Infectious Disease Control"

Abstract

Vaccination is one of the most effective methods of preventing infectious diseases by immunizing a critical portion of host population. In this thesis, we focus on the problem of how to evaluate and improve the effectiveness of vaccination programs in controlling infectious diseases. To address such a problem, we develop a computational approach to characterizing vaccination decision making at two levels: (1) population-level vaccine allocation decision making; (2) individual-level voluntary vaccination decision making. At the population level, due to the limited vaccine supply, public health authorities need to determine how to allocate a given number of vaccine doses to certain individuals/subpopulations that can most effectively benefit the whole population. Regarding such a problem, we investigate the impact of host population heterogeneities on the dynamics of disease spread. Then, we determine how to target subpopulations for vaccine allocation. At the individual level, in the context of voluntary vaccination, individuals' decisions have an impact on the actual vaccination coverage, which will crucially affect the effectiveness of disease control. In order to understand the impact of voluntary vaccination, we develop decision models to characterize and evaluate individuals' vaccination decision making during an epidemic. In order to demonstrate the performance of the proposed methods, we carry out a series of simulation-based experiments to investigate the spread of an influenza-like disease and the implementation of vaccination programs.

*** ALL INTERESTED ARE WELCOME ***