



**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

**SCHOOL OF COMPUTING**  
Faculty of Engineering

Project Proposal Form MCST 1043  
Sem: 1 Session: 2024/2025

## SECTION A: Project Information.

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Program Name: **Master of Data Science**

Subject Name: **Project 1 (MCST 1043)**

Student Name: **Nurfarahin Binti Amir Hamzah**

Metric Number: **MCS241020**

Student Email & Phone: **nurfarahin99@graduate.utm.my**

Project Title: **Landslide Susceptibility Analysis and Prediction Using Machine Learning**

Supervisor 1: \_\_\_\_\_

Supervisor 2 / Industry  
Advisor(if any): \_\_\_\_\_

## SECTION B: Project Proposal

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### Introduction:

Malaysia situated far away from the Pacific Ring of fire that make it safe from catastrophic geological hazards like the earthquakes, tsunamis, tornadoes and volcano eruptions. However, Malaysia is not immune to geological disaster such as floods, landslide, sinkholes that has always led to loss of lives, extensive damage to infrastructures and environment. As Malaysia geographically located at the equator, this country receives high rainfall distribution and humidity throughout the year which cause to the floods and landslides, especially during the Northeast Monsoon that occurs from November to March every year. Landslides can be described as the large-scale movement of soil because of high water content in the soil. Heavy rainfall is the main factor of aggressive landslides. This can be proving with major landslide incidents occurred in Malaysia during the northeast monsoon season, such as the landslide tragedy at Father's Organic Farm, Batang Kali, Selangor on 16 December 2022, and the collapse of the Highland Tower on 11 December 1993. Therefore, early mitigation measures to avoid the recurrence of this incident are very important to protect the publics' safety and reduce infrastructure damage. The analysis and prediction conducted in areas identified as having a high risk of landslides will help the authorities take early actions to protect the safety of the residents and reduced the landslides impacts. Machine learning techniques combined with ArcGIS software is the best tools for landslides susceptibility analysing and prediction that can improved the precision of geological hazards information and awareness to public.

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**Problem Background:**

Landslide is a geological hazard that affected thousands of people, loss lives, property and infrastructure damaged which worth of billions of ringgits every year. Currently, tools and techniques that have been used for identifying landslides activities are qualitative, limited and sometimes cannot handle large data of remote sensing and geological information system (GIS). Machine learning is the suitable tools in improving landslide susceptibility study because of its capability to process and analyse the large volumes of data which may demonstrate the relationship between various factors that contribute to the occurrence of landslides. Risk assessment of probable landslide areas can be accomplished by using machine learning algorithms with high accuracy and reliability can be obtained by integrating data on past landslides with geographic information. Nevertheless, machine learning technique to landslide prediction is currently in its early stages. There are still issues in dealing with data, specifically the integration of data, identification of the best features to be included in the model and the selection of the right model to use and the use of the derived models to provide solutions to problems that concern stakeholders. Thus, the systematic research of synoptic type is seen as necessary to conduct the possibilities of applying machine learning tools in the analysis of factors affecting landslide susceptibility with a view of improving the possibilities of landslide hazard models' practical application and implementation.

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**Problem Statement:**

In the rapid development of technology, more effective analysis and prediction are needed to identify the areas with a high risk of landslides to make careful preparations and planning for effective mitigation measurements. By introducing machine learning in creating analysis and prediction models for landslide susceptibility assessment and mapping, this tool can enhance the precision of landslides prediction and provide the accurate decision-making for mitigations planning and land-use management with cost effective and saving time.

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**Aim of the Project:**

This research aims to develop a machine learning model for landslide susceptibility analysis and prediction with visualization of the high-risk area of landslide occurrences.

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**Objectives of the Project:**

1. To create a robust dataset for analysis and prediction of landslide using topographical, geological, meteorological and land-use data.
  2. To improve the landslide spatial analysis and prediction accuracy using machine learning models.
  3. To identify the landslide prone areas using the landslide susceptibility maps from ArcGIS software for mitigation and land-use planning management.
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**Scopes of the Project:**

This research focuses on the landslide susceptibility analysis in Kuala Lumpur and Selangor, Malaysia. The machine learning models are applied to improve the spatial analysis and prediction performance of landslide susceptibility and correlate it using ArcGIS software to get the visualization of landslide prone areas.

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**Expected Contribution of the Project:**

1. Provide accurate risk assessment and mapping for landslide susceptibility of the high prone landslide area.
  2. Enhanced the geological assessments performance and decision-making for disaster managements, urban planning and geological hazard mitigation strategy.
  3. Enhance the integration of geological data using machine learning
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**Project Requirements:**

Software: ArGis, Power BI

Hardware: \_\_\_\_\_

Technology/Technique/  
Methodology/Algorithm: Machine learning, Geospatial analysis

**Type of Project (Focusing on Data Science):**

☐ Data Preparation and Modeling

☐ Data Analysis and Visualization

☐ Business Intelligence and Analytics

☐ Machine Learning and Prediction

☐ Data Science Application in Business Domain

**Status of Project:**

☐ New

☐ Continued

If continued, what is  
the previous title? \_\_\_\_\_

**SECTION C: Declaration**

**I declare that this project is proposed by:**

☐ Myself

☐ Supervisor/Industry Advisor ( \_\_\_\_\_ )

Student Name: \_\_\_\_\_

**Signature**

**Date**

**SECTION D: Supervisor Acknowledgement**

The Supervisor(s) shall complete this section.

**I/We agree to become the supervisor(s) for this student under aforesaid proposed title.**

Name of Supervisor 1: \_\_\_\_\_

**Signature**

**Date**

Name of Supervisor 2 (if any): \_\_\_\_\_

**Signature**

**Date**

## SECTION E: Evaluation Panel Approval

The Evaluator(s) shall complete this section.

**Result:**

[ ] FULL APPROVAL

[ ] CONDITIONAL APPROVAL (Major)\*

[ ] CONDITIONAL APPROVAL (Minor)

[ ] FAIL\*

\* Student has to submit new proposal form considering the evaluators' comments.

**Comments:**

Name of Evaluator 1: .....

Signature \_\_\_\_\_

.....  
Date

Name of Evaluator 2: \_\_\_\_\_

.....  
**Signature**

.....  
**Date**




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