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SPEAKER TITLES/ABSTRACT

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“Multidimensional Monotonicity Discovery with MBART”

For the discovery of a regression relationship between y and x , a vector of p potential predictors, the flexible nonparametric nature of BART (Bayesian Additive Regression Trees) allows for a much richer set of possibilities than restrictive parametric approaches. To exploit the potential monotonicity of the predictors, we introduce mBART, a constrained version of BART that incorporates monotonicity with a multivariate basis of monotone trees, thereby avoiding the further confines of a full parametric form. Using mBART to estimate such effects yields (i) function estimates that are smoother and more interpretable, (ii) better out-of-sample predictive performance and (iii) less post-data uncertainty. By using mBART to simultaneously estimate both the increasing and the decreasing regions of a predictor, mBART opens up a new approach to the discovery and estimation of the decomposition of a function into its monotone components. (This is joint work with H. Chipman, R. McCulloch and T. Shively).