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Prediction of Weather Forecasting by Using Machine Learning

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ABSTRACT- Weather forecasting has become important now a day because of varying climatic conditions around the world. Many technologies have been introduced to predict the weather whose accuracy is around 70%.Weather forecasting is used in machine learning. It is a powerful technique to predict the weather with more accuracy. Weather dataset is collected and analysed and algorithms on it to predict the weather. Using a Back Propagation Neural Network the error rate becomes less and many factors that are involved to predicting the weather gives the accurate results. To compare and evaluate the performance of above model and the programming was carried out using Visual Studio as a tool.

KEYWORDS- Classification, Weather Forecasting, Weather Conditions, Rainfall Prediction, Back Propagation Neural Network.

I. INTRODUCTOIN

Weather forecasting is the application of science and technology to predict atmospheric conditions at specific places and times. People have tried to predict the weather officially for thousands of years since the 19th century.[1] After manual calculations, primarily based on changes in barometric pressure, current weather conditions, sky conditions or cloud cover, weather forecasts now rely on computer-based models, taking into account many atmospheric factors. Human opinion is still needed to select the optimal forecast model on which to base the forecast, including knowledge of pattern recognition technology, remote connectivity, model performance and model bias. Prediction inaccuracies are due to the turbulence characteristics of the atmosphere, the enormous computational power needed to solve the equations that describe the atmosphere, the errors associated with measuring initial conditions, and an incomplete understanding of the waiting process. Therefore, as the difference between the current time and the time when the prediction is made (prediction range) increases, the prediction accuracy decreases. Ensembles and model agreements can help narrow errors and select the most likely outcomes[3]. The end use for weather forecasts is very diverse. Weather warnings are important predictions to be used to protect life and property. Forecasts based on temperature and precipitation are important for agriculture, so they are also important for commodity market traders. Power companies use temperature forecasts to estimate demand over the next few days. Every day many people use the weather forecast to determine what clothes to wear on a given day. Heavy rain, snow, wind chills significantly reduce outdoor activity, so forecasts can be used to plan, advance, and survive activities in the vicinity of these events[9]. Rain predictions can be used by farmers. Machine learning is a data science technique which creates a model from a training dataset. A model is basically a formula which outputs a target value based on individual weights and values for each training variable. In each record, corresponding weights (sometimes between 0 and 1) to each variable tells the model how that variable is related to the target value[5][6]. There must be sufficient amount of training data to determine the best possible weights of all the variables. When the weights are learned as accurately as possible,a model can predict the correct output or the target value given a test data record. Utilizing simple machine learning techniques allow us to be relieved from the complex and resource-hungry weather models of traditional weather stations. Such a forecasting model can be offered to the public as web services very easily[2]. Holmstrom et al. proposed a technique to forecast the maximum and minimum temperature of the next seven days, given the data of past two days[5]. They showed that both the models were outperformed by professional weather forecasting services for the prediction of up to seven days. A data mining based predictive model to identify the fluctuating patterns of weather conditions was proposed. The proposed data model uses Hidden Markov Model for prediction and k-means clustering for extracting weather condition observations. Grover et al. studied weather prediction via a hybrid approach, which combines discriminatively trained predictive models with deep neural networks[10] that models the joint statistics of a set of weather-related variables.

II. EXISTING SYSTEM

Ms. Ashwini Mandale et al developed on Data mining techniques it used the algorithm Decision tree Algorithms for meteorological to forecast weather[1]. Ankita Joshi et al proposed a data mining techniques of decision tree algorithm. They found 63% accuracy in variation of rainfall for our proposed model. There are several limitations in better implementation of weather forecasting in data mining techniques. They used only small

limited areas for weather forecasting. Accurate weather prediction is a difficult task due to dynamic change of atmosphere[7].

III. PROPOSED SYSTEM

Weather forecasting is used in machine learning. It is a powerful technique to predict the weather with more accuracy. Weather dataset is collected and analysed and algorithms on it to predict the weather. Using a Back Propagation Neural Network model the error rate becomes less and many factors that are involved to predicting the weather gives the accurate results. To compare and evaluate the performance of above model and the programming was carried out using MATLAB as a tool. Through our proposed system we would like to improve the overall performance by using the regression and classification neural network architectures through frameworks such as Tensorflow and keras.

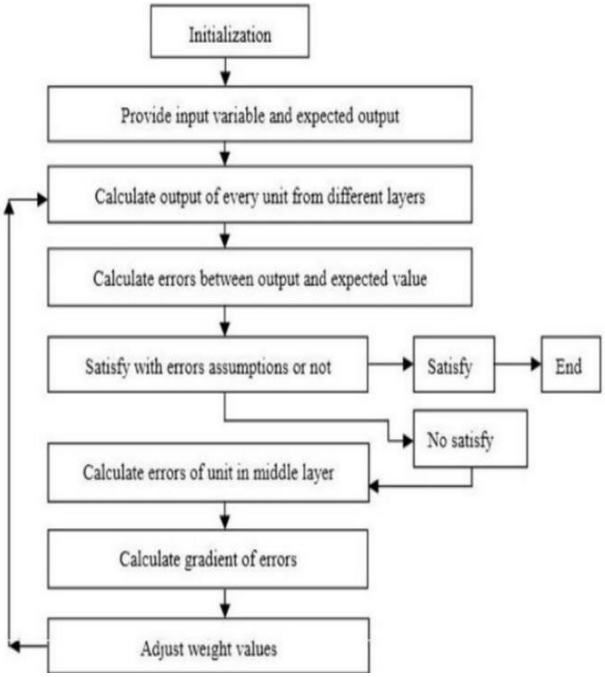

Fig. 1: Back Propagation working process

- We first initialized some random value to 'W' and propagated forward.
- Then, we noticed that there is some error. To reduce that error, we propagated backwards and increased the value of 'W'.
- After that, also we noticed that the error has increased. We came to know that, we can't increase the 'W' value.
- So, we again propagated backwards and we decreased 'W' value.
- Now, we noticed that the error has reduced.

A. Functional Requirements

The following are the Functional requirements of our system.

Data should be reliable for prediction. Based on the data temperature is given to the user.

B. Non- Functional Requirements

In software engineering and requirements engineering a non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system rather than specific behaviours.

The project non-functional requirements include the following:

Basic knowledge on the traditional weather forecasting system.

- Availability
- Flexibility
- Scalability
- Usability
- Performance

IV. RESULTS

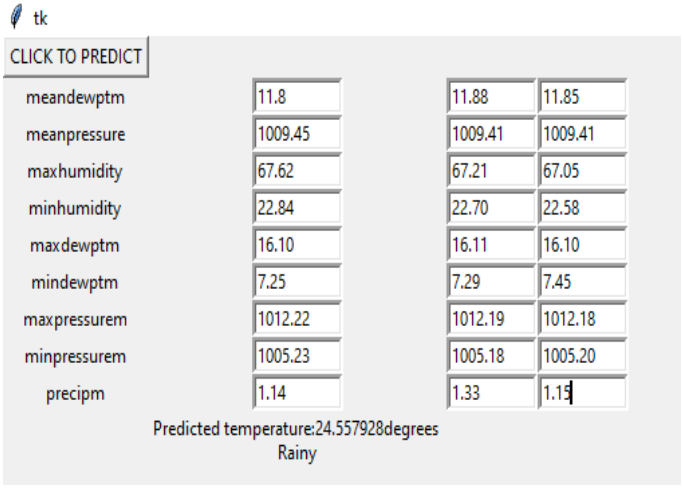

Fig. 2: Algorithm Predicting the Weather

We are taking the inputs as last 3 days parameters like meandewpoint,meanpressure,maxhumidity,minhumidity,maxdewpoint,mindewpoint,minpressure,maxpressure,precipitation.By taking these parameters regression technique will perform the operations by using the libraries like numpy,pandas. Running the code in Microsoft Visual Studio Code it will displays the predicted temperature.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

V. CONCLUSION

The proposed methodology aims at providing an efficient weather forecasting framework for predicting and monitoring the weather attribute datasets to predict. In past the parameters of weather were recorded only for the present time only. The future work will explore a working model of selection that can be classifying the framework for continuous monitoring the climatic attributes.

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