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Prediction Of Future Weather Forecasting Using Artificial Neural Network

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Abstract
Prediction of weather is determination of correct values of weather parameters and also the future weather based on these parameters. The different weather parameters were recorded day to day wise and then using Back propagation algorithm, the neural network is trained for different combinations. In "prediction of future weather forecasting using artificial neural network" the neural network is trained using different combination of weather parameters, the parameter used are humidity, temperature, pressure, wind speed, dew point and visibility. After training neural network using these parameters the prediction of future weather is done.
Keywords: Artificial neural network, Backpropogation algorithm

I. Introduction

As the weather changes rapidly that effects the number of people specially farmers, the prediction of correct weather condition specially prediction of correct rainfall become very important. There are number of approaches for predicting the weather conditions.

Climatology for prediction: Another method for predicting weather is Climatology, where the averaging of the statistics collected from last few years will be done.

Analog Method for prediction:
Another method which involves examining today's forecast scenario and remembering a day in the past when the weather scenario looked very similar (an analog). The forecaster would predict that the weather in this forecast will be have the same as it did in the past.

Numerical Weather Prediction: Power of Computers are used numerical weather prediction. Complex computer programs, also known as forecast models, run on supercomputers and provide predictions on many atmospheric variables such as temperature, pressure, wind, and rainfall. [10]

In proposed model an approach is provided that, the Back Propagation Algorithm can be applied on the weather forecasting dataset to train the neural network and effect of the parameters on each other were recorded and depending upon the values received from neural network, the prediction will be done.

II. Related Work

Decision trees: Decision trees models are used in data Decision tree models are used in data mining to create a tree and provide a rule based on that the prediction will be made. The different algorithms available are including CHAID (Chi-squared Automatic Interaction Detection), CART (Classification And Regression Trees) [1]. Fuzzy Set in the Radiation Fog example Shyi-ming Chen and Jeng-ren Hwang together in proposed a new fuzzy time series model called the two factors time – variant fuzzy time series model to deal with forecasting problems. In their model two algorithms were used for temperature prediction. The author presented a one – factor time variant fuzzy time series model and proposed an algorithm called Algorithm-A, which handles the forecasting problems. However, in the real world, an event can be affected by many factors, for example, the temperature can be affected by the wind, the sun shine duration, the cloud density, the atmospheric pressure,…etc., if we only use one factor to forecast the temperature, the forecasting results may lack accuracy.[2]

A model named "A Weather Forecasting System using concept of Soft Computing: A new approach" constructs an image, which represents the actual data.

They relate those data to the forthcoming weather events based on their previous records and history or whatever recognized by their system [3].

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A self configurable weather research forecast portal was developed to utilize the Weather Research Forecast (WRF) model for configuring and scheduling specific weather forecast. It generates weather visualizations relevant to its audience [4]. The another model known as "Extracting Spatial Semantics in Association Rules for Weather Forecasting Image" stores a the images and then later extracting the image for further analysis [5]. Another approach such as Weather.com [6] and AccuWeather.com [7] only support the meteorologists in analyzing and predicting customized weather forecasts for a city or metropolitan area rather than providing general users with the ability to manipulate and interactively identify possible threats associated with impending weather hazards. Artificial Neural Network can be effectively used for the Prediction and classification of thunderstorm with appreciable level of accuracy. Its work reports the Artificial Neural Network design with minimum set of input parameter; however increase in input parameter will effectively increase the prediction accuracy [8]. Automatic indexing and retrieval depending on image content has become more successful for developing large volume image retrieval applications [9]. The two rainfall prediction models which were developed and implemented in Alexandria, Egypt. These models are Artificial Neural Network ANN model and Multi Regression MLR model. A Feed Forward Neural Network FFNN model was developed and implemented to predict the rainfall on yearly and monthly basis. A feed forward neural network with back propagation algorithm was implemented and tested for the purpose of yearly basis rainfall forecasting.

III. Working

In this model the different weather parameters are collected day to basis all parameters were provided to the neural network. Each time all parameters except one is provided as the input and the excluded parameters is applied to the output using the backpropogation algorithm training is provided to the neural network.

After training, sample of same data is provided to the neural network to note the prediction for different parameters and to store all the predicted parameters in prediction file. Now from the prediction file the clusters is formed which is consisting of all the prediction for all data in month wise format.

IV. Step by step description of operation

1. Collection of Data Set

Data is collected on monthly basis for a specific region, as weather condition will vary depending upon the regions. For each month a data were collected day to day basis and the parameters collected are temperature, Pressure Humidity, Wind Speed, Dew point, Visibility are collected monthly basis and stored in excel files.

2. Training
In training phase all the data collected are given as input for training to generate a prediction file.

3.Generation of Prediction file and Clusters
Now the different combination of input samples were given as a input to the neural network and then storing all predicted value for the input parameter in prediction file.

4. Formation of Clusters
The prediction file is consisting of all the predicted value for the input combinations applied for training now cluster is formed monthly basis. For example twelve clusters are formed having the prediction for each combination.

5. Prediction
Now based upon the data available in prediction file user will enter the date for which the prediction is required. If the date is the past date, the input values of the temperature, pressure, dew point, visibility will be fetched from database and if the date is the future date then prediction file will be search and based on the prediction file the prediction about the particular day will be given.

V. ARCHITECTURE AND DATA FLOW DIAGRAM

A. Architecture
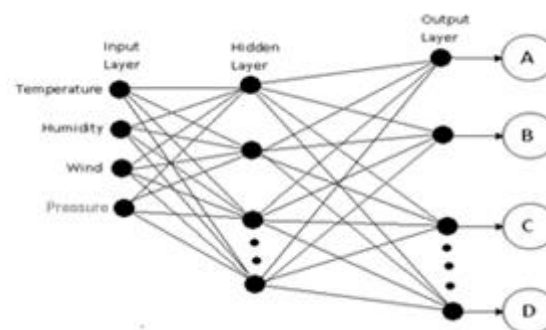
Architecture

Where,
A - Effect of temperature on other parameters if increased or decreased by some 5C
B - Effect of temperature on other parameters if increased or decreased by some 10C.

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C - Effect of temperature on other parameters if increased or decreased by some 15C.
D - Effect of temperature on other parameters if increased or decreased by some 20C

B. *Data flow diagram*
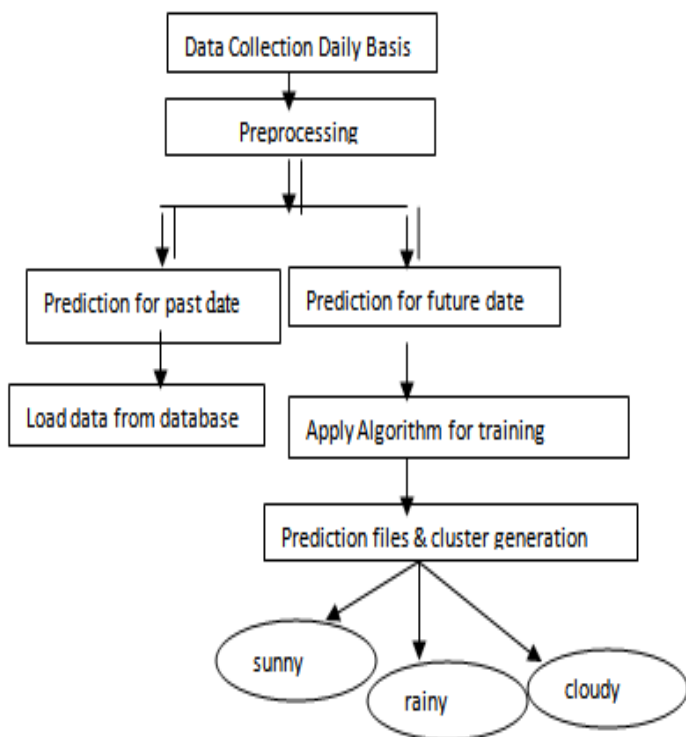
VI. Future work

Currently the data for specific location is collected to predict the future weather. In future the data can be collected across the locations using the wireless sensors which can be connected to the remote station and then utilizing the recorded data for prediction.

Again it can be extended to collect the readings for hurricane data and prediction can be done for hurricane.

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