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Weather Prediction with Machine Learning

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Abstract

Background: On an everyday basis, weather forecasts are necessary for farmers to ensure crop yield and plan irrigationschedules by predicting heavy rainfall or droughts, temperature, etc. Since outdoor activities are severely curtailed by heavy rain, snow, and wind chill, forecasts can be used to plan activities around these events and to plan ahead and to copeup with them.

Objectives: In this paper, we discussed weather prediction as it is one of the greatest challenges for meteorological expertsand scientists. As they are dealing with a large number of datasets, that's why we are using the Random Forest algorithm because the RF method is very fast and effective in working with large datasets.

Methodology: We have used a random forest algorithm for the purpose of weather prediction. A random forest is a machine learning technique that's used to solve regression and classification problems. It utilizes ensemble learning, whichis a technique that combines many classifiers to provide solutions to complex problems. A random forest algorithm consists of many decision trees.

Results and discussion: As compared to other algorithms or models, Random forest machine learning forest results are more accurate because random forests consist of multiple single trees each based on a random sample of the training data, and due to this reason they are typically more accurate than single decision trees without hyper-parameter tuning. Thus, therandom forest machine algorithm produces precise prediction results where actual values of weather forecast are much closer to predicted values with 93% accuracy, and low error rates with 0.34 is Mean Square Error, 0.58 is Root Mean Square error.

Conclusions and future work: It was analyzed in the Random Forest algorithm with a dataset collected over a year. Theresults of the algorithm were pretty good. The result is well predictable since the result is based upon different trees by selecting parameters with high accuracy. It is highly recommended to use Random Forests over the Decision tree even when the volume of the dataset or the number of parameters increases. In the future, better predictions can be made to validate the result with a larger dataset of weather data.

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