

Using Geo-Spatial Methods for Derivation of Fine-Resolution Forest Inventory in Georgia from Ground Inventory Data and Landsat Imagery

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Fine-resolution forest inventory is important for forest product industry and planning of forest production procurement and activities. It helps to improve the understanding of the complex and dynamic characteristics of forest ecosystems and enhance forest management and planning. In USA, state or interstate level forest inventories usually are based on the USDA Forest Service Forest Inventory and Analysis Program (FIA) data. The sampling intensity of FIA is one field plot every 5000m, or about every 3 miles. This study develops fine-scale forest inventory approaches in a grid file format at a cell size of 25 25m based on the Landsat images. First, Landsat images covering the whole State of Georgia are processed and enhanced to 25m. Then, two fine-scale forest inventory approaches are developed based on geo-spatial statistics. K nearest neighbor method (KNN) is one of the widely used approaches for large area inventory. We discuss in this study two aspects of the KNN methodology, optimum K selection and data reduction, and propose related to them improvements. Furthermore, we describe a development of one systematic geostatistical approach including ordinary kriging, universal kriging, and regression kriging for forest inventory at pixel level. We conduct the model and estimation valuation using several diagnostic criteria. We present large area forest inventories mapped using the results from KNN and geostatistical approaches. Finally, we discuss one example of the described analysis and compare the results with other studies.

Keywords: Forest inventory, geo-spatial methods, Landsat images

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