Development of Artificial Neural Network (ANN) for Lightning Prediction under Malaysia Environment

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ABSTRACT

The purpose of this project is to present the development of Artificial Neural Network (ANN) for lightning prediction under Malaysia environment. The study of Artificial Neural Network is very important in achieving the objective. The system was implemented using the data from Malaysia Meteorological Service (MMS) and Tenaga National Berhad (TNB) for weather data and lightning data respectively. In the proposed method, a three layer back-propagation neural network with Levenberg Marquardt algorithm has been developed and predicts the output data for the next four hours. Through training, ANN will able to recognize the pattern of input data and predict for the future output. The Levenberg Marquardt technique has been used to train ANN that receive input data and select the best output with the smallest error between output data and target data. The understanding of lightning characteristic is also important in this project because its help to improve the performance of the ANN system in predicting lightning activity. All the simulation in this project is using Matlab software.

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CHAPTER 1

INTRODUCTION

1.0   Project Overview

In recent years, lightning strike on building has become a major concern. Many researchers have to search for the best solution and method to predict lightning activity. It will be easier for them to minimize the effect of lightning strike on building. This paper presents the development of Artificial Neural Network (ANN) for lightning prediction under Malaysia environment. The system was implemented using the data from Malaysia Meteorological Service (MMS) and Tenaga National Berhad (TNB) for weather data and lightning data respectively.

In the proposed method, a three layer back-propagation neural network with Levenberg Marquardt algorithm has been developed and predict the output data for four hours in advanced. Through training, ANN will able to recognize the pattern of input data and predict for the future output. The Levenberg Marquardt technique has been used to train ANN that receive input data and select the best output with the smallest error between output data and target data. Lastly, testing process is a stage that used developed network to predict lightning for four hours in advanced. Moreover, single ANN and modular ANN have been developed in order to compare the performance of both ANN for lightning prediction. All the simulation was done using the Matlab software.