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ASSISTANCE TO THE FARMER

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Abstract
Agriculture is one of the most important and lowest-paid professions in India. Machine learning can lead to agricultural prosperity by changing the income scenario by growing the best crops. Agriculture is the foundation of India and plays an important role in the Indian economy by providing some level of home-cooked food to ensure food security. In India, the horticulture industry contributes around 23% of the GDP and has a labor utilization rate of 59%. India is the second-largest producer of horticultural crops. Innovative connectivity can help farmers get more yields. Anyway, right now food production and expectations are running out due to unnatural climate change, which will negatively affect farmers' savings by getting unlucky yields, besides helping farmers to remain less visible as to what is in stock. work helps young farmers in this way by teaching AI to guide them in planting the right crops, one of the main innovations in crop forecasting. The main purpose of artificial intelligence is to train computers to use information or experiences to solve real-world problems. Therefore, we propose a framework using simulated intelligent strategies and calculations (such as linear regression, decision trees, and support vector machines) to predict collection yield, taking into account, plus recommendations, and different constraints set by the client, Creating alternative crops for more positive yields.
Keywords: crop yield prediction, long short-term memory (LSTM), simple RNN, SVM

Introduction

Agriculture is the backbone of the Indian economy as it plays an important role in the survival of every human and animal in India. It is one of the most important sectors of the global economy, and as the world's population grows, the demand for food is increasing rapidly [1]. The world population, estimated at 1.8 billion in 2009, is expected to grow to 4.9 billion by 2030, leading to a dramatic increase in demand for agricultural products.

In the future, human demand for agricultural products will increase, which requires efficient development of agricultural land and increased crop yields. At the same time, crops are often damaged by adverse weather conditions due to global warming. The ability to accurately predict crop yields can play a decisive role in the development of sustainable and efficient agriculture. Traditional crop yield forecasting methods rely on human observation and expert knowledge, which are often time-consuming and unreliable [2]. A single crop failure due to factors such as poor soil fertility, climate change, flooding, poor soil fertility, insufficient groundwater, etc. can destroy crops and, in turn, affect farmers.

In other countries, societies advise farmers to increase the yield of specific crops depending on the location of the area and environmental factors [3]. The population is growing at a significantly higher rate, so it is necessary to estimate and

monitor crop yields [4]. Therefore, a proper method should be devised to consider the impact characteristics of seasonal changes for better crop selection [5].

Agriculture is one of the most important sectors of the world economy, and as the world's population grows, so does the demand for food. The ability to accurately predict crop yields can play a decisive role in the development of sustainable and efficient agriculture.

Traditional crop yield forecasting methods rely on human observation and expert knowledge, which are often time consuming and unreliable. With the advent of machine learning (ML) technology, it is now possible to create models that can accurately predict crop yields using historical data. This

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project aims to develop crop yield prediction models using ML techniques. The model will be trained on large datasets of historical crop yields and weather conditions to ensure its accuracy and reliability

Related Work

1. Material and Methods:

Crop yield prediction is an essential task for the decision-makers at national and regional levels for rapid decision making. An accurate crop yield prediction model can help farmers to decide on what to grow. a crop yield prediction model that combines machine learning algorithms with data fusion techniques. The authors used a support vector regression algorithm and fused meteorological data, remote sensing data, and soil data to predict crop yield. The authors used a convolutional neural network to extract features from remote sensing data and achieved high accuracy in predicting crop yield. ML algorithms including decision tree, linear regression, naïve bayes, support vector machine (SVM), were used for multi-sensor data fusion and ensemble learning for grain yield prediction in wheat. A set of thirty wheat cultivars and breeding lines were grown under three irrigation treatments i.e., light, moderate and high irrigation treatments to evaluate the yield prediction capabilities of a low-cost multi-sensor (RGB, multi-spectral and thermal infrared) UAV platform. Multi-sensor data fusion-based yield prediction showed higher accuracy compared to individual-sensor data in each ML model. The coefficient of determination values for SVM, models regarding grain yield prediction were observed from 0.527 to 0.670. In order to perform accurate prediction and handle inconsistent trends in temperature and rainfall various machine learning algorithms like RNN, LSTM, etc can be applied to get a pattern. It will complement the agricultural growth in India and all together augment the ease of living for farmers. In past, many researchers have applied machine learning techniques to enhance agricultural growth of the country.

2. Algorithm

2.1 SVM Algorithm

"Support Vector Machine" (SVM) is a supervised learning machine learning algorithm that can be used for both classification or regression challenges. However, it is mostly used in classification problems, such as text classification.

x+b=0, where w is a vector normal to hyperplane and b, is an offset. If the value of w. x+b>0 then we can say it is a positive point otherwise it is a negative point. Now we need (w,b) such that the margin has a maximum distance.

For a linear SVM, the documentation tells me the formula is: **12wTw+Cl∑i=1ξi.**

2.2 DECISION TREE

Decision trees work by dividing input variables into subsets based on their values and recursively dividing the data into smaller subsets until a stopping condition is met. Each partition is based on the input variable that provides the greatest information gain, i.e. the reduction in entropy or impurity of the data. In crop yield forecasting, decision trees can be used to identify the environmental factors that have the greatest impact on crop yield and how they interact. Decision trees have several advantages in predicting crop yield. It can handle both categorical and continuous input variables, can handle missing values, and can automatically identify interactions between input variables.

Additionally, decision trees are interpretable and the structure of the tree provides insight into the relationship between input variables and output variables. Overall, decision trees are a powerful and interpretable machine learning algorithm for crop yield prediction. It can handle both categorical and continuous input variables and can identify interactions between input variables.

2.3 NAÏVE BAYES

Naive Bayes is a probabilistic ML algorithm that can be used to predict crop yield. Naive Bayes is based on Bayes' theorem and assumes that the input variables are independent of each other, a

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simplifying assumption that makes the algorithm more computationally efficient. Naive Bayes uses Bayes' theorem and assumes independence between input variables to calculate the probability of an output variable given the input variables. One of the strengths of Naive Bayes is its speed and efficiency, which makes it suitable for large datasets with many input variables. Additionally, Naive Bayes can handle both categorical and continuous input variables, and can also handle missing values. Naive Bayes has been successfully used for crop yield prediction. For example, a study by M.T. Saleem et al. Prediction of Pakistani wheat crop yield using Naive Bayes. The study found that Naive Bayes was good at predicting wheat crop yields with 95% accuracy. Naive Bayes is a fast and efficient machine-learning algorithm for crop yield prediction. It can handle both categories and continuous input variables and can handle missing values. However, it assumes the independence between input variables, which may not always be the case in practice, and assumes that the input variables are normally distributed.

$$P(A \mid B) = \frac{P(B \mid A)P(A)}{P(B)}$$

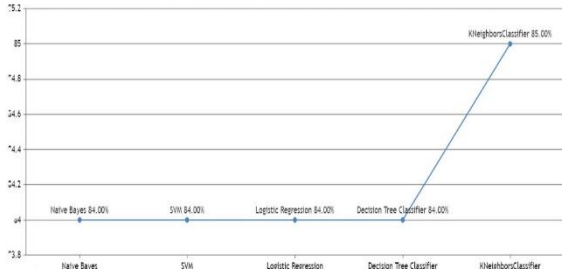
Posterior, Likelihood, Prior, Normalizing constant

$$P(B) = \sum_{Y} P(B \mid A)P(A)$$

4. Result:

In order to establish a baseline for comparison with the proposed SVM and decision tree, naïve bayes this research also implemented several well-known classifiers, including linear regression, decision tree, SVM, along with the traditional AdaBoost presented in Algorithm. Both the complete and reduced feature sets were used to train the classifiers, in order to demonstrate the impact of feature selection.

Table 2: Performance of the Classifiers without Feature Selection



5. Conclusion:

In this paper, a new method was suggested to improve the prediction of crops and alternative crops using machine learning. The proposed method uses a combination of information gain-based feature selection and a cost-sensitive SVM and Decision tree than Naïve Bayes. The algorithms compared the performance of this new method with six other machine learning classifiers, including linear regression, decision tree, naïve bayes, SVM. The new method first used a technique called information gain (IG) to find out which attributes were most important in the Prediction of the best crops. Then, the machine learning classifiers were trained using both the important and all the available attributes. The results showed that using the important attributes improved the performance of the classifiers. This new method proposed in this research paper can help improve the accuracy of the prediction of best crops and alternative crops.

6. References:

1. R. Ghadge, J. Kulkarni, P. More, S. Nene, and R. L. Priya, "Prediction of crop yield using machine learning," Int. Res. J. Eng. Technology, vol. 5, 2018.
2. F. H. Tseng, H. H.Cho, and H. T. Wu, "Applying big data for intelligent agriculture-based crop selection analysis," IEEE Access, vol. 7, pp. 116965-116974, 2019.

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3. A. Suresh, N. Manjunathan, P. Rajesh, and E. Thangadurai, "Crop Yield Prediction Using Linear Support Vector Machine," European Journal of Molecular & Clinical Medicine, vol. 7, no. 6, pp. 2189- 2195, 2020.
4. M. Alagurajan, and C. Vijayakumaran, "ML Methods for Crop Yield Prediction and Estimation: An Exploration," International Journal of Engineering and Advanced Technology, vol. 9 no. 3, 2020.
5. P. Kumari, S. Rathore, A. Kalamkar, and T. Kambale, "Predicition of Crop Yeild Using SVM Approch with the Facility of E-MART
System" Easychair 2020.
6. S. D. Kumar, S. Esakkirajan, S. Bama, and B. Keerthiveena, "A microcontroller-based machine vision approach for tomato grading and sorting using SVM classifier," Microprocessors and Microsystems, vol. 76, pp.103090, 2020.
7. P. Tiwari, and P. Shukla, "Crop yield prediction by modified convolutional neural network and geographical indexes," International Journal of Computer Sciences and Engineering, vol. 6, no. 8, pp. 503513, 2018.
8. P. Sivanandhini, and J. Prakash, "Crop Yield Prediction Analysis using Feed Forward and Recurrent Neural Network," International Journal of Innovative Science and Research Technology, vol. 5, no. 5, pp. 1092-1096, 2020.
9. N. Nandhini, and J. G. Shankar, "Prediction of crop growth using machine learning based on seed," Ictact journal on soft computing, vol. 11, no. 01, 2020.
10. A. A. Alif, I. F. Shukanya, and T. N. Afee, "Crop prediction based on geographical and climatic data using machine learning and deep learning", Doctoral dissertation, BRAC University) 2018.