**Review on Crop Recommendation System**

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The paper [1] addresses the challenges faced by farmers in India, where a majority rely on agriculture as their occupation. The repeated cultivation of the same crops without considering soil conditions and the use of same fertilizers lead to reduced crop yields, soil acidification, and top-layer damage. To address these issues, the authors propose a system utilizing machine learning algorithms to help farmers in making informed decisions.

The system's primary objectives are to suggest the most suitable crop for a specific piece of land based on soil content and weather parameters, and to provide information on the required content and quantity of fertilizers, as well as the necessary seeds for cultivation. By incorporating machine learning algorithms such as Support Vector Machine (SVM) for rainfall prediction and Decision Tree for crop prediction, the system aims to enhance farmers' decision-making processes [1].

Precise Farming uses advanced technologies such as IOT, Data Mining, Data Analytics, Machine Learning to collect the data, train the systems and predict the results. With the help of technologies Precise farming helps to reduce manual labor and increase productivity. It guides an individual for smart farming [2].

The paper [2] uses 10 classification algorithms to find the best model for future prediction. These include Naïve Bayes, Logistic Regression, SVM, Decision Tree, Bagging Classifier, XG Boost Classifier, Random Forest Classifier, Ada Boost Classifier, LGBM Classifier, Gradient Boosting and KNN. The training and testing ratio was kept to be equal i.e. 50:50. Six algorithms obtained a score of more than 90%. The Random Forest model hyper tuned with Randomized CV was selected as the best model since its accuracy is 95.45%.

The paper [3] compares various supervised learning algorithms like KNN, Decision Tree, and Random Forest on the dataset containing 22 varieties of crops. It uses Decision Tree and Random Forest Classifier and evaluates the model's performance under two criterions- Entropy and Gini Index.

It concluded that the crop prediction dataset showed the best accuracy with Random Forest Classifier both in Entropy and Gini Criterion with 99.32%. In contrast, K-Nearest Neighbour with k = 5 has the lowest accuracy among the three with 97.04%, and the accuracy of Decision Tree Classifier is in between KNN and Random Forest Classifier. When comparing the accuracy value, Decision Tree Gini criterion gave a better accuracy of 98.86% compared to Decision Tree Entropy Criterion.

The paper [4] focuses on addressing the challenges faced in Sri Lanka, where despite having manual agricultural knowledge, there is a lack of automated systems to detect environmental factors and suggest optimal crops for cultivation.

It integrates various technologies, including Arduino microcontrollers for environmental data collection, machine learning techniques such as Naïve Bayes and Support Vector Machine. The automatic processing of environmental factors eliminates the need for specialist guidance and minimizes maintenance costs. With an accuracy exceeding 95%, the system is deemed suitable for Both rural and urban areas in Sri Lanka [4].

It uses parameters such as depth, texture, pH, soil colour, permeability, drainage, water holding, and erosion. The ensemble technique employed is Majority Voting, with base learners including Support Vector Machine, Naïve Bayes, Multi-layer Perceptron, and Random Forest.

**References**

The paper [5] begins by highlighting the crucial role agriculture plays in providing employment and income in rural areas. Despite its importance, the paper notes that the yield per hectare in India is lower than global standards. The authors identify reasons for the high suicide rate among marginal farmers and present their paper as a study offering a solution to address these issues.

The system involves connecting farmers through a smartphone app, utilizing GPS technology for user identification and location. Farmers specify the area and soil type, and machine learning algorithms, including Support Vector Machine (SVM), Artificial Neural Network (ANN), Random Forest (RF), Multivariate Linear Network (MLN), and a combination of regression and KNN, are employed to predict crop yields. The Random Forest algorithm demonstrated the highest accuracy at 95%. Additionally, the system recommends the use of chemical fertilizers to enhance output [5].

The paper [6] proposes an ensemble learning approach to enhance prediction accuracy.

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