



DEVELOPMENT OF TREES MANAGEMENT SYSTEM USING RADIAL BASIS FUNCTION NEURAL NETWORK FOR RAIN FORECAST (An article review)

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SUMMARY

Trees generally play a critical role across numerous significant aspects in human's-livelihood. In the metropolitan areas, trees can be advantageous in creating-an environment that is highly systematic as they contribute to the large production-of oxygen as well as the reduction of gaseous pollutants, hence improving-the general air quality. However, it is also important to note that, tree planting-in the cities requires excellent planning which includes the execution of a-well-planned and highly efficient tree management system by the local municipalities. Successful tree growth depends on the ability to manage such factors as pests, diseases, water, fertilizer requirements, etc. Even though the data stemming-from the monitoring of tree management activities could only be tracked once trees have been planted but there are some studies which have demonstrated-that the data stemming would affected by the tree development [1]. Nevertheless,-this is not an overnight process and intensive sources with higher number of datasets are frequently difficult to find and access. Quantitative forecasting for weather element such as rainfall, humidity, temperature,-and others is valuable in agricultural areas [2]. This is because, factoring-in the weather element in the tree-management system or planning could substantially drive down the operational costs associated to it. Better scheduling-of activities pertaining to the management of trees planted can also be derived if-weather forecast is being taken into consideration as an important part of the-planning process. This, therefore, has demonstrated that there is a need to innovate-the existing system as to incorporate the weather element due to Malaysia's-climatic conditions. Weather forecast is not only crucial in the urban planning to mitigate the risks-stemming from weather Trees generally play a critical role across numerous significant aspects in human's-livelihood. In the metropolitan areas, trees can be advantageous in creating-an environment that is highly systematic as they contribute to the large production-of oxygen as well as the reduction of gaseous pollutants, hence improving-the general air quality. However, it is also important to note that, tree planting-in the cities requires excellent planning which includes the execution of a-well-planned and highly efficient tree management system by the local municipalities. Successful tree growth depends on the ability to manage such factors as pests, diseases, water, fertilizer requirements, etc. Even though the data stemming-from the monitoring of tree management activities could only be tracked once trees have been planted but there are some studies which have demonstrated-that the data stemming would affected by the tree development [1]. Nevertheless,-this is not an overnight process and intensive sources with higher number of datasets are frequently difficult to find and access. Quantitative forecasting for weather element such as rainfall, humidity, temperature,-and others is valuable in agricultural areas [2]. This is because, factoring-in the weather element in the tree-management system or planning

could substantially drive down the operational costs associated to it. Better scheduling-of activities pertaining to the management of trees planted can also be derived if-weather forecast is being taken into consideration as an important part of the-planning process. This, therefore, has demonstrated that there is a need to innovate-the existing system as to incorporate the weather element due to Malaysia's-climatic conditions. that include floods and landslides but also in the general management of trees at the local recreational facilities and parks. Weather forecasting-is a challenging activity. The challenging nature of weather forecasting can be derived from the complex atmospheric processes that are usually not-presented via a perfectly linear correlation. Comparing the traditional and numerical-methods, ANN is found to be the best approach for the weather prediction [3]. According to the research by [4] that compares linear and non-linear-technique for rainfall prediction, ANN models are having higher correlations-compared to the linear models, indicating better generalization capacity of the-non-linear models in predicting by producing lower error and fitting better with-the measured data. Weather forecasting can be done by leveraging on the Numerical Weather Model (NWP) a statistical and Machine Learning-based model [4]. This statement-being proved by the studies in [5], shows that the machine learning based-model give a better prediction than the linear regression algorithm to predict-rainfall. An artificial neural network computational tool is strong and data driven. Its characteristic is self-adaptive, flexible which has the capacity to learn and-handle nonlinear and tough underlying characteristics of any physical process-with high grade of accuracy [2]. Thanks to its ability in providing a better solution-to complex problems that significantly reduce noise and optimize approximations,-ANN is getting more attention from a lot of scholars in their attempts to unravel the inner workings of weather forecasting process [6]. Traditional-methodologies are often found to encounter constant challenges in addressing-non-linear physical, spatial and temporal processes as well as the underlying uncertainties-that exist in certain parameters used. The attributes of the ANN model have therefore made it clear about its suitability to be deployed in studies-pertaining to weather forecasting ANN consists of several techniques such as the feedforward neural networks,-backpropagation neural networks and radial basis function neural network (RBFNN). RBFNN structure is similar to typical ANN structure, that consists of-one hidden layer that contain three main parameter that is output weights,-widths and centered [7]. [8] highlights that RBFNN is the most suitable machine-learning technique to be deployed in the study that scrutinizes rainfall forecast in-comparison to other techniques including Generic Programming, Support Vector-Regression, M5-Rules, M5-Model trees and k-Nearest Neighbor. This argument-has been further resonated by [9], in which they conclude that RBFNN provides higher accuracy of results in rainfall forecast as compared to the backpropagation-neural network technique. Besides, another study conducted by [10] finds out that the use of multilayer perceptron is suitable for in Atner while-RBFNN in Dharni RBFNN. Thus, we have proposed a model of weather forecasting using Radial Basis Function Neural Networks (ANN) order to predict weather in a very effective-and efficient way and to enhance the rainfall prediction in Malaysia by utilizing-the RBFNN model. Other than its proven ability to provide a better rainfall prediction,-this model also employs a better algorithm that is far more simplistic and with a faster learning capability. Rainfall prediction relies heavily on important-weather-related parameters that include air pressure, temperature and wind-speed that should certainly be considered in the development of a sound algorithm-in rainfall prediction [11]. Therefore, an analysis has been conducted across a few meteorology datasets as data input centered around the important-parameters such as temperature, windspeed,

humidity as well as air pressure. 2. Data and Research Methodology 2.1. Rainfall Data Having located near the earth's equator, Malaysia is one of the countries that is-blessed with a tropical climate which implies that it is hot and humid throughout-the year. 2.2. Model Performance Technique The performance of a rainfall forecasting system is analyzed via two statistical-analyses which are Root Mean Square Error (RMSE) as well as accuracy percentage. 2.3. Radial Basis Function Neural Network The concept of Artificial Neural Network is a network composed by a collection-of processing units that are computer-programmed based on the working of human brain [12].

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