ASSESSING URBAN HEAT ISLAND (UHI) INTENSITY IN SEBERANG PERAI TENGAH, PENANG: CONVENTIONAL METHOD VS MACHINE LEARNING

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DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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ABSTRACT

Urban Heat Islands (UHI) are urbanized areas experiencing higher temperatures compared to rural regions due to human activities. Penang is facing increasing UHI effects, significantly impacting environmental sustainability and human well-being. This research focuses on mapping and predicting UHI intensity across Penang using satellite imagery and machine learning model. The objectives are to identify parameters influencing UHI intensity, quantify the relationship between these parameters and UHI, and utilize a machine learning model for UHI intensity prediction. Indices such as NDVI, NDBI, NDWI, SMI, and LST are used to analyze surface temperature variations. Regression analysis for 2013 shows a slight negative relationship between NDVI and LST (R-squared = 0.0115), indicating vegetation's minimal cooling effect. In 2023, the analysis reveals a moderate positive relationship between NDBI and LST (R-squared = 0.4611), suggesting built-up areas significantly increase surface temperatures. Additionally, a Bagging machine learning model predicts UHI intensity with high spatial accuracy. Results highlight the critical role of green spaces in mitigating UHI effects and the model's potential in urban planning and environmental management.

Keywords: *Urban Heat Islands (UHI), land surface temperature (LST), machine learning, regression analysis, environmental management*

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