



## **Deriving Spatial and Aspatial Data of Individual Trees from UAV Very High Resolution Images Using a Multilevel Slicing and Coding Algorithm**

Chien-Yu Lin (1), Chinsu Lin (2), and Chein-I Chang (1)

(1) University of Maryland Baltimore County, Computer Science and Electrical Engineering, Baltimore, USA, (2) National Chiayi University, Forestry and Natural Resources, Chiayi, Taiwan (chinsu@mail.ncyu.edu.tw)

This paper applied a canopy-height-model-based multilevel slicing and coding (MSAC) algorithm to detect trees over a forest. The spatial data such as a point feature of tree location and a polygon feature of tree crown and the aspatial data such as crown radius, tree height, and height to crown base are determined at the tree level. Based on a digital forest simulator, the performance of MSAC algorithm in the determination of spatial and aspatial data of a forest was first examined. An UAV-mission was carried out to collect very high resolution images such as a resolution of 6 cm for evaluation the performance of MSAC algorithm in real applications. For a forest with a density of 1000 trees per hectare, our results showed that the hit accuracy varied between 100 and 85% and 100 and 70% for the artificially and naturally regenerated forest respectively. All visible trees from air were completely detected at the exact x- and y- position, while a tree whose top is beneath a superior level of canopy height was not detected. The error percentage of Height and crown radius estimation were around 5% and 40% respectively.