

Abstracts

Yang Ni

Texas A&M University, USA

Applications of Bayesian nonparametrics in multi-omics and electronic health records

In this tutorial, I will discuss several challenging biomedical problems to which Bayesian nonparametric approaches provide elegant solutions. The problems arise from various applications including genomics, microbiome, and electronic health records. One common feature of these different applications is that the study population (e.g., cells, hosts, and patients) is quite heterogeneous, and hence traditional methods based on the iid sampling assumption are not suitable. Bayesian nonparametrics provide a principled way to accommodate such heterogeneity and to identify homogeneous subpopulations, which can facilitate more precise inference and decision making.

Yanxun Xu

Johns Hopkins University, USA

Bayesian Nonparametric Statistics for Advancing Innovation and Discovery in Precision Medicine.

In this tutorial, we delve into the application of Bayesian Nonparametric (BNP) methods for density estimation and regression, pivotal tools in advancing precision medicine. BNP methods, renowned for their flexibility and adaptability, allow for modelling complex biological and medical data without the restrictive assumptions typical of parametric models. Through a blend of practical examples, this tutorial highlights how BNP approaches, including Gaussian processes and Dirichlet process mixtures, can significantly enhance our understanding of patient-specific disease trajectories and treatment effects. Through these applications, this tutorial underscores the significant role of BNP methods in improving patient care by facilitating more nuanced and data-driven clinical decisions.