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Rainfall Prediction Using Machine Learning.

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A B S T R A C T

The rainfall prediction project is based on machine learning.Here our project will predict rainfall using previous data analysis. Genetic algorithm is used in this project. Numerous research works are being carried out by various people to predict the occurrence of rainfall before it actually comes. Use of genetic algorithms has seen in intense use for various research purposes and prediction of weather is not an exception. In this project, we have proposed a system that could predict the rain beforehand using genetic algorithm.

Genetic algorithm is used to extract features from the input data set. When compared to other approaches use of genetic algorithms seems to be more efficient for predicting the rainfall as hence it is used in the current work. The evaluation results are performed based on evaluating various parameters and the proposed model seems to provide a better efficiency when compared to the rest of the previous traditional rainfall prediction systems.

Keywords -Rainfall Prediction, Genetic Algorithm, Crossover, Accuracy, Evaluation, SVM, Naivy bias, RBFN.

1. Introduction

In this project, We have proposed a model that makes use of a genetic algorithm for predicting rainfall using previous dataset. The genetic algorithm is also used for finding the accuracy and performance of the entire proposed model.

Rainfall is one of the most important climatic change that needs to be predicted well before in our country. Various countries losing numerous lives due to this heavy rainfall. Rainfall prediction is a challenging task and the results should be accurate.

There are many hardware devices for predicting rainfall by using the weather conditions like temperature, humidity, pressure. In this project classifiers that we used SVM, Naivybias, and RBFN monetary unit are additional appropriate than alternatively applied math and numerical techniques. We have used CSV dataset of various regions of country for rainfall prediction. Performed an overall analysis for predicting the rainfall of the particular area.

2. Literature Review

There are numerous works that have been proposed by various researches for predicting rainfall in given geographic area in their papers. In paper [1], they have proposed a system that could predict the rain be forehand using genetic algorithm. Matlab is used for observing the performance of the algorithm. Genetic algorithm is used for feature extraction from the input dataset. Then they have displayed the error area in the graph representation. So using these values of dataset. They can predict the rainfall in accurate and good response...

In paper [2] They have used model (ARIMA MODEL(Auto Regressive Integrated Moving Average)) This modelis used for time series prediction and analysis and forecasting. It contains four methods and is proposed by Box and Jenkins. The following are the four steps used in the ARIMA model. Generally, sensors are taken as input like wind sensor, light sensor etc.. But here using convolution neural networks to take the input from the past data. In this, the data is separated into training and testing and calculating Mean absolute error from this NN training. No of iterations are being calculated and checking the best Epoch value.

In paper [3] This paper proposes a rainfall prediction model using Multiple Linear Regression (MLR) for Indian dataset. The input data is having multiple meteorological and to predict the rainfall in more precise. The Mean Square Error (MSE), accuracy, correlation are the parameters used to validate the proposed model. results in the proposed MLR based rain fall prediction method. The total number of data in the selected data set is 4116. Figure 4 describes the MLR prediction result. The accuracy of the MLR prediction is 0.99

In paper [4] paper suggests a method for an effective EWS for very short-term heavy rainfall with machine learning techniques. The EWS produces a warning signal when it is expected to reach the criterion for a heavy rain advisory within the next 3 hours.We devised a selective discretization method that converts a subset of continuous input variables to nominal ones. . The selective 368 discretization method selectively discretized

input variables that have a nonlinear relationship with the very 369 short-term heavy rainfall, and the PCA reduced the dimensionality of input variables by creating a new 370 coordinate system that provides an informative view of the data.

In paper [5] In this paper they presented some new results concerning the application of this approach to the forecasting of the individual rainfall intensities series collected by 135 stations distributed in the Tiber basin. SVM- There are many algorithms used for classification in machine learning but SVM is better than most of the other algorithms used as it has a better accuracy in results. classification, Support Vector Machine Algorithm has a faster prediction along with better accuracy. SVM is a very efficient simple classifier algorithm which is widely used for pattern recognition. Also it can have a very good classification performance than any other classifier.In SVM approach, the main aim of an SVM classifier is obtaining a function f(x), which determines the decision boundary or hyper plane. The Approaches C and D give similar good results. The obtained MSEs were about 2 mm of rain for all the stations we have considered, as shown in Tab. 3. In Fig. 4 we present the absolute errors and the scatter

3. Advantages and Disadvantages

Advantages-

- Modern machines can control the prediction of rainfall.
- The amount of time saved may be very high because of the ML program. And we can all use more energy in everyday life today.
- Successfully monitor rainfall prediction using ML.
- We can schedule the system to irrigate a piece of rainfall efficiency.

Disadvantages-

- Weather is extremely difficult to forecast correctly
- It is expensive to monitor-so many variables from so many sources
- The computers needed to perform the millions of calculations necessary are expensive
- The weather forecasters get blamed if the weather is different from the forecast
- The cost of maintenance is high.

5. Methodology-

Machine learning works by analyzing what features are Extracted and the URL is tested on the classifier. To train the Classifier, we used the UCI Phishing Website Dataset.

5.1 Genetic algorithm

The block diagram is depicted which shows the genetic algorithm that is intensely used in feature selection. The feature selected from the input dataset is used with the selected feature.The model consists of three modules. The first one is the Preprocessing module where the input is taken and then converted for extracting the features. The second one is the Genetic Algorithm. Data processing is done for the given input dataset.we have a flow of genetic algorithm.This algorithm was used to predict the rainfall dataset values. For choosing best from the selected region or area.

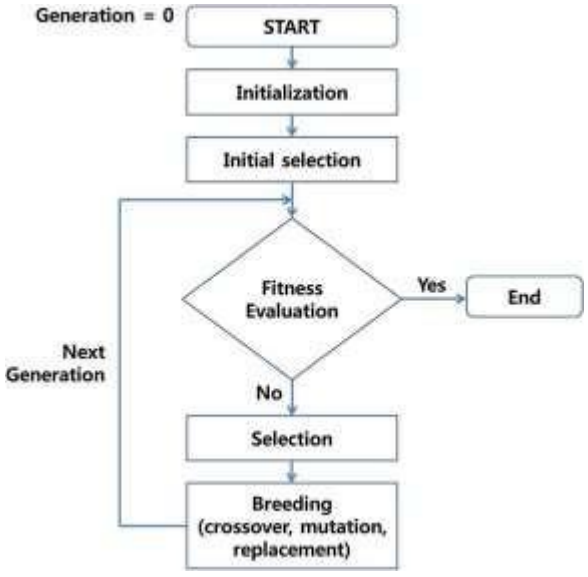

Figure 1: genetic algorithm process

5.1.2. Module 1: Genetic flow

In Fig.2, we have a flow of genetic algorithm. It will assign the fitness using the selection, crossover and mutation operators. Then if the value is true then it will go for another prediction. If it is false then again it will go for assigning the fitness using this three operator. All this three operator has unique operations. This algorithm was used to predict the rainfall dataset values. For choosing best from the selected region or area. It was helped our proposed system to predict the values in faster and giving the best performance validation.

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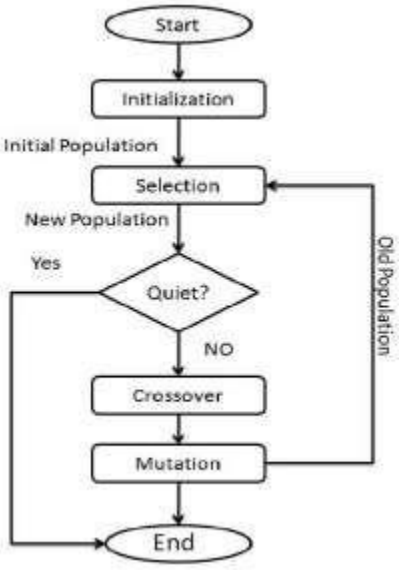

Figure 2: Genetic Flow

5.1.2 Module 2: Dataset

We have used India's CSV dataset for analysis. SVM, Navy bias and RBFN Classifiers. Svm SVM is a supervised machine learning algorithm which can be used for classification or regression problems. It uses a technique called the kernel trick to transform your data and then based on these transformations it finds an optimal boundary between the possible outputs Navy bias Naive Bayes uses a similar method to predict the probability of different class based on various attributes. This algorithm is mostly used in text classification and with problems having multiple classes. RBFN an RBFN performs classification by measuring the input's similarity to examples from the training set.

Each RBFN neuron stores a "prototype", which is just one of the examples from the training set. When we want to classify a new input, each neuron computes the Euclidean distance between the input and its prototype Project objectives vs. project goals Genetic algorithm This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation Classifiers- Svm In SVM, we take the output of the linear function and if that output is greater than 1, we identify it with one class and if the output is -1, we identify is with another class. Since the threshold values are changed to 1 and -1 in SVM, we obtain this reinforcement range of values([-1,1]) which acts as margin Navy bias Naive Bayes is a kind of classifier which uses the Bayes Theorem.

It predicts membership probabilities for each class such as the probability that given record or data point belongs to a particular class. The class with the highest probability is considered as the most likely RBFN Activation functions in RBFNs are conventionally implemented as Gaussian functions.

6. System Configuration

Requirements for analysis

Algorithm
Classifiers
Dataset

Software Requirement

Operating System -Windows 7, Windows 8, Android
Languages - Python
Compiler
Browser – Chrome, Firefox, Opera, UC-Browser, etc.

Database Requirement

CSV

7. Conclusion

There are numerous technologies that are growing with the growth in the technical era. Prediction of weather has intensively got a rapid growth in the imminent technological era. Genetic algorithms play a vital role in classification techniques and it also plays a vital role in predicting the weather of a specific area or a country for a particular period of time. In this paper, we have proposed an efficient model of using a genetic algorithm for predicting the rainfall in a particular area well before to avoid the loss of lives and property

damage. The model proposed using genetic algorithm extracts the features from the given dataset. The proposed model is observed to perform better than any of the previously existing models. Future work could include the use of any security protocols for securing the entire system.

REFERENCES

[1] International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277- 3878, Volume-8, Issue-2S3, July 2019 Rainfall Prediction using Genetic Algorithm J.Refonaa, M. Lakshmi, R S S SrinivasaRao, P Eshwar Prasad.

[2] Proceedings of the International Conference on Electronics and Sustainable Communication Systems (ICESC 2020) IEEE Xplore Part Number: CFP20V66-ART; ISBN: 978-1-7281-4108-4 Rainfall Prediction Using Machine Learning Deep Learning Techniques by CMAK Zeelan Basha, Nagulla Bhavana, Ponduru Bhavya, Sowmya v]

[3] (ICACCS 2020) Machine Learning based Rainfall Prediction by R. Kingsy Grace1 and B. Suganya2] This paper proposes a rainfall prediction model using Multiple Linear Regression (MLR) for Indian dataset. The input data is having multiple meteorological and to predict the rainfall in more precise. The Mean Square Error (MSE), accuracy, correlation are the parameters used to validate the proposed mode.

[4] S. Accepted Manuscript Application of machine learning to an early warning system for very short-term heavy rainfall by Seung-Hyun Moon, Yong-Hyuk Kim, Yong Hee Lee, Byung-Ro Moon Please cite this article as: Moon, S-H., Kim, Y-H., Lee, Y.H., Moon, B-R., Application of machine learning to an early warning system for very short-term heavy rainfall, Journal of Hydrology (2018), doi: https://doi.org/10.1016/j.jhydrol.2018.11.060

[5] Paper Daily Rainfall Forecasting using an Ensemble Technique based on Singular Spectrum Analysis by Francesco Masulli, Daniela Baratta.