

Adaptive Partial Identification of Treatment Effects

Abstract: In this paper, I propose multivariate random forests for partial identification of treatment effects. Under several weak monotonicity assumptions of the mean potential outcomes, the method captures and measures the significance of two distinct types of heterogeneity: treatment effects that vary by the treatment status and assignment; and treatment effects that vary across exogenous variables that can influence the outcome or the treatment assignment. By using the method of moments estimator, multivariate random trees adaptively search for subsets of data that exhibit the highest variation in the coefficients of interest. Investigation of the large sample theory shows that the method recovers asymptotically normally distributed parameters. To validate the approach, the article examines two different settings: partially identified treatment effects with an unknown treatment assignment; and partially identified local average treatment effects with an instrumental variable that can violate the exclusion restriction assumption. Based on the National Longitudinal Survey of Youth and U.S. Census data, the results suggest significant heterogeneity in the effect of the Head Start program on years of schooling, and in the effect of family size on the mother's labor supply. Additional calibrated experiments show the advantages of multivariate random forests.