UNIVERSITI TEKNOLOGI MARA

ULTRAVIOLET INDEX PREDICTION USING LONG SHORT-TERM MEMORY (LSTM)

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JAN 2025

ACKNOWLEDGEMENT

Alhamdulillah, praises and thanks to Allah because of His Almighty and His utmost blessings, I was able to finish this research within the time duration given. Firstly, my special thanks go to my supervisor, Dr. Norlina Binti Mohd Sabri. Her invaluable guidance, constant support, and insightful feedback have been crucial throughout this journey. Her expertise and patience have not only enriched this research but also significantly enhanced my learning experience. I am deeply grateful for her unwavering encouragement and commitment.

Special appreciation also goes to my beloved parents. Their unconditional love, endless sacrifices, and unwavering belief in my abilities have been my greatest source of strength. Their continuous support, both emotionally and financially, has enabled me to pursue and complete this research. I am forever indebted to them for their prayers and encouragement.

Last but not least, I would like to give my gratitude to my dearest friend. Their constant companionship, moral support, and understanding have been a great comfort to me throughout this challenging period. Their encouragement and assistance have been invaluable, and I am deeply thankful for their presence in my life.

ABSTRACT

The UV Index Prediction System project aims to tackle the serious public health concern of ultraviolet radiation exposure, which can result in serious health disorders like skin cancer, cataracts, and other UV-related illnesses. This project's main driving force is the requirement for precise and timely UV index level forecasts to enable people to minimize health risks and take the appropriate safeguards. Because of the temporal interdependence and complex structure of environmental data, traditional methods of UV index prediction are not always accurate. This study uses Long Short Term Memory (LSTM) neural networks, a kind of recurrent neural network (RNN) renowned for its adeptness in processing sequential input, to overcome these obstacles. The project methodology consists of several important stages, including a review of the literature, data gathering from dependable sources including environmental agencies and meteorological departments, and LSTM model deployment. The research framework includes a precise structure that outlines the goals, assignments, duties, and deliverables for every stage. The gathered data is preprocessed to make sure it is relevant and of high quality before being included to the LSTM model. To maximize the predicting performance of the model, historical UV index data is used for training and validation. The LSTM model is especially well-suited for this purpose because of its capacity to recognize and understand long-term dependencies in data. The LSTM based predictive model's conception and development, as well as thorough testing and evaluation, comprise the real labor done. The developed model demonstrated predicting performance with MAE at 0.074 and MSE at 0.008 as well as RMSE at 0.091. A moderate level of relationship exists between the model inputs and outputs as shown in the R-squared value of 0.41. Additionally, the system successfully predicted UV index levels with accuracy at 81.46%. The systematic approach demonstrates higher performance levels and better predictive accuracy when compared to traditional forecasting solutions.

TABLE OF CONTENTS

CHAPTER THREE: METHODOLOGY