統計科學研究所
INSTITUTE OF STATISTICAL SCIENCE

學　術　演　講

講　題：Statistical modeling for physical activity distributional objects assessed via wearable sensor devices

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地　點：統計所B1演講廳

Abstract

Wearable devices such as accelerometers enable the continuous and objective measurement of physical activity and sleep, which has shown to link with psychological and physiological health. They offer significant potentials to supplant traditional clinical markers in observational and interventional studies. In recent years, there are increasing interests to appropriately model the daily physical activity distribution as multivariate complex object data summarized as probability densities, histograms, or quantile functions. Traditional statistical methods often fail to apply when the data are sampled from an arbitrary non-Euclidean metric space. In this talk, we will introduce two of our recent work on modeling physical activity distributional objects. The first work concerns about two-sample testing comparing the repeatedly observed physical activity distributions assessed over multiple days. We proposed a novel non-parametric graph-based, two-sample tests for object data with the same structure of repeated measures. A set of test statistics are proposed to capture various possible alternatives. The tests exhibit substantial power improvements over the existing methods while controlling the type I errors under finite samples, as shown through simulations, and are demonstrated to provide additional insights into the location and inter- and intra-individual variability of the daily physical activity distributions in a study for mood disorders. The second part introduces a structural equation model with a random quantile function as the mediator to study the indirect mediation effect through physical activity. Our method was applied to a randomized trial to investigate the mediation effect of physical activity on the causal path between flexible duty-hour policies and the sleep related outcomes among internal medicine residents.

※ 茶會：09:40開始

※ 實體與線上視訊同步進行。