ESTIMATION OF TIMBER VOLUME IN TROPICAL RAINFOREST USING AIRBORNE LASER SCANNER: A CASE STUDY IN AYER KEROH RECREATIONAL FOREST, MELAKA

Fatehah Abdul Latip, Azman Ariffin & Wan Hazli Wan Kadir.

Tropical Map Research Group, Faculty of Geoinformation and Real Estate, Universiti Teknologi Malaysia (UTM), 81310 UTM Skudai, Johor,Malaysia.
fatehahbest@yahoo.com.my (019-7731363)

Abstract :

Airborne Laser Scanner (ALS) has been used extensively for timber volume estimation especially in temperate region. Application of such technology in tropical region specifically in developing countries faces several challenges due to low penetration of laser pulses over tree canopy and relatively low density of point clouds due to the cost constraint. This paper presents a thorough investigation on the capability of ALS data in estimating density of vegetation over Ayer Keroh recreational forest, Melaka. The estimation of forest density involves five main processing stages, i.e. delineation of individual trees, estimation of individual tree diameter at breast height (DBH) based on allometric equation, estimation of crown diameter, estimation of tree height and validation of results. Individual tree crown segmentation is based on the inverse watershed segmentation routine and local maximum filtering. Tree height and crown diameter of individual trees will be calculated by using canopy height model (CHM) and crown segments. These parameters will be used as input in the allometric equation that is specially developed over tropical region to estimate tree DBH. Based on the estimated DBH, tree height and crown diameter, the timber volume will be calculated at a certain unit area by using the multiplicative method. The final timber volume map will be validated using field collected data. In this study, the results are presented as a map of average of timber volume for every one acre in the study area. The root mean square (RMSE) result for estimation of timber volume by using inverse watershed segmentation showed about 111.31m^3/acre whereas for local maximum filtering gave 73.62m^3/acre of RMSE value.

Keywords : ALS, timber volume, allometric, maximum filtering, segmentation