THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

Adaptive Prediction Strategy with Individualized Variable Selection

By

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Abstract

Today, physicians have access to a wide array of tests for diagnosing and prognosticating medical conditions. Ideally, they would apply a high-quality prediction model, utilizing all relevant features as input, to facilitate appropriate decision-making regarding treatment selection or risk assessment. However, not all features used in these prediction models are readily available to patients and physicians without incurring some costs. In practice, predictors are typically gathered as needed in a sequential manner, while the physician continually evaluates information dynamically. This process continues until sufficient information is acquired, and the physician gains reasonable confidence in making a decision. Importantly, the prospective information to collect may differ for each patient and depend on the predictor values already known. In this paper, we present a novel dynamic prediction rule designed to determine the optimal order of acquiring prediction features in predicting a clinical outcome of interest. The objective is to maximize prediction accuracy while minimizing the cost associated with measuring prediction features for individual subjects. To achieve this, we employ reinforcement learning, where the agent must decide on the best action at each step: either making a clinical decision with available information or continuing to collect new predictors based on the current state of knowledge. To evaluate the efficacy of the proposed dynamic prediction strategy, extensive simulation studies have been conducted. Additionally, we provide two real data examples to illustrate the practical application of our method.

Date   : **28 August 2023 (Monday)**
Time   : **10:00am**
Venue : **Room 4504 (Lifts 25/26)**

All are Welcome!