Comparison between Fast EP-ANN and
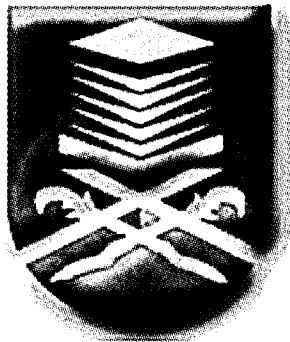
Classical EP-ANN for Lightning Prediction

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ABSTRACT

Lightning is an electrical discharge and produce the high energy which that brings at millions of volts and a few tens kilo ampere current. It is also produce the high temperature about thousand degrees Celsius within a few tens of milliseconds. Malaysia has high lightning occurrences because it is situated near the equator line which is characterized by high lightning activity. Over the years, various lightning prediction system have been developed and many technique have been presented to predict lightning. One of the methods for lightning prediction is by using an Artificial Neural Network (ANN) prediction system for lightning occurrences based on historical lightning and meteorological data from Malaysian environment. Using this method has a few problems about to finding suitable network architectures. This paper presented the improvement of method ANN with Evolutionary Programming (EP) as an optimization technique. This optimization technique will optimize to find ANN architectures systematically with less computation time. The mutations operators in EP discuss in this paper are Fast EP which apply Cauchy mutation and Classical EP which apply Gaussian mutation and the comparison for both of its. The best value sets of input data taken whether by using a Cauchy or Gaussian mutations and both operators will be compare to decide which the most suitable operators for lightning prediction is. As the result, the most suitable technique will create the best ANN architectures.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Lightning can some cause of damaging and endanger to electrical system equipment because of the powerful energy produced. Nowadays, is important to obtain the information about occurrences of lightning to take the caution and prevent any unexpected incident from happening. This thesis presents the application of Artificial Neural Network (ANN) as the one of system can predict the occurrences of lightning. ANN is an intelligent machine learning technique inspired by the way our biological nervous system that process information. ANN is emerged as a powerful tool in various engineering and non-engineering application. With the ability to learn by example and do task based on training experience, it is intensely suitable for pattern recognition and forecasting tasks. Of a lot researches use ANN to conduct their researches because of its computation speed, robustness and ability to be used as an arbitrary function approximation mechanism which learns from observed data [1]. ANN architecture can be developed by applying the Evolutionary Programming as an optimization technique. This is because ANN has the problem about the process of finding the suitable ANN architecture with take time-consuming. An optimization technique is required to reduce the computation time and also tedious trial and error process of the original ANN technique. There are many mutation operator provides in EP but this project only discuss on the Fast EP which apply Cauchy mutation and Classical EP which apply Gaussian mutation and the comparison for both of its. The best value set of inputs for ANN