UNIVERSITI TEKNOLOGI MARA

EVALUATION OF TREE GROWTH CHARACTERISTICS OF HARUM MANIS MANGO FROM MULTITEMPORAL UAV IMAGE IN PLANTATION FARM UITM PERLIS

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ABSTRACT

Innovations in Unmanned Aerial Vehicle (UAV) technology and data processing capacities have made it easier to collect high-resolution images and 3D data that can be used to monitor and measure tree characteristics in agriculture. This research explores the performance of high spatial resolution UAV imagery to estimate tree height and crown dimensions for Mango Tree. Furthermore, high-resolution spatial imagery generated by unmanned aerial vehicles (UAVs) can provide precise and effective estimate of tree measurements and structural canopy variables. The aim of this study is monitor Harum Manis tree growth and crown canopy diameter using multitemporal UAV image in plantation farm. This research will use Agisoft PhotoScan to process multitemporal data and eCognition for analyse object-based image analysis (OBIA). The study area for this research is in University Teknologi Mara Arau Perlis at Harum Manis mango farm. The contribution of this study is to produce Canopy Height Mapping (CHM) from difference multitemporal UAV data and characterization of mango tree develop using OBIA algorithm to monitoring development Harum Manis Tree. The RMSE for May 2019 is 0.315m with R^2=0. 8115.Combination OBIA and UAV can be used for monitoring crop.

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This chapter is intended to describe about research background. Besides that, from this chapter will explain about problem statement, aim, objective of the project and also the research question. After that, it will show the significant and scope of study.

1.1 Research Background

Precision agriculture use of high technologies in farm management such as Global Positioning Systems (GPS), use of remote sensing to monitor yield, use of variable rate technology for seeding, fertilization, pest management, and drones give farmers high resolution images of each plant. Satellite agriculture and site-specific crop management (SSCM) are also recognized as precision agriculture. Parameter from canopy height is important in certain crop inventories and individual tree crowns have been identified and evaluate from a high-resolution digital model separately using remote technology and Canopy is one of the most significant architectures in crop monitoring and characterization. The characterization of the crown crop like height, volume, and area can use to provide information for decisions on crop management in precision agriculture (Panagiotidis et al. 2017).

In recent year, unmanned aerial vehicles (UAV) have been used for agriculture, farmers can more easily monitor the growth of their plants, in which areas with normal growth and which areas have abnormal growth. The application of unmanned aerial vehicles (UAV) as remote sensing platforms have enormous potential to describe the site-specific characteristics of crop. Furthermore, the UAV can obtain a high resolution image in a range of a few centimetres with low altitudes and huge overlaps from flight automatically and used automatic photo processing to generate Digital Surface Model (DSM) and Digital Elevation Model (DEM) based on "Structure from Motion" method (Torres-Sánchez et al. 2015). The cost of collecting data using UAV remains extremely low compared to Laser Imaging Detection and Ranging (LIDAR) and image from satellites. Hence, there is great interest in using such methods to monitoring, mapping, and precision agriculture.

Furthermore, a large number of accurate crop data obtained from UAV require automatic processes for image analysis and object-based image analysis (OBIA) technique have been used and these methods have achieved high automation rates and were adjusted to proses high resolution image from UAV (de Castro et al. 2018). In this research, Harum Manis mango tree will be used to monitor crop farms through the combination of UAV technology and OBIA methodology. OBIA procedure was developed to characterize the variables Harum Manis