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THE HONG KONG UNIVERSITY OF SCIENCE TECHNOLOGY

Department of Mathematics

MATHEMATICS COLLOQUIUM

Change-point regression models: new results, diverse applications, and some history

By

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Abstract

A vast number of methods have been proposed to accommodate nonlinearity in linear models. These include transforming the dependent variable, adding higher-order terms, spline models, and kernel smoothing. All of the techniques just mentioned, along with most others, have in common the assumption of smoothness. However, in many cases there is reason to believe the underlying pattern to be discontinuous, either on the raw scale ("broken line") or its derivative ("bent line"). These change-point models have a long history. They were first posed, to my knowledge, in the 1950s in order to estimate changes in stock prices. In 1989 I became interested in applying them to model the mean in a biological context, which I will use in this talk as a motivating example. It then became clear that many questions are better addressed using quantiles rather than means and that accounting for repeated measures would be useful. Both of these extensions are used to model cognitive changes in Alzheimer's disease. The next step for that example is to allow the change-points to vary via a random effect. All of these situations involve interesting theoretical issues due to the likelihood's irregularity as well as computational challenges of varying complexity. Time permitting, I will discuss a related question in the area of non-inferiority clinical trials.

Bio: *Professor Chappell has been faculty at the University of Wisconsin for 36 years. His methodological research is in the areas of designs for clinical trials including Phase I and non-inferiority trials as well as longitudinal and generalized linear models and survival analysis. He collaborates extensively with investigators in the University of Wisconsin School of Medicine and Public Health, nationally, and internationally, with specializations in mental health, aging, radiation biology in cancer, and randomized clinical trials. He has served on several US FDA advisory committees, been a member of a large number of DSMBs for the US NIH, VA, and industry, been made Fellow in the American Statistical Association and the Society for Clinical Trials, and elected president of the latter. He is currently also distinguished visiting professor at the City University of Hong Kong.*

Date : 27 November 2026 (Friday)
Time : 3:00pm - 4:00pm
Venue : Lecture Theatre K (near Lift 31/32)

All Are Welcome!