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A Review on weather prediction using machine learning

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Abstract: *In this review paper, we have research on the machine learning techniques to prediction of weather with much accuracy. Ins this research process we have used following parameters to predict weather: temperature, rainfall, evaporation, sunshine, wind speed, wind direction, cloud, humidity and size of datasets. This research aims to compare the performance of many machine learning algorithms for predicting weather using weather data. From the collected weather dataset which contains some weather attributes, which are most relevant for weather prediction. In this review, various Machine Learning Techniques have explored which includes Naive Bayes Algorithm, Logistic Regression. The experimental results show that Naive Bayes algorithm has good level of accuracy than other algorithms.*
Keywords: *Weather Forecast, Machine Learning Techniques-Naive Bayes Algorithm, Logistic Regression, Data pre-processing*

I. INTRODUCTION

Weather forecasting prediction has been one amongst the foremost regressive with distinction variables. It improves the static scientifically and technologically difficult issues round the multivariate analysis and thus initially its uses have increased from last century. The nature of present time weather forecasting is not only very complex but also highly quantitative. Weather forecasting is use for predicting weather by determining some factors that include temperature, humidity, pressure, wind, etc. There are various technique and ways to find weather and to analyses its results, which include statically format known as Statistical Weather Prediction, Numerical Weather Prediction and Graphical Weather Prediction. Among them we have come across and worked in Numerical Weather Prediction (NWP).

Numerical Weather Prediction (NWP): it uses the power of computers to make a forecast. Many computer programs, also known as forecasting models, run on supercomputers and provide predictions on many atmospheric variables such as temperature, wind pressure, humidity and rainfalls. A forecaster examines how the features prediction by the computer will interact to produce the day's weather. It generates the data in numerical format.
The numerical weather prediction is flawed in that the equations used by the models to simulate the atmosphere are not precise. If the initial state is not completely known, the computer's prediction of how that state will evolve will not be entirely accurate. Naive Bayes algorithm gives more accurate results when we use it for textual dataset analysis. Naive Bayes approach is a method to classify events based on occurrence probability or not happening [6]. Naive Bayes algorithm shows proper results using native attribute when it receives primitive practice. Bayes' theorem: -
$P(A|B) = P(B|A)\ P(A)/P(B)$

II. LITERATURE REVIEW

Weather Forecast systems predict weather. Weather forecasting provides critical stimulation about linear and nonlinear models. Weather prediction modelling involves combination of many computer models, observation and acquaintance of trends and designs. Using these methods, practically accurate forecasts can be made up [1].
Making a weather forecasting prediction involves three main steps: observation and analysis, extrapolation to find the future state of the atmosphere, and prediction of particular attributes. Prediction of forecast varies from one to two degrees of the actual temperatures. Although this accuracy of weather prediction is not as bad, as the predictions are made for further in time. Furthermore, weather forecasting prediction in some areas where the climate is not consistence, is off by even more [2]. Machine Learning Algorithms and many classifiers' names Naive Bayes Bernoulli, Logistic Regression, Gaussian, support vector machine are uses for evaluate more accurate output.
Predictability of weather figures, predictability of weather with a numerical solution of statistics that control movement and climate change. Many climate forecasting techniques, in addition to being used for short-term weather forecasting, are being used in research studies such as air pollution and the effects of greenhouse gases on global climate change [3]. In the case study of The chaotic time series of Indian monsoon rainfalls, Basu and Andharia 1992, we have found that the resulting forecast

formula uses only the rainfall of past seven years as predictors, making a forecast eight months in advance [4]. Charles Jones and Pete Peterson 1999, [5] have completed a research at the University of California, California, for air surface temperature prediction over the city. Guhathakurta, 1999, [6][7] has implemented this technique for short-term prediction of surface ozone at Pune city. In this prediction multiple regression data analysis using ANN technique has been used. It has been observed that, the parallel model can be developed for all the major cities with different sets of data but the network architecture will be different.

After many comparative study of short term rainfall prediction models for real time flood forecasting, E.Toth etal., have found that the time series analysis technique based on ANN provides significant improvement in the flood forecasting prediction accuracy in comparison to the use of simple rainfall prediction approaches [8].

To estimate the maximum surface temperature and relative humidity a Feed forward multi-layered ANN model is designed by Chaudhuri, and Chattopadhyay, in 2005, and stated that one hidden-layer neural network is efficient forecasting tool by which an estimation of maximum surface temperature and maximum relative humidity can be obtained [9].

Shawshank Singh from School of Computer Science and Engineering Galotti's University Greater Noida [10] collected data on the actual weather of Nashville city from wunderground.com website, as well as nine other cities around Nashville: Knoxville, Chattanooga, Jackson, Bowling Green, Paducah, returns a list of weather view data. In all of their experiments, they use the root mean squared error to evaluate models. The first active weather forecasting model consisted of only one layer and could therefore show only temporary variations in the vertical structure of the atmosphere.

III. CONCLUSION

In this review paper, we presented an overview of weather forecasting techniques with time series dataset describing the main contributions in this field. The different measuring attributes play a pivotal role in giving precise weather forecasting. We have observed that Naive Bayes gives the best weather prediction results with an accuracy of 100% and also exhibits highest values in Recall as compared to other classification algorithms. Naive Bayes approach proves to be an efficient and acceptable method for weather prediction. The level of accuracy and prediction are highly depending on the data being used as input for classification and prediction. Every algorithm has its advantage and limitations; it is very difficult to choose the best algorithm. For weather dataset, it has concluded after analyzing various models of supervised learning that the Naive Bayes algorithm has appreciable level of accuracy and acceptance.

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