

Title: Bayesian Clustering of Spatial Functional Data with an Application to the Clustering of Mobility Behaviors in Houston During COVID-19 Pandemic

Abstract: In this talk, I will introduce a Bayesian partitioning model based on random spanning trees. The proposed method guarantees contiguity in clustering and allows to detect clusters with arbitrary shapes and sizes. We embed this partition model within a hierarchical modeling framework to detect a clustered pattern in latent variables. We focus on illustrating the method through a clustered regression coefficient model for spatial data, and a Bayesian wavelets model for modeling and clustering spatial functional data. We prove Bayesian posterior concentration results under an asymptotic framework with random graphs. We design an efficient collapsed Reversible Jump Markov chain Monte Carlo (RJ-MCMC) algorithm to estimate the clustered coefficient values and their uncertainty measures. The method is applied for the analysis of daily leaving-home index (LHI) data at 2144 census block groups of Harris County in Texas provided by SafeGraph, with the goal to study changes in mobility patterns due to the COVID-19 pandemic and how they relate to public policy and social demographic variables.