Statistical Learning for Individualized Decision Rules: A Quantile Approach

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The problem of finding the optimal individualized decision rule (IDR) or a series of sequential individualized decision rules based on individual characteristics is important for applications in precision medicine, government policies, targeted marketing, and other areas. Existing work has been mainly focused on the mean-optimal IDR, which if followed by the whole population would yield the largest average outcome (assuming a larger outcome is preferable). For a variety of applications, the mean may not be the most sensible metric, for example, when the outcome has a skewed distribution. It has also been observed that due to the heterogeneity in treatment response, the estimated mean-optimal IDR may be suboptimal or even detrimental to certain disadvantaged subpopulations. This talk will discuss how the quantile criterion can be used independently or in conjunction with the mean criterion to address these challenges, the related new methodology, and statistical theory.