

Functional Data Analysis with Applications to High-Frequency 3D Imaging

Many scientific areas are faced with the challenge of extracting information from large, complex, and highly structured data sets. A great deal of modern statistical work focuses on developing tools for handling such data. This project aims at developing a suite of functional data analysis, FDA, techniques to analyse samples of manifolds, as outcomes, alongside large numbers of scalar predictors. This work is motivated by an anthropological application involving 3D facial imaging data. The data consist of thousands of subjects, thousands of measurements per face, and hundreds of thousands of genetic markers. The goal is to uncover the genetic architecture of the human face, and to better understand the ancestry of different facial features. The proposed framework is used to understand how individual characteristics, such as age and genetic ancestry, influence the shape of the human face.

Requirements: knowledge of differential equations and statistics; knowledge of functional data analysis not required but advantageous.