DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE
THE UNIVERSITY OF HONG KONG

Public Seminar of PhD Candidate

Mr. LAM Chi Kin

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The University of Hong Kong

will give a talk

entitled

BAYESIAN COMPUTATIONAL METHODS AND APPLICATIONS

Abstract

We discuss three novel applications of Bayesian approaches in dose-finding, change-points detection and curve-fitting.

With the emergence of novel targeted anti-cancer agents, drug combinations have been recognized as cutting-edge development in oncology. However, limited attention has been paid to the overdose control in the existing drug-combination dose-finding methods which simultaneously find a set of maximum tolerated dose (MTD) combinations. To enhance patient safety, multi-agent nonparametric overdose control (MANOC) design for identifying the MTD combination in phase I drug-combination trials is developed. By minimizing an asymmetric loss function, the probability of overdosing is controlled in a local region of the current dose combination. The MANOC design is further extended to identify the MTD contour by conducting a sequence of single-agent subtrials with the dose level of one agent fixed. Simulation studies are conducted to investigate the performance of the proposed designs. While the MANOC design can prevent patients from being allocated to over-toxic dose levels, its accuracy and efficiency remain to be competitive. As an illustration, the MANOC design is applied to a phase I clinical trial for identifying the MTD combinations of buparlisib and trametinib.

Global warming is becoming a more pressing issue to the world, which is supported by historical data that stronger and more frequent tropical cyclones have been observed in recent decades. To provide quantitative evidence for this growing trend, the change-point detection problem is reframed in a Bayesian variable selection context, and a latent probit model approach is proposed to estimate both the number and locations of change-points with ordinal data. Simulation studies are conducted to assess the performance of this method, and the new approach is applied to detect changes in the ordinal data of the north Atlantic tropical cyclone record.

We develop a Bayesian change-point approach to estimating an unknown curve under the variable selection framework. In each of the numerical iterations, a step function, which is a fundamental form of the approximation, is chosen using the reversible-jump Markov chain Monte Carlo owing to the varying number of change-points. With certain modifications, this approach can be applied to isotonic and concave curve fitting. This method is exemplified by analyzing the data on annual temperature anomalies from the years 1850 to 2015, and is applied to investigate the relationship between economic development and carbon dioxide emission in 1960–2013 for four countries.

on

Monday, April 23, 2018

2:30 p.m. – 3:30 p.m.

at

Room 301, Run Run Shaw Building

All interested are welcome