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| UTM UNIVERSITI TEKNOLOGI MALAYSIA RESEARCH UNIVERSITY | **SCHOOL OF COMPUTING**<br>**FACULTY OF ENGINEERING**<br>**UNIVERSITI TEKNOLOGI MALAYSIA** |

# PSM 1 (SCSJ 3032)
# PROJECT PROPOSAL FORM

Session/Semester: 2022/2023-2

**Instruction:** Please complete and submit this form to the departmental PSM committee. The proposal must be reviewed by the supervisor before submission.

## SECTION A: STUDENT INFORMATION

| | | | |
|---|---|---|---|
| Name | JOHN MATTHEW HAYUN BANAYAD | | |
| Year/Course | **4 SCSJ** | | |
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**Proposal No.** 1 *(Please follow your preference. Proposal No. 1 – the highest priority, followed by Proposal No. 2 Each student may propose a maximum of 2 topics).*

## SECTION B: PROJECT DETAILS

| | |
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| **Supervisor Name:** | PROF. MADYA. TS. DR. MOHD SHAHIZAN BIN OTHMAN |
| **Project Title:** | Using Decision Tree or Support Vector Machines Algorithms to Analyze Microclimate Data in Aiding the Safeguarding of Cultural and Historical Architectures |

### Problem Background and Proposed Solution:

Cultural and Historical Architectures are a part of Cultural Heritage, are structures that were created in the past throughout the nation's history. These structures degrade over time due to age as well as exposure to the elements. According to (Bertolin, 2019), climate change is a threat to cultural and historical architectures as it worsens the decay rates of the architectures. (Sesana et al., 2021) also mentions that climate change increases hazardous events such as landslides, floods, and droughts, which can impact the cultural architectures.

According to (Guzman et al., 2020), current methods in preserving historical and cultural architectures rely on reactive measures. This means that measures taken to preserve these sites, such as maintenance and repair, only happen after the impact from climate change has occurred. Due to this, the historical and cultural architectures are damaged or lost, making it too late to repair.

To resolve this issue, a more active course of action should be taken to preserve these cultural architectures from being lost to time and the elements. One method of a more active course of action would be to use machine learning-based systems to monitor microclimate changes in Johor Bahru, Malaysia. In this research paper, two machine learning algorithms will be studied, the Decision Tree algorithm and the Support Vector Machines (VSM) algorithm. Both Decision Tree and the VSM algorithms could be used to analyze microclimate data collected and identify the important factors that affect the cultural architectures.

Using data collected from the Malaysian Meteorological Department, a machine learning algorithm will be used in analyzing the data. Afterwards, based on the information obtained from the analysis, a preventive maintenance strategy will be created to preserve the cultural architectures. Finally, a user-friendly dashboard that displays real-time microclimate data as well as giving recommendations on maintenance will also be designed at the end of the research paper.

Although initially focusing on the historical and cultural architectures in Johor Bahru, Malaysia, the proposed solution in combating the deterioration of the cultural architectures could be also adjusted and used in other cultural heritage sites both inside Malaysia and the rest of the world. This research could help in preserving these cultural heritage sites from being lost to time, allowing it to be appreciated by the future generation.

## Objectives:

1) To compare and analyze Decision Tree and Support Vector Machines algorithms, and to choose the most appropriate algorithm.
2) To design a preventive maintenance strategy that will suggest the most suitable actions in maintaining the historical and cultural architectures based on the insights gained from analyzing microclimate data.
3) To design a user-friendly dashboard displaying real-time microclimate data as well as giving recommendations in maintenance to aid government officials in safeguarding Cultural and Historical Architectures.

## Scopes:

The purpose of this research is to aid in the preservation and safeguarding of Cultural and Historical Architectures in Johor Bahru, Malaysia by using machine learning algorithms. To do so, a comparison between the Decision Tree algorithm and the Support Vector Machines algorithm will be made to determine the most suitable algorithm to be used. Afterwards, a preventive maintenance strategy swill be designed based on insights gleaned from the data analysis, and designing a dashboard displaying real-time microclimate data, to aid the local authorities in preserving the historical and cultural architectures.

**Project Requirements:**

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| Software | **:** Windows |
| Hardware | **:** Personal Computer |
| Technology/Technique/ Method/Algorithm | **:** Decision Tree, Support Vector Machines |

Network Elements **:** ……..……

Security Elements **:** ……..……

**Project Type:** *(Please tick one)*

[ ] System Development

[ ✓ ] Research

**Project Area:**

Area **:** Machine Learning

(e.g.: *Security – Cryptography*)

## SECTION C: STUDENT ACKNOWLEDGEMENT

I confirm that this project is:

[ ] My own idea

[ ✓ ] Proposed by the supervisor… PROF. MADYA. TS. DR. MOHD SHAHIZAN BIN OTHMAN

Date: April 18, 2023 Student Signature: ……...

## SECTION D: SUPERVISOR ACKNOWLEDGEMENT

I …… PROF. MADYA. TS. DR. MOHD SHAHIZAN BIN OTHMAN …… confirm that I have reviewed this student's project proposal and therefore agree for the proposal to be submitted for evaluation.

Date **:** April 18, 2023 Signature **:** ……

Official Stamp

## SECTION E: EVALUATION PANEL APPROVAL

**Outcome:**

[ ] Full Approval
[ ] Conditional Approval (Minor)
[ ] Conditional Approval (Major)
[ ] Fail

**Notes** (*Please state reasons for conditional or failed approval)*

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**Evaluation Panel:**

1. ……..
2. ……..

Date: …… Signature: …..……

Name: …..…….

## SECTION F: FOR FACULTY COMMITTEE ONLY

Date Received: …….

Signature : ……. (Official Stamp)

**References:**

Bertolin, C. (2019). Preservation of Cultural Heritage and Resources Threatened by Climate Change. Geosciences, 9(6), 250. https://doi.org/10.3390/geosciences9060250

Sesana, E., Gagnon, A., Ciantelli, C., Cassar, J., & Hughes, J. P. (2021). Climate change impacts on cultural heritage: A literature review. Wiley Interdisciplinary Reviews: Climate Change, 12(4). https://doi.org/10.1002/wcc.710

Guzman, P., Fatorić, S., & Ishizawa, M. (2020). Monitoring Climate Change in World Heritage Properties: Evaluating Landscape-Based Approach in the State of Conservation System. Climate, 8(3), 39. https://doi.org/10.3390/cli8030039