ARTIFICIAL NEURAL NETWORK (ANN), A FORMIDABLE TOOL FOR ATMOSPHERIC FORECASTING. A REVIEW

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ABSTRACT

Forecasting weather is the eminent role of science and technology that predict the future condition of a weather for particular area. Unlike traditional methods, advanced weather forecasting involves a combination of computer models and knowledge of trends and patterns. Weather forecasting has turned out to be an important area of research in the past few decades which has affect the life of people. The purpose of this study was to review how frequently ANN is being used for weather forecasting, ANN performances and ways to improve it. This paper reviews the recent past and present uses of Artificial Neural Network for weather forecasting. Available literatures of some algorithm, techniques and parameter employed by different researchers to apply ANN for Weather Forecasting was presented. At the end, this review has shown that using Artificial Neural Network (ANN) approach for weather forecasting yields good results and can be considered as an alternative to traditional metrological approaches, BPNN found to be widely used and ENN can perform more than individual ANN. This study also highlighted the capabilities of ANN in predicting several weather phenomenon's such as temperature, rainfall, thunderstorms, others.

Keywords: *Artificial Neural Network, BPNN, Forecasting Techniques, Weather*

1 INTRODUCTION

Currently, weather forecasting is in high demand for several applications in agriculture, air traffic services, floods, and energy and environment control. Weather forecasting is an expectation of what the weather will resemble in next 1 hour, tomorrow, or 1 week from now. It includes a combination of models, perceptions, and learning of patterns with precedents (Saba and Rehman 2012; Norouzi et al. 2014). By utilizing these techniques, sensible exact estimates could be made up to 7 days ahead. Weather forecast are furnish by collecting required data (i.e. parameters) about the specified location status of the atmosphere (Gurung, 2017). Accurate weather predictions are important for planning our day to day activities. Farmers need information to help them plan for the planting and harvesting of their crops. Airlines need to know about the local weather conditions in order to schedule flights (www.learner.org/exhibits/weather/forecasting.html).
All these helps us to make more informed daily decision and may even help keep us out of danger.

Most early forecasting was based on observations of weather patterns. Over the years, this observations has resulted in traditional wisdom a good idea of which is inaccurate, day-to-day analysis of the weather is to be predicted and these forecasting should be communicated for the end users for taking decisions. It is a most challenging issue since the decisions that are taken are mostly with uncertainty (Krishna, 2015). Many have highlighted that most of the changes in the climatic conditions are mostly due to the global weather changes. Therefore if these weather changes are identified, effective prediction techniques can be planned (Krishna, 2015). However, unlike traditional methods, modern Weather forecasting involves a combination of computer models, observation (by use of instruments, balloons and satellites), and knowledge of trends and patterns (used by Local weather observers and weather stations). Using these methods, reasonably accurate forecasts can be made. Though, there is limited success in forecasting the weather parameters using the numerical model (Karmakar and Kowar, 2012).

Artificial Neural Network came into existence in 1986 which is able to reduce this limited success and drawing considerable attention in various researched work across the world, as it can handle the complex non-linearity problems better than the conventional existing statistical techniques. No other model (except the neural network model) so far has been able to forecast long-range weather parameter so accurately (Sanjeev et al., 2008). Neural Networks has numerous applications in real life for machine vision and to search suitable solutions as compared to the traditional numerical models. For instance, currently, neural networks are employed in documents analysis and recognition (Rehman and Saba 2014; Neamah et al. 2014; Alkawaz et al. 2016), flood control (Joorabchi et al. 2007; Saba 2016), biomerics classification stock market, weather forecasting and rice yield forecast (Phetchanchai et al. 2010; Elsafi 2014). Recent research exhibits that neural networks are promising non-linear tools if proper training and testing is conducted as well attention is given to learning parameters.

The modern application of science and technology help predict the state of the atmosphere in future time for a given location, it is so important due to its effectiveness