Machine Learning based Rainfall Prediction

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ABSTRACT

Weather forecast is one of the most important ways to predict the weather in any country. This paper proposes a rain forecast model using Multiple Linear Regression (MLR) on the Indian database. Input data has more weather parameters and rainfall prediction more accurately. Mean Square Error (MSE), precision, correlation parameters are used to validate the proposed model. From the results, the proposed machine learning model provides much better results than other algorithms in the textbooks.

There are many hardware tools to predict rainfall through climatic conditions such as temperature, humidity, pressure. These traditional methods cannot work in them an effective way so that by using machine learning techniques we can produce accurate results. We can just do it has a history of rain data analysis and can predict future rainfall. Different strategies produce different accuracy is therefore important to choose the right algorithm and model according to requirements.

Keywords: - Multiple Linear Regression, rainfall, prediction, Predictability, Machine Learning, Accuracy, Rainfall Accurate Results

I. INTRODUCTION

Rain forecast is important for Indian culture as well it plays a major role in a person's life on a large scale. Icon demanding the responsibility of the weather department to predicting precise rain frequency. Icon it is complicated to accurately predict rain by change weather conditions. It is a challenge to predict rain both summer and rainy seasons. Researchers everywhere the world has developed various rainfall models most falls using random numbers and they are the same weather data.The proposed model is developed using multiple lines retreat. The proposed method uses Indian meteorological rain forecast day. Usually machine learning the algorithms are divided into two main categories: (i) unsupervised reading (ii) unsupervised reading. Everything clustering algorithms come under the control of the machine reading. Figure 1 represents a distinct division of machine learning algorithms. Figure 2 describes rain predictive research based on the Indian neural network situation. Although many models have developed, but still what is needed to do research is to use machine learning algorithms for accurate predictions. There is no error forecasting provides better agricultural planning as well other industries.

This paper is organized as follows: Phase II discusses various approaches related to literature, Phase III describes the proposed MLR based Rain Fall system Predictability. The results are described in Section IV and Phase V ends the paper

II. RELATED WORK

There are many activities in the forecast books rainy season. This section discusses some of the related activities on our proposed route. Kumar Abhishek et al. babe proposed a rain forecast method using the neural network of [2]. The proposed model in [2] predicts rainfall of Udupi District from the Karnataka region of India. BPNN with ed forward, recurrent layer and BPNN and cascade feed advanced neural networks are explored. Proposed the model takes 70% of training data and 30% of testing. Continuous network shows better accuracy if compared to BPNN. MSE is high with BPNN.

Aswin et al. in [4] suggest a model to predict I rain through Deep Learning Architectures (LSTM and ConvNet). LSTM and ConvNet Architectures used to model and predict Global monthly average rain for 10368 Geographic Locations globally for 468 months. RMSE for the proposed system, LSTM is 2.55 while ConvNet's RMSE is 2.44 hidden layer errors can still be minimized.

Xianggen Gan et al. they discussed the back broadcast neural network for rain forecast. Proposed model was tested using a database from 1970 to 2000 with 16 climatic boundaries. During network training I target error is set to 0.01 and reading level is set to 0.01. The proposed model is implemented using

Matlab neural network location and BPN Network accuracy the prediction is 100% while the regression prediction is 67%.

Sam Cramer et al. proposed a prediction method rain through Genetic Programming. GP and MCRP were compared to 21 different databases of cities across Europe. 10-day daily rain data was considered training data and one-year rainfall data taken as test data. GP overcomes MCRP weaknesses with various predictions better weather than MCRP. Mohini P et al. discussed a research of different NNs to predict rainfall. FFNN, RNN, TDNN was used for better prediction compared to prediction strategies. The disadvantage of NNs is that it predicts it is only accurate about the annual rainfall compared to it monthly rain forecast. Overcoming the problem climate limits can be applied. Sandeep Kumar Mohapatra et al. have suggested a rain forecast data from 1901 to 2002 for Bangalore, India. I The data collected was investigated using a data mining method Lower Line. To verify and get computational Pandas and scikit Read used. Rain forecast in different seasons the K wrap was used. Rain forecast the season was more accurate compared to the summer season.

Sankhadeep Chatterjee et al. they have proposed predictions rain using Neural Network. Meteorological Station from Dumdum, West Bengal provided data over the years between 1989 - 1995. Data was compiled using K means integration. At [9] Hybrid Neural Network (HNN) compared with the MLP- FFN section. HNN was better with to produce 89.54% accuracy (with selective features) and 84.26% accuracy (excluding selection factors) in comparison MLP-FFN.

Table 1. Comparison of Rainfall Prediction Methods

S. No.	Methods	Performance Parameters	Tools Used
1.	a)Feed Forward with Back –Propagation b)Layer Reccurent c) Cascaded feed Forward back Propagation	Mean Square Error (MSE)	Matlab: Nntool, Nftool
2.	Deep Convolutional Neural Network	MSE, Correlation, Critical Success Index (CSI)	Not Mentioned
3.	LSTM and ConvNet	Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE)	Not Mentioned
4.	BP network	Accuracy	Matlab: Neural Network Platform
5.	Genetic Programming	RMSE	Not Mentioned
6.	Artificial Neural Network	Accuracy	Meteorological Parameters
7.	Linear Regression	RMSE, MAE	Pandas and scikit Learn
8.	Hybrid Neural Network	Accuracy, Precision, Recall	Not Mentioned
9.	Likelihood	Accuracy	Hadoop

III. LITERATURE SURVEY

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Gap Finding: Aswin et al. in [4] suggest a model to predict i rain through Deep Learning Architectures (LSTM and ConvNet). LSTM and ConvNet Architectures used to model and predict Global monthly average rain for 10368 Geographic Locations worldwide for 468 months. RMSE for the proposed system, LSM is 2.55 while ConvNet's RMSE is 2.44 hidden layer errors can still be minimized.

IV. MLR BASED RAIN FALL PREDICTION

The proposed method is based on multilinear regression. The data for prediction is collected from Publicly available sources and 70 percent of the data is for training and 30 percent of the data is for testing. Figure 2 describes the block diagram of the proposed modus operandi. Multiple regression is used to predict are values with the help of descriptive variables and a statistical method. It has a linear relationship between The Descriptive variables and output values. Following equation for multiple linear regression is:

$$y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + ... + \beta_p x_{ip} + \varepsilon$$

The reference value is indicated by n. I the dependent variant is yi and the descriptive is xi. ù0 and ùp is a constant y and a descriptive retreat change in sequence. Model error is indicated by .In the proposed model most climate parameters are it is necessary to predict

the rain, it is better to use multiple line receptions instead of simple line receptions.

Guessing done in a multi-line setbacks are: the linear relationship between the two of descriptive and independent variables, closely related variables are independent variables, yi are calculated randomly and the meanings and variations are 0 and 1. Figure 3 describes the predictive flow of MLR
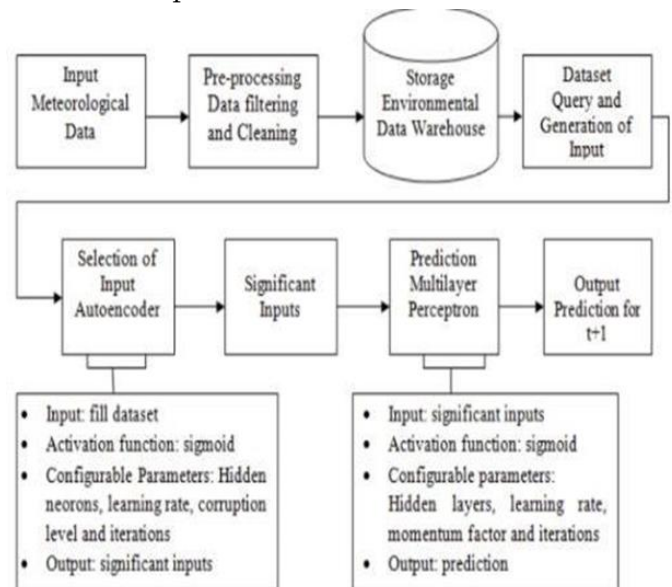

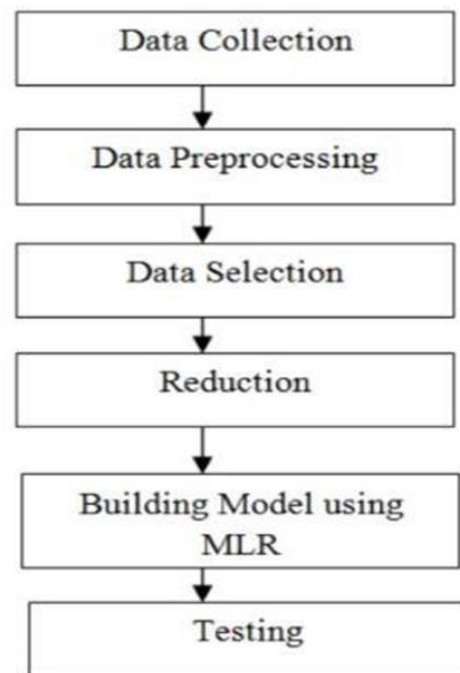Figure 2. Block Diagram of Proposed Methodology

Figure 3. Model Generation using MLR

V. RESULT

This section discusses the implications for the proposed MLR rain-based prediction method. Total amount of data in The selected data set is 4116. Figure 4 describes the MLR predictive effect. The accuracy of the MLR prediction is 0.99 and shown in Figure 5. Comparison of performance parameters are shown in Table 2.
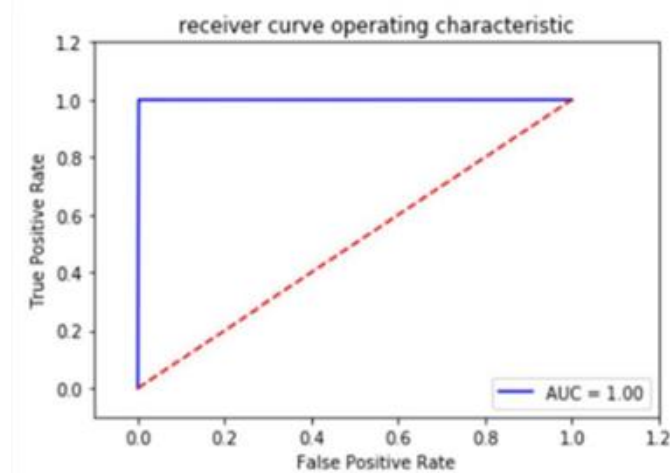
VI. APPLICATIONS

Machine learning algorithms are very useful for predicting rainfall. Other major machine learning algorithms are the ARIMA Model (Auto-Regressive Integrated Moving Average), Emotional Network, Descent, Vector Support Machine and Editing Maps.

Two of the most widely used models predict rainfall seasons such as linear and indirect rain models. The first models are the ARIMA Model. When using the Artificial Neural Network (ANN) rain forecast can be done using Back Propagation NN, Cascade NN or Layer Recurrent Network.

VII.   FUTURE SCOPE

A weather forecast is a forecast of a particular place, using scientific and technological know-how. These include temperature, rainfall, clouds, wind speed, and humidity.

Weather alerts are a special type of short-range weather forecast designed to protect human health A weather forecast is a forecast of a particular climate using the use of science and technology. These include temperature, rainfall, clouds, wind speed, and humidity. Weather alerts are a special type of short-range weather forecast designed to protect human health.

VIII.   CONCLUSION

Rainfall forecasts play a key role in agriculture production. Growth in agricultural production is supported the amount of rain. It is therefore necessary to predict seasonal rainfall to assist farmers in agriculture. I the proposed route predicts rainfall in the Indian database it uses multi-line backlash and provides improvement results depending on accuracy, MSE and correlation.

IX. REFERENCES

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