# Large-scale Spatial Predictive Modeling with Applications to Ecological Remote Sensing Data

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**Abstract:** Climate change is anticipated to have profound implications for the long-term forest ecosystem resilience and increase carbon fluxes to the atmosphere. Our understanding of these critical problems have been limited by conventional plot-level ground-based observations. Recently developed remote sensing techniques such as stereo photos provide large-scale high-resolution data that would allow researchers to carry out ecological surveys of forest at an unprecedented scale. In this work, we propose a data science workflow to predict palm tree density on forested landscapes in Puerto Rico by applying machine learning tools to data from imaging and remote sensing technologies, combined with ground observation data from field plots. Also, we perform data analysis based on the palm density prediction to reveal its link with other environmental factors, and verify existing ecological theories about landscape characteristics.