AN APPLICATION OF QUANTILE RANDOM FORESTS FOR PREDICTIVE MAPPING OF FOREST ATTRIBUTES

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Abstract—Increasingly, random forest models are used in predictive mapping of forest attributes. Traditional random forests output the mean prediction from the random trees. Quantile regression forests (QRF) is an extension of random forests developed by Nicolai Meinshausen that provides non-parametric estimates of the median predicted value as well as prediction quantiles. It therefore allows spatially explicit non-parametric estimates of model uncertainty. Here, we illustrate how to use QRF in predictive mapping of continuous forest attributes such as tree canopy cover and biomass. Using FIA plot data as our response, we model the forest attributes as functions of landsat and other predictor variables through the quantregForest R package. We predict the 5th, 50th, and 95th quantiles and map the distributions over a mountainous region in the Interior West. We demonstrate how to produce prediction intervals, explore causal relationships, and detect outliers using this method, then make user-friendly code available through the extensions to the ModelMap R package.

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