

**University of California, Irvine  
Statistics Seminar**

***VCBART: Bayesian Trees for Varying Coefficients***

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Many studies have reported associations between later-life cognition and socioeconomic position in childhood, young adulthood, and mid-life. However, the vast majority of these studies are unable to quantify how these associations vary over time and with respect to several demographic factors. Varying coefficient (VC) models, which treat the covariate effects in a linear model as nonparametric functions of additional effect modifiers, offer an appealing way to overcome these limitations. Unfortunately, state-of-the-art VC modeling methods require computationally prohibitive parameter tuning or make restrictive assumptions about the functional form of the covariate effects.

In response, we propose VCBART, which estimates the covariate effects in a VC model using Bayesian Additive Regression Trees. With simple default hyperparameter settings, VCBART outperforms existing methods in terms of covariate effect estimation and prediction. Using VCBART, we predict the cognitive trajectories of 4,167 subjects from the Health and Retirement Study using multiple measures of socioeconomic position and physical health. We find that socioeconomic position in childhood and young adulthood have small effects that do not vary with age. In contrast, the effects of measures of mid-life physical health tend to vary with respect to age, race, and marital status. An R package implementing VCBART is available at <https://github.com/skdeshpande91/VCBART>

*If you are not part of the ICS community and would like to attend, please contact Lisa Stieler, [lstieler@uci.edu](mailto:lstieler@uci.edu), for access*