統計科學研究所
INSTITUTE OF STATISTICAL SCIENCE

統計所學術演講

中研院統計所

學 術 演 講

講　題：Using Machine Learning and Causal Inference to Improve Patient Care and Reduce Costs in Diagnosis of Blood Cancers

講　者：Prof. Michael Sachs
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時　間：2023年8月14日(星期一)，15:30-16:30

地　點：統計所B1演講廳

Abstract

Complete blood counts are a widely available analysis commonly used by general practitioners in the evaluation of patients with varying medical conditions. It provides data on hemoglobin concentration, platelet counts, and white blood cells. Occasionally, these tests reveal the presence of immature leukocytes or even so-called blast cells (blasts) in peripheral blood, a hallmark of acute leukemia. Using Danish register and primary care laboratory data, we used ensemble machine learning method to develop a prediction algorithm to identify distinct signatures that may be indicative of preclinical blood cancer. This algorithm is highly accurate for predicting a blood cancer diagnosis within 6 months of the blood test, with an area under the ROC curve of 0.83. This has the potential to reduce costs by referring fewer individuals to hematologic specialists compared to using the WHO guidelines, while detecting the same amount or more underlying cancers. To determine whether using this algorithm to guide referrals improves patient outcomes, we conducted an emulated prediction trial using independent Danish register data. In this emulated trial, under the assumption of no unmeasured confounding, we are able to estimate the causal effect of using the prediction algorithm to guide referrals on all-cause death within 5 years compared to the current standard of care. Future work includes external validation on a new cohort such as Clalit or the UK Biobank, and conducting an actual randomized experiment.

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