MATH RESEARCH AT UNC CHARLOTTE 2024

Project: Survival analysis models for personalized medicine

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Project description. In recent years, personalized medicine, or precision medicine, has received tremendous attention in clinical practice and medical research, as patients often exhibit heterogeneous responses to treatments. The White House launched the Precision Medicine Initiative in 2015, a research effort to revolutionize how to improve health and treat disease, further making precision medicine a national priority. Unlike the traditional "one size fits all" medical practice designed for the "average patient", personalized medicine seeks to recommend the right treatment to the right patient at the right time by considering individual differences in genes, environments, and lifestyles. The main objective of this project is to investigate the connection between survival analysis models and personalized medicine. Specifically, our research will delve into fundamental survival analysis models like the Cox model, and investigate how to estimate the optimal individualized treatment strategies under the survival analysis framework. Data from HIV/AIDS vaccine efficiency trials will be analyzed.

Prerequisite and student's role. We welcome students with a background in probability and statistics to work on this project. In the first 2-3 weeks, the student will learn the basic knowledge of survival analysis models and the statistical framework of personalized medicine. Then, the student will implement algorithms that estimate the optimal individualized treatment rules, conduct numerical studies, and analyze the real data.