# Photo Ecometrics for Forest Inventory

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**Abstract**

In this paper, we report the results obtained from the application of digital photogrammetry and hyperspectral data analysis for forest inventory purposes. Our long term goal is to provide low-cost yet accurate estimates of as many important forest biophysical parameters as can be measured and inferred with airborne digital cameras. Accuracies of traditional multispectral image analysis algorithms of remotely sensed data are low. Traditional photo interpretation is error prone and expensive. We propose new image analysis strategies that make use of the 3D spatial morphological information from stereo images and the multispectral, texture and contextual information inherent in the imagery.

Research on the use of 3D crown shape information in automated tree species recognition has not been reported before. The minimum requirements of image spatial resolution for deriving estimates of tree heights and crown size with high accuracies are not known. With digital photogrammetry, it has been proven that digital camera images can be georeferenced and orthorectified to an accuracy of one to several meters allowing for selecting ground control points directly from digital camera images for georectification of other images including high resolution satellite images. With the georeferenced and orthorectified digital camera images and the above parameters accurately determined, we can detect changes of species composition, height, crown closure, and diameter. These same techniques will significantly improve our ability to economically assess the accuracy of thematic vegetation maps.