University of California, Irvine
Statistics Seminar

Optimal Personalized and Dynamic Classification with Fixed Trees for Survival Outcomes

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6011 Donald Bren Hall

Motivated by Alzheimer's disease (AD) research need to predict risk of cognitive decline dynamically based on various biomarkers and risk factors in the presence of complicated interactions, I will present a work-in-progress statistical framework that utilizes Fixed Survival Trees (FSTs) for time-dynamic classification of survival outcomes.

FSTs provide a structured yet adaptable approach to classifying individuals into high- and low-risk categories using potentially longitudinally collected biomarkers. Unlike traditional tree-based survival models, which dynamically grow and prune based on data, FSTs maintain a fixed topology while optimizing time-dependent classification thresholds. Our method incorporates cumulative and incidence-based dynamic classification principles, extending time-dependent ROC and AUC concepts to obtain optimal decision thresholds at internal nodes. Additionally, we introduce a semi-parametric modeling framework that incorporates personalized risk factors and efficiently estimates classification thresholds using a maximum concordance estimator. By integrating survival analysis with tree-based classification, FSTs aim to provide personalized, interpretable, and computationally efficient risk stratification tools for AD progression.