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Using Deep Learning in a Fresh Way to Forecast and Examine Brain Tumors

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Abstract:

The agricultural sector is vital to India's economy. While precipitation is crucial for farmers, accurate weather prediction has become an enormous challenge in recent times. You can better plan for your crops and take preventative measures with the help of a reliable rainfall prediction. As a result of the rapid acceleration of climate change, global warming has far-reaching consequences for both people and the natural world. Because of this, floods are becoming droughts and sea levels are increasing, which impacts farming. Unwanted and unsuitable precipitation quantities are a result of adverse climate change. To learn more about weather and precipitation, a precipitation prediction is a great tool to have. The primary goal of this study is to accurately describe the climate from various perspectives (e.g., agriculture, research, power generation, etc.) so that customers can determine whether a change is necessary in the climate and its parameters (e.g., temperature, humidity, precipitation, wind speed), which in turn determine the drives precipitation projection. It is also difficult to forecast precipitation since it is site dependent. Predicting when it will rain is one of the many uses for machine learning, a dynamic branch of AI. Our method for predicting precipitation in this study is based on a multi-attribute UCI reference data set. Improving the accuracy of precipitation forecasts via the use of machine learning classification algorithms is the primary objective of this project.

Keywords – Rainfall Prediction system, Machine Learning, Dataset, Classification algorithms.

I. Introduction

In every part of the globe, people rely on rainfall forecasts for crucial aspects of their daily lives. Analyzing the frequency of precipitation is a dangerously important task for the Weather Service. Precipitation forecasts are notoriously inaccurate due to the wide variety of meteorological conditions. Predicting summer and rainy season rainfall is implied. For these and other reasons, studying adaptive algorithms for rain prediction is crucial. The term "machine learning" describes a technique that can "manipat and extract latent, unknown and potentially useful information about data." It's an effective and high-quality technology. The area of machine learning is massive and rapidly expanding in both scope and application. If you want to know how accurate a data set is or how to make predictions from it, you may use one of the many supervised, unsupervised, or synchronous learning classifiers that

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are part of machine learning. This information may be used in our proposal for a precipitation forecasting system, since it will greatly benefit individuals. The best accurate model was determined by comparing many machine learning techniques, including Decision Tree, Random Forest, K-Nearest Neighbor, and Logistic Regression.

This case makes use of the precipitation dataset housed in the UCI repository. Current classification methods were reviewed and compared in this research. Future research and its potential applications are also discussed in the publication. This research article aims to forecast a location's rainfall using user-supplied input factors. Date, location, high and low temperatures, humidity, wind speed and direction, quantity of evaporation, and so on are all examples of parameters. Four algorithms—Logistic Regression, KNN, Decision Tree, and Random Forest—are used to learn these precipitation characteristics. Random Forest and KNN provide us with around 88% accuracy, making them the most efficient of them. Lastly, we will provide a prediction on the rainfall status for that specific place.

II.LITERATURE REVIEW

The main objective of this paper is to study the different approaches proposed by the authors and build a real-time precipitation forecasting system to overcome the shortcomings of the previous methods and provide the most accurate and optimal solution. System [1] predicts rainfall for Udupi district of Karnataka state in India. BPNN with cascade feedback neural network technique is used. Network shows better accuracy than BPNN. This system may not work correctly for long-term forecasting of rainfall. System [2] G. Geetha and R. Selvaraj used ANN model to predict monthly rainfall over Chennai area and took different meteorological attributes such as maximum and minimum temperature, humidity, etc. relative, wind speed and wind direction. They analyzed the data and predicted weekly rainfall over selected areas of Chennai. The prediction using ANN gives good accuracy compared to the multiple linear regression model. This algorithm works on two passes: a forward pass and a back pass. The input is passed to the front layer and it is transmitted to the next layer through the network. Finally, the result is generated in the keyword layer after parsing the result from the previous layer. The paper proposed by [3] introduced a system of precipitation forecasting using deep KNN mining technique. A single value of K is given that is used to find the total number of nearest neighbors which helps to determine the class label for the unknown data. Similar parameters are grouped in the same cluster type and thus, with the help of KNN, we determine the type or category of a particular data set. This algorithm does not need time to learn classification or regression. This system may not lead to a good accuracy if the wrong value of K is chosen.

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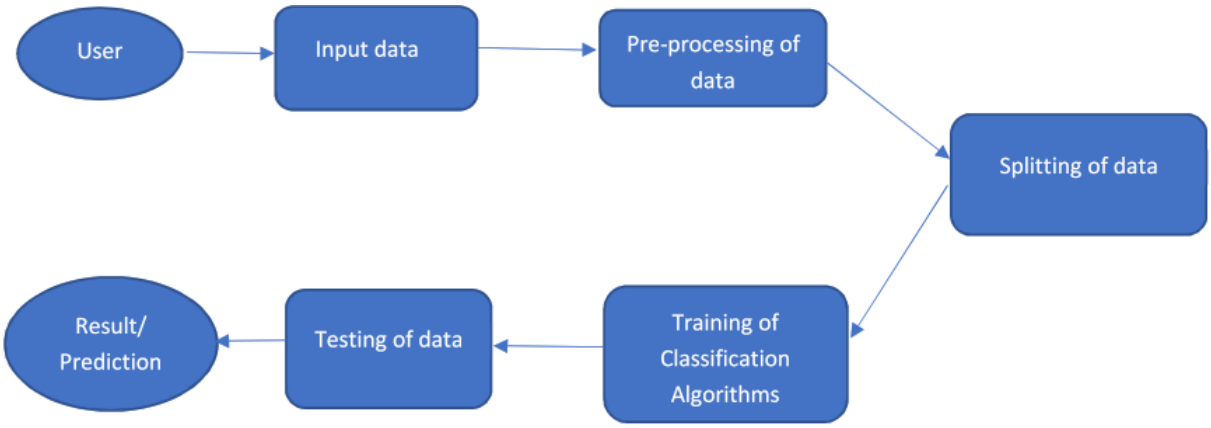
III. PROPOSED METHODOLOGY



A. Data Exploration and Analysis

Data analysis is performed to obtain certainty that future results will be near so that predictions are valid and correctly interpreted. This certainty can only be achieved after verifying the raw data and checking for outliers, thus ensuring that the data has been collected without any errors. It also helps to find data containing features that are not related to the predictive model.

B. Data preprocessing:

Data preprocessing is a data mining technique that converts raw and inconsistent data into an understandable format useful for the model. Raw data is inconsistent and inconsistent. complete, and contains missing features as well as many bugs. According to data mining and analysis, we learned that our model's raw data contained many null values that needed to be replaced with their mean. We can also deal with missing values by deleting unrelated columns or rows. The encoding of the categorical data is done because the model is based on mathematical equations and calculations, so it is necessary to convert this categorical data into numbers. feature selection is also part of preprocessing, where we select only features that contribute to our precipitation prediction model, thus reducing training time and increasing accuracy. model body. Scaling is the final step of preprocessing in, the independent variables are included in a specific range so that no one overwhelms the other.

C. Modeling:

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Initially, in the proposed model, the obtained meteorological data are cleaned, then they are preprocessed and then sorted. Finally, the precipitation data is classified into different categories according to the guidelines of the Indian Meteorological Department. In this paper, we have proposed a approach to predict precipitation using a machine learning classifier. The preprocessed data is split into .70% for training and 30% for testing. Four different machine learning algorithms are applied on the disaggregated data and then, each of the results are analyzed and the final correct result is displayed. The operation of the individual classifiers is explained in section above.

1) Logistic Regression: Logistic regression is a supervised taxonomy algorithm used to predict the probability of a given target variable. The nature of the target or dependent variable is branched, there will be only two possibilities of classes 0 for error and 1 for success.

2) K-Nearest Neighbor (K-NN): K-Nearest Neighbor is one of the simplest machine learning algorithms based on supervised learning technique. The K-NN algorithm takes into account the similarity of new cases/new data with existing cases and places the new case in a category that is mainly related to the available categories. It classifies objects by nearest neighbors. He groups named points and uses them to score another point. Similar data is grouped together and null values of the data can be filled with K-NN. As soon as these missing values are filled, we apply ML techniques to the dataset. Higher accuracy can be achieved using different combinations of these algorithms.

3) Random Forest: Random Forest is a supervised learning algorithm used for both classification and 1087 regression as well as decision tree generation on sample data.

1) Step 1-Have a selection of random samples from a given data set.
2) Step 2 - It builds a decision tree for each data sample, then it makes predictions from each decision tree.
3) Step 3 – After that, voting will be done for each prediction outcome.
4) Step 4 - Finally select the most voted prediction result as the final prediction result.

5) Decision Tree: This classification algorithm works on categorical data as well as numeric data which is a decision tree algorithm. It creates a tree structure and is very easy to implement, parsing the data into a tree graph. This algorithm divides data into two or more related tuples based on the most important metrics. We first calculate the entropy of each attribute, then we divide the data, with predictors with maximum information gain or minimum entropy: The resulting
is easy to read and interpret. than. This algorithm has higher accuracy than others because it analyzes data sets in tree graph.

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1) Accuracy: The ratio between the number of correct output samples and the total number of input samples.

2) Accuracy: The number of true positives divided by the number of positives predicted by classifiers.

IV. RESULT AND ANALYSIS

The objective of this research paper is to design a model and analyze the performance of various machine learning algorithms and predict the most accurate precipitation prediction algorithm. This study was performed using Logistic Regression, Random Forest, Decision Tree, K-Nearest Neighbor techniques on the dataset. For testing purposes, we came up with real-time values of maximum and minimum temperature, relative humidity, wind speed, and more. final prediction. Compare the performance of the algorithms shown below and their exact scores shown in the table.

Method	Classification Accuracy	Precision
Random Forest	88.21	0.844
KNN (n=27)	87.36	0.791
Decision Tree	73.67	0.16
Logistic Regression	84.63	0.732

Fig.1 Accuracy on 30% test data.

V. ADVANTAGES

1) Water resources can be effectively managed by a precipitation forecasting system.

2) Areas that may be evacuated if flooding is forecast.

3) Help to take appropriate measures to effectively manage water resources, increase crop productivity and not waste resources.

VI. CONCLUSION

Index in Cosmos
July 2022Volume 12 Issue 3
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The overarching goal is to catalog the several ML methods that have been effective in the past for predicting future precipitation. The rationale behind this research was to find ways to reduce testing and attribute use while simultaneously improving model accuracy. Prior to being used in the model, the data undergoes preprocessing. The top classifiers are K-Nearest Neighbor (87% efficiency) and Random Forest (88% efficiency). On the other hand, a 73% accuracy rate is the worst output from the Decision Tree Classifier. Time series, grouping, association rules, and other aggregation approaches are just a few more ML methods that might be used to expand this research. Building more complicated and coupled models is important to attain a greater accuracy of the precipitation forecasting system, considering the constraints of this research. Building a research with bigger coupling monitoring for a particular region allows for faster, more accurate calculations, and this form of model may be used with massive data sets.

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