Optimal Treatment Assignment of Multiple Treatments with Analysis of Variance Decomposition

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Abstract: Personalized medicine to identify individualized treatment assignment rules has received increasing interest. When there are more than two treatments, the outcome weighted learning framework builds an optimal assignment rule via the skill of reproducing kernel Hilbert space. One main challenge is that the interpretation of covariates is difficult since the solution is a black-box classifier. Consequently, we establish a structured optimal treatment assignment rule with the functional analysis of variance decomposition. The method promotes the sparsity of the final solution by using structured kernel function and an l_1 penalty term. Meanwhile, we propose an easy-handling iterative procedure to overcome the calculation problem. Convergence of the risk function for resulting estimator is shown in the paper. The finite sample performance of the proposed method is demonstrated by simulation studies and a real data analysis.