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Predicting Crop Yields Using Machine Learning Algorithm

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A B S T R A C T

The agriculture sector plays a vital role in the growth of a country's economy. However, climate change and other natural disruptions have posed significant threats to the industry. To address this problem, machine learning (ML) has emerged as a promising approach to find effective solutions. One such solution is the Crop Yield Forecast, which involves predicting crop yield based on historical data, including weather and soil parameters. This paper focuses on predicting crop yield using the Random Forest algorithm based on existing data from Tamil Nadu. The models built were tested with samples to ensure accuracy. This prediction model can help farmers estimate crop yield before planting and prepare accordingly. The Random Forest algorithm, a popular and efficient supervised machine learning algorithm, was used to accurately forecast crop yield in the future.

Keywords: Agriculture, Economy, Climate Change, Natural Disruptions, Machine Learning, Crop Yield Forecast, Predicting Crop Yield, Historical Data, Weather Parameters, Soil Parameters, Random Forest Algorithm, Tamil Nadu, Accuracy, Farmers, Planting, Supervised Learning Algorithm.

1. Introduction

Agriculture is the foundation of every economy, and in a country like India, where the population is rapidly increasing, advancements in the agriculture sector are essential to meet the growing demand for food. Agriculture has been a part of India's culture for centuries, with people growing crops on their own land to meet their needs. The natural crops produced on the land have been consumed by humans, animals, and birds, contributing to a healthy and prosperous life. However, with the advent of modern technologies and processes, the agricultural sector is gradually deteriorating. People are now focused on developing hybrid and synthetic products instead of natural ones, leading to an unhealthy lifestyle. Moreover, due to a lack of awareness about proper crop cultivation techniques, people are unable to grow crops at the right time and in the right place, resulting in a changing climate and a strain on fundamental resources such as soil, water, and air, which can lead to food insecurity.

2. Literature Survey

Machine Learning (ML) is a discipline that addresses problems where the relationship between input and output variables is either unknown or difficult to establish. In ML, the term "learning" refers to the process of automatically learning a representation of the data from examples. One of the strengths of ML is its ability to model complex non-linear relationships, such as those found in Crop Yield Prediction (CYP). Supervised Learning, a popular ML approach in CYP, involves predicting an outcome variable from a set of independent variables. A function is learned from the independent variables that maps inputs to the desired outputs. The model is trained until it achieves a desirable level of accuracy on the training data. Regression, Decision Tree, Random Forest, KNN, and Logistic Regression are examples of Supervised Learning algorithms.

3. Proposed Work

The proposed work will be conducted using RStudio, a programming environment created by JJ Allaire, the creator of the ColdFusion programming language. The Chief Scientist at RStudio is Hadley Wickham. R is a widely used tool for statistics, data analysis, and machine learning. It is more than just a statistical package, as it also serves as a programming language that enables users to create their own objects, functions, and packages. R is platform-independent, which means it can be used on any operating system, and it is free. By using R, the steps of the analysis will be explicitly documented, making it easy to reproduce and update the analysis. This feature will enable us to quickly try out new ideas and correct any issues that arise.

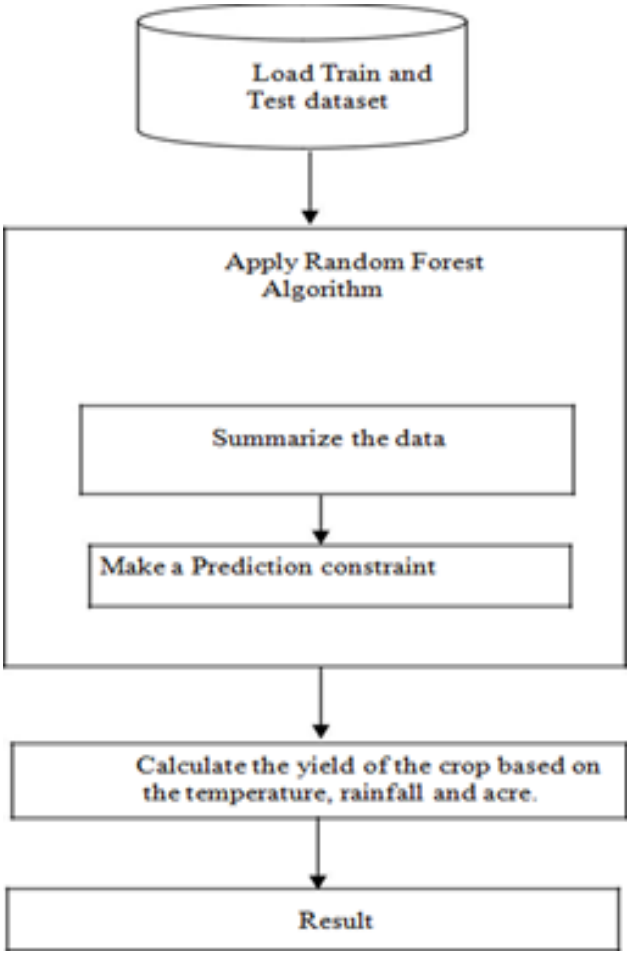

Figure 1.1

4. Results and Discussion

A C# language-based web software has been created on the .net platform, utilizing SQL Server 2008 as the backend. The homepage of the website, cropadvisor.in, displays information regarding the study's methodology, contact information for the administrator, registration for new users, and login for registered users. For registered users, a window is displayed showing that out of 20 years of data, the predictions for soybean in Dewas district were correct in 18 years and incorrect in two years, indicating a prediction accuracy of 90%. Similar analyses were carried out for other crops and districts, and the overall accuracy of the developed model was presented in Table 2.0. The web-based software predicted crop yields from input climatological parameters and showed that each crop was predominantly influenced by a specific climatic parameter. The average accuracy for a particular crop in different districts was determined and presented in Table 2.0, with the prediction accuracy ranging from 76% to 90% for the selected crops and districts. Based on these results, the overall prediction accuracy of the developed model was found to be 82%. With such high accuracy, the model can be used by policymakers to make informed decisions well in advance of the crop harvest.

S.No.	Name of the Crop	Average prediction accuracy, %
1	Soyabean	87
2	Paddy	85
3	Maize	76
4	Wheat	80

Figure 2.1

5. Conclusion

In conclusion, the results indicate that the Random Forest algorithm can be used to predict crop yield accurately. The algorithm produces a larger number of models with lower error rates, making it suitable for massive crop yield prediction in agricultural planning. This enables farmers to make informed decisions regarding the appropriate crop to grow, leading to the development of the agricultural sector through innovative ideas.

6. Future Enhancement

This paper describes crop yield prediction ability of the algorithm. In future we can determine the efficient algorithm based on their accuracy metrics that will helps to choose an efficient algorithm for crop yield prediction.

REFERENCES

Aditya Shastry, H.A Sanjayand E.Bhanushree,"Prediction of crop yield using Regression Technique", International Journal of computing12 (2):96-102 2017,ISSN:1816-9503

E. Manjula , S. Djodiltachoumy,"A Model for Prediction of Crop Yield", International Journal of Computational Intelligence and Informatics, Vol. 6: No. 4, March 2017

Mrs.K.R.Sri Preethaa, S.Nishanthini, D.SanthiyaK.VaniShree,"CropYield Prediction",International Journal On Engineering Technology and Sciences – IJETS™ISSN(P): 2349-3968, ISSN (O):2349-3976 Volume III,Issue III, March- 2016

Askar Choudhury, James Jones, "CROP YIELD PREDICTION USING TIME SERIESMODELS"

Jharna Majumdar, Sneha Naraseeyappa and Shilpa Ankalaki, "Analysis of agriculture data using datamining techniques: application of big data"Majumdar et al. J Big Data (2017) 4:20 DOI 10.1186/s40537