

**UNIVERSITI TEKNOLOGI MARA**

**UAV MULTISPECTRAL IMAGE FOR  
TREE CROWN DELINEATION OF  
MANGIFERA INDICA USING  
OBJECT BASED IMAGE ANALYSIS  
(OBIA)**

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Disertation submitted in partial fulfillment  
of the requirements for the degree of  
**Bachelor of Surveying Science and Geomatics  
(Honours)**

**Faculty of Architecture, Planning and Surveying**

**August 2022**

## ACKNOWLEDGEMENT

Assalamualaikum w.b.t. First and foremost, I would like to thank to Allah S.W.T because of His love and strength that He has given to me to undergo my degree life at UiTM Arau, Perlis. I do thank for His blessing to my daily life, for the good of my mental and physical during research time.

Thank you to Gs. Dr. Nurul Ain Mohd Zaki, my supervisor, and Pn. Nursyahani Nasron, my co-supervisor, for giving support, encouragement, guidance, and feedback during this beginning of the research study until complete of this research study. Without her supervision, it would have been difficult to complete this research.

I would like to thank the following persons, Nadia, Fahmi, Izzul, Irdina and Amirul, without them whom I would not have been able to complete the data collection of this research and would not have completed my degree.

Last but not least, I want to express my heartfelt gratitude to my family for their unwavering support and hope. Always be there for me through thick and thin to support me during my degree life. This thesis would not have been conceivable without such hope.

## **ABSTRACT**

Tree crown delineation are the basis of precision forestry and agriculture precision forestry and agriculture rely on accurate tree delineation. There are many techniques and algorithms that can be applied in order to create the tree crown delineation whether in forest or plantation. However, the result of each segmentation technique or algorithm used derive difference result. This study was conducted at Harumanis plantation located at UiTM Arau, Perlis with the aim of to access the tree crown delineation of Harumanis plantation from UAV multispectral using two algorithms between watershed segmentation and local maxima and local minima. In this study, conventional method was used to derive the parameter and positioned of tree, functioned as reference. The UAV multispectral image was used to determine the individual tree crown delineation by using algorithm of watershed and local maxima and minima which had been processed using eCognition software. Besides that, the manually digitized of tree crown delineation was conducted to perform the accuracy assessment. The output of tree crown delineation of watershed and local maxima and minima shown watershed algorithm has higher accuracy with 83.3% of Total 1:1 match and 73% of goodness of fit while local maxima and minima are 81.7% and 71%. This research will benefit the forest management for the future planning and forest quantification estimation using remote sensing technology.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Introduction

In this chapter, an introduction to the research study will be described which including the research background, problem statement, aims and objectives, research question, study area, methodology, significance of study, and scope and limitations will be further discussed.

### 1.2 Research Background

Harumanis mango are one of botanically classified as *Mangifera indica* which is a special tropical species breed, grows only in Perlis, Malaysia (Uda et al., 2020). The Harumanis mango only harvested once a year during the season is the best mango in terms of shape, the texture, taste, and demand in the market (Uda et al., 2020). The harumanis mango is unlike other mangoes because of it has a vibrant green skin with yellow dots that remained the same colour even when ripe (Kuan, 2021). Harumanis mangoes have an aromatic fragrance when ripe, and their sweet content is due to the lower rainfall distribution factor, as well as the excellent sunshine (Uda et al., 2020).

Furthermore, the weather and a suitable natural ecology to support the production of high-quality fruits are important components in the planting of Harumanis, and these factors are only found in Perlis. According to Jaafar (2017), to produce healthy flowers of harumanis mango, the weather must be a very hot and dry weather during the day and a cold and windy at night which is needed continuously for a three-month period. If it rains frequently during the period, the flowering Harumanis trees will not bear fruit.

With the used of tree crown delineation it will create a geographic layer of tree crowns with health levels and crown diameter, as well as mean vegetation index values, to assist in lowering the uncertainty of decisions needed to control variability on farms. Individual Tree Crown (ITC) identification from aerial images is important in forestry and precision farming (Kuikel et al., 2021). ITC segmentation is a technique for separating individual trees from background vegetation and precisely delineating crown boundaries for forest management and inventory. This will help forest management and

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