

UNIVERSITI TEKNOLOGI MARA

**SLOPE FAILURE MODEL BASED
ON UAV IMAGES
USING GWR TECHNIQUE**

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ABSTRACT

Slope failure is the serious natural phenomena occur in Malaysia especially during the monsoon season. The majority of catastrophes in this country have occurred in hillside areas, resulting deaths, injuries, and property destruction. Over the past few decades, numerous research has created landslide susceptibility maps using a variety of methods. This study was focused on monitoring a slope failure using Unmanned Aerial Vehicles (UAV) images. The primary data that were used in the study were images data from UAV in Lojing Gua Musang. Orthomosaic, Digital Surface Model and Digital Terrain Model were constructed through photogrammetry processes. A Digital Elevation Model was also created, from which the slope, elevation and aspect were created using the algorithm in ArcGIS software. Geographically Weighted Regression (GWR) provide better prediction for local estimation where four related factors were calculated and extracted from the spatial database and used to analyse slope failure model. Compared with the global logistic regression model, the Akaike Information Criteria was improved by 1409.565, the adjusted R-squared was improved from 0.244 to 0.995, and the sum of square ANOVA of this analysis was improved from 37331.061 to 223.206. The comparisons obtained from the models show that geographically weighted regression has higher predictive performance. As the result, the appropriate combination colours and symbols of the slope failure map was produced for spatial prediction model in order to be applied for slope failure monitoring approaches by the authorities and environmentalist.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

According to (Robani, 2009), slope failures are typically precipitated by a change in the environment, such as a change in rainfall, drainage, loads, or surface stability as a result of plant loss. It is driven about by prolonged rains, earthquakes, and human activity. Hundreds of individuals have been killed in landslide tragedies. Additionally, it results in economic losses and damages infrastructure and utilities. There are many factors of slope failure which is related to erosion such as rainfall characteristics, slope characteristics, and structure characteristics. This study was focused on detecting a slope failure at Lojing Highland Gua Musang because the study area was experiencing the slope failures since 2017. In Malaysia, due to the monsoonal system, it receives a lot of rain, about 3000 mm each year, which means that the country is expose to slope failure, especially in high land and sloping areas.

Lojing Highland Gua Musang has been classified as a landslide-prone location in Malaysia due to its mountainous terrain. Lojing Highland Gua Musang is geographically located in Peninsular Malaysia, southwest of Kelantan, at an elevation of 1829 metres above mean sea level and covering an area of 1817 square kilometres. According to The Sun Daily written by Mohd Shahbuddin, heavy rains will send water rushing down the bare slopes, causing danger to the local people especially Orang Asli community after the hills have been stripped bare for agriculture purposes. Orang Asli in Lojing Gua Musang have suffered numerous losses as a result of the landslide, particularly those who have lost their agricultural and plantation land, which has resulted in a loss of income. In the other hand, uncontrolled logging in the Lojing Highland Gua Musang and Pos Brooke areas to make way for farming must be halted immediately, as the current scenario threatens the lives of the Orang Asli community who reside nearby.

There were many landslide events recorded in Gua Musang in few years back. For records, the major landslide at Gua Musang was reported on September 2003 involve the newly-cut slope in a mountainous as reported by (Jamaluddin, 2006). The slope