Yale SCHOOL OF PUBLIC HEALTH Biostatistics

SEMINAR

Hierarchical Functional Data with Correlated Continuous and Binary Measurements

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ABSTRACT

The physical activity data is obtained by a device worn by sixty participants in a study for exercise interventions. We focus on two measurements: energy expenditure and interruption to sedentary behaviors. The energy expenditure is a skewed continuous variable, and the interruption to sedentary behaviors is a binary variable. It is reasonable to assume that a correlation structure exists between these two longitudinal variables. To analyze the data, a functional data approach is proposed to handle simultaneous measurements of a continuous and a binary outcomes. The regression structures are specified as smooth curves measured at various time-points with random effects that have a hierarchical correlation structure. The random curves for each variable are summarized using a few important principal components, and the association of the two longitudinal variables is modelled through the association of the principal component scores. Via a quasilikelihood type approximation for the binary component, we develop an efficient algorithm to fit the model. The method is applied to the physical activity data, and is evaluated empirically by a simulation study.

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