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Title: Functional Snippets: Another form of functional data

Abstract: Functional data are samples of random functions, and the statistical analysis of such data is termed functional data analysis (FDA). Due to advances of modern technology, FDA has emerged as a major field of research. While the source data are functions, they can only be measured at discrete time points in reality, leading to different sampling plans of functional data. In this talk, we first give a brief overview of the different types of sampling plan that have been commonly studied in the literature. Then we focus on another type of functional data, functional snippets, that has received less attention, Functional snippets are short segments of the source functional data that are observed, possibly irregularly and sparsely with noise, on subject-specific subintervals that are much shorter than the entire study interval. This causes no major problems for the estimation of the mean function but poses challenges for the estimation of the covariance function, because information for the covariance function is only available in a band around the diagonal. Thus, the estimation of the covariance function becomes an extrapolation problem and involves complex identifiability issues. After briefly reviewing current approaches we offer two alternative solutions. The first is a semi-parametric approach that models the variance function non-parametrically but the correlation function parametrically, possibly with parameter dimension growing with sample size. The second approach is to expand the covariance function through a functional basis expansion. Theoretical and numerical performance of these approaches will be discussed, along with data applications.

Based on joint work with Zhenhua Lin (Univ. of Singapore) and Qixian Zhong (Tsinghua University).