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Summary

The main aim of this study is to develop robust machine learning models to characterize the properties of urban forests (e.g., composition, density, diversity, size of trees together with the horizontal and vertical structures) and estimate ecosystem services such as habitat quality and carbon sequestration of such forest forests at various scales using remote sensing. Specifically, satellite-derived imagery will be used to characterize canopy surface properties of urban forests, revealing the temporal and geographic changes in urban forest canopy characteristics at moderate spatial scale. Further, multi-spectral imagery from drone-based sensors will be used to derive semantically rich species level canopy characteristics and to estimate aboveground biomass at fine scale. To evaluate the accuracy of carbon stock estimation from remote sensing data of urban forests, drone derived AGB will compared against field-measured biomass values. The aims of this research will involve case studies assessing different urban forests in the subtropics of Australia. Specifically, two types of forests will be assessed: a planted multispecies arboretum at the Logan Campus of Griffith University and native remnant forest at the Nathan campus of Griffith University, which are both in South East Queensland, Australia. Key methodologies include object-based image analysis to derive semantically rich urban forest characteristics, machine learning and artificial intelligence to estimate accurate aboveground biomass of urban forests from satellite and drone-derived images. The outcome of the research will support intelligent modelling and monitoring of ecosystem services such as carbon sequestration and habitat quality of urban forests.

Research Expertise

- GIS/Remote Sensing
- R/Python programming (IT related area)