

AGRICULTURE CROP SELECTION AND YIELD PREDICTION

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Abstract— Agriculture is a place that performs a vital role in improving the country's financial system. Agriculture is what has contributed to human improvement. India is an agricultural united states and its economy relies upon specially on fruit plants. Agriculture is the core of the whole lot in our united states. Crop selection is essential in agricultural organization. The dedication of the yield may be based on various factors, along with market fee, production stages and the state's very own regulations. Many agricultural reforms are necessary to enhance our Indian financial system. Improvements in agriculture may be carried out the usage of device studying techniques which can be efficiently carried out to agriculture. Along with all of the things in the discipline of machines and innovations used in agriculture, precious and correct statistics on numerous issues also plays a massive function in it. The purpose of the system is to put into effect a regressor tree judgment, a random woodland, yield dedication technique, in order that this decision facilitates to solve many troubles of agriculture and farmers. This is improving our Indian economy to yield extra plants.

Keywords: Agriculture, Plants, production, Crop Selection, Yield Prediction, Decision Tree, Random Forest Algorithm.

I. INTRODUCTION

Agriculture in India has a long history. Recently, India has been ranked second in the international in terms of agricultural manufacturing. Agriculture-associated industries which include forestry and fishing accounted for sixteen.6% of GDP in 2009 and about 50% of the overall team of workers. The monetary contribution of agriculture to India's GDP is declining. Crop yields are a critical source of earnings in agriculture. Yields rely upon numerous factors, such as climatic, geographical, natural and financial elements. It is tough for farmers to determine while and what vegetation to plant because of the uncertain costs. As Wikipedia notes, India's demise rate has risen from 1.4 to one. Eight% in step with 100,000 human beings over 10 years. Due to the uncertainty of climatic conditions, farmers do not recognize what vegetation to grow, when and where to start. The use of various fertilizers is also unsure due to modifications in seasonal climatic conditions and fundamental assets which include soil, water and air. Under this sort of situation, crop yields are steadily declining. The strategy to the farmer's trouble is a clever and person-pleasant advice device. Predicting yield is a main problem within the agricultural quarter. Each farmer strives to yield and whether or not it meets his expectancies, primarily based at the farmer's reveal in in a specific crop, predicting the yield. Agricultural productivity depends broadly speaking at the weather, pests and preparation for harvesting. Accurate facts on crop records are essential to agricultural threat control decisions. In this text we've proposed a model to solve those troubles. The novelty of the proposed gadget is to assist farmers maximize yields and also provide the most efficient crop for a selected region. The proposed version provides a preference of crops in economic and environmental conditions, in addition to the manufacturing of the largest plants, in an effort to later assist to growth the united states's call for for food. The proposed model predicts yields by using searching at elements inclusive of rainfall, temperature, location, season, soil type, and many others. The device also facilitates determine the first-class time for fertility. The modern gadget, which indicates yielding, is both hardware based, luxurious to preserve, or hard to achieve.

II. LITERATURE REVIEW

Data Mining Review for Fertilizer Recommendations, 2018

Steps to maintain soil vitamins in case of deficiency, soil fertilizers are brought. A general hassle amongst Indian agronomists is to pick the nearest deliver of fertilizer and upload it manually. Too an awful lot or too little fertilizer can damage vegetation and reduce yields. This paper presents a top-level view of the various mining strategies used in making ready soil datasets for fertilizer guidelines.

Overview of non-mining agricultural methods, 2017 Agriculture is the maximum vital software, in particular in growing countries like India. The use of data generation in agriculture can make a distinction in choice making and farmers can increase their productivity. Data mining performs an important role in the selection making of diverse aspects inside the subject of agriculture. It examines the function of records mining in the area of agriculture and discusses the work of numerous authors within the discipline of agriculture. In addition, he talks approximately the numerous applications of facts mining in solving numerous agricultural issues. This report consolidates the paintings of several authors into one region, so it will likely be useful for experts to achieve facts on the contemporary nation of records mining and packages in the context of the rural discipline.

AgroNutri Android software, 2016

This article mentioned the concept of making AgroNutri as an Android application that enables proportion records approximately

the harvest and the number of fertilizers carried out. The idea is to calculate the applied amount of NPK compounds based totally at the clean supply of the crop of hobby. This utility works based on the work performed by using the farmer, that is taken as an input, which the farmer presents. The future intention of Agro Nutri is if you want to offer GPRS nutrition on website. In addition, this application will be protected as an detail of specific agriculture, wherein sensors may be used to determine the quantity of NPK gift in the soil, and this quantity may be deduced from the offers and offers us an correct measure of the components. Which need to be introduced.

Machine Learning: Applications in Indian Agriculture, 2016

It is a rural location that lacks the adaptation of era and achievements. Indian farmers must align with the usual agenda. Machine getting to know is a native concept that can be implemented to any subject in all inputs and outputs. It has effectively progressed its skills as compared to software programs and software measures. Machine mastering algorithms have advanced the accuracy of artificial intelligence machines, which includes sensor systems used in precision agriculture. This article evaluates various use instances for gadget learning in agriculture. It additionally presents a perception into the disadvantages confronted by Indian farmers and how those may be addressed thru these guidelines.

The impact of population boom, monetary improvement and technological change on worldwide food manufacturing and consumption, 2015

Over the following few many years, humanity will call for extra meals at the cost of less land and water. This looks at assesses the impact on meals manufacturing of four scenarios selected from the Millennium Ecosystem Assessment and the Special Report on Emissions Scenarios. Effects on land and water assets because of human development and precise modifications are taken into consideration in part and at the same time, at the same time as woodland and agricultural adjustments require improved human development and economic system. The impact of income on nutritional needs is recorded the usage of dynamic flexibilities. The region of agricultural land is expected to growth by means of 14% among 2010 and 2030. Restrictions on deforestation have a sturdy impact on land and water charges, but little impact on global meals manufacturing and meals fees. Since projected changes in earnings have the most important partial effect on consistent with capita food consumption, population growth ends in the highest growth in general meals production. The effect of technical exchange is accelerated or mitigated by using adjusting the depth of land management.

III. SYSTEM ANALYSIS

Proposed System

The proposed induction system will assist farmers to choose a suitable crop that yields a higher yield, as well as improve the us in agricultural technology. In addition, it can be used to reduce losses by means of farmers and growth yields to boom agricultural capital. The proposed device will therefore help to lessen the issues confronted by way of farmers and prevent their suicide attempts, and will also act as an aid to provide farmers with the effective data they want to reap high yields, thereby maximizing yields, which therefore reduce their demise. Rate and reduce problems. The yield can be stepped forward via tracking the productivity of various vegetation, which facilitates to maximize the yield, in addition to the right crop of decided on fields and selected seasons, which solves the problems of farmers inside the agricultural area. Therefore, the proposed system offers a method for predicting crop yields. A farmer will control the crop yield per acre earlier than cultivating the sphere to supply a better yield.

Advantages of Proposed System

- Useful for individuals who are far from cities.
- Improving the performance of time use. The decline is slow.
- Safe and effective device.
- This application is inside the discipline of agriculture, in order that we are able to pick out the right crops, after which it predicts the selected crops and the circumstance of the fee, etc.

IV. SYSTEM DESIGN

System Architecture

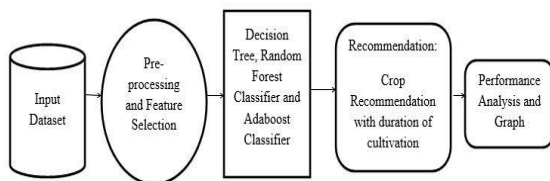


Fig. Agriculture Crop Selection and Yield Prediction

V. METHODOLOGY

Decision Tree

A decision tree is a graphical representation of all possible solutions to a problem or decision given certain conditions. It is a tree-structured classifier in which internal nodes represent dataset features, each leaf node represents the outcome, while the branches represent the decision rules.

The decision tree algorithm has several advantages, including being simple to understand and interpret, dealing with both numerical and categorical data, and handling missing values. However, if the tree is too complex or there is insufficient data, it may suffer from overfitting. To avoid overfitting, techniques such as pruning and limiting tree depth are frequently used.

Random Forest Algorithm

Random Forest is a powerful machine learning algorithm that is widely used for classification and regression tasks. It is an ensemble learning method that combines multiple decision trees to make predictions. Random Forest works by creating multiple decision trees on random subsets of the training data, using a subset of the features at each split. This process helps to reduce overfitting and improves the generalization ability of the model. Once the trees are built, the algorithm aggregates the predictions of all trees to make a final prediction. Random Forest is a powerful machine learning algorithm that is widely used for classification and regression tasks. It is an ensemble learning method that combines multiple decision trees to make predictions. Random Forest works by creating multiple decision trees on random subsets of the training data, using a subset of the features at each split. This process helps to reduce overfitting and improves the generalization ability of the model. Once the trees are built, the algorithm aggregates the predictions of all trees to make a final prediction.

Random Forest is a popular ensemble learning algorithm that combines multiple decision trees to produce a more accurate and stable model. The algorithm randomly samples the data and features for each tree and aggregates the predictions of the individual trees to produce the final prediction.

Data Pre-processing

- This is the first actual step to the real improvement of a machine learning model, statistics series. This is a crucial step that determines how proper the model will be.
- The more and more facts we get, the higher our model will carry out.
- There are numerous techniques of data collection including textual content feeding, manual intervention, and so forth.
- The dataset used in this Indian crop forecast is from every other source.
- Data series is the technique of accumulating and measuring facts about the variables of hobby in a scientific manner that allows you to answer questions, check hypotheses and compare results.
- Data series is a part of studies common to all regions of have a look at, inclusive of physical and social sciences, humanities, enterprise, etc. Although strategies vary throughout disciplines, the emphasis on accurate and sincere series remains the identical.

Calculate Yield of Production

In this task, the price of the harvest is calculated from the fine of the harvest, decided by way of the order. With this process, the minimum and most yield is stated.

The significance of crop manufacturing is in comparison to the place harvested, the earnings consistent with hectare and the amount of production of the product. Crop yields yield in line with unit place harvested for harvest production.

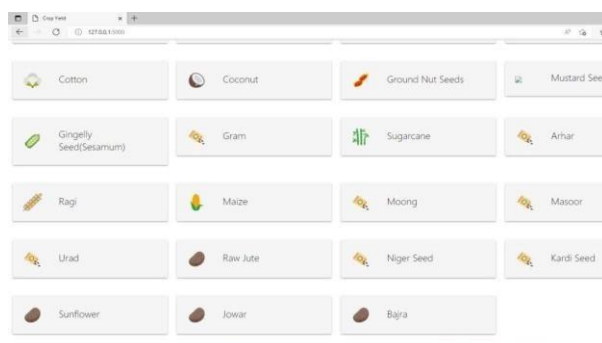
Predict Crop Value

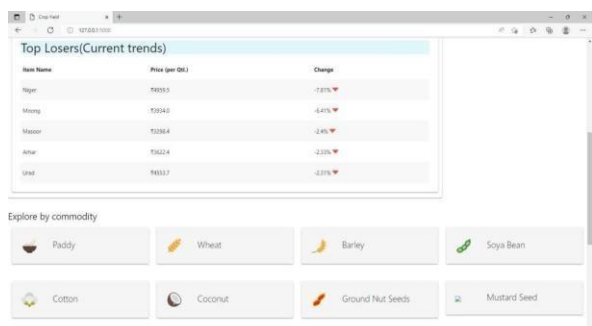
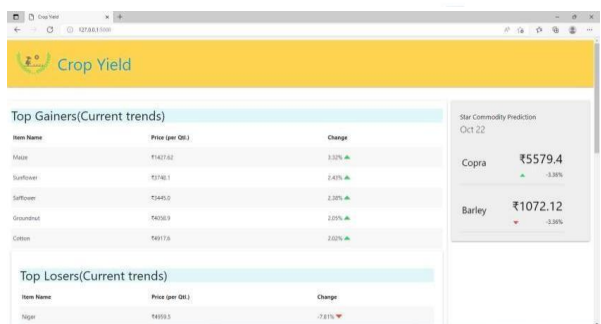
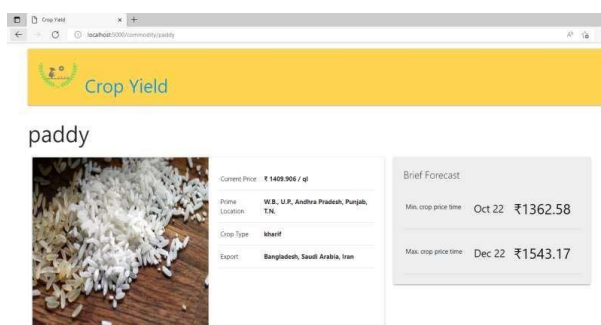
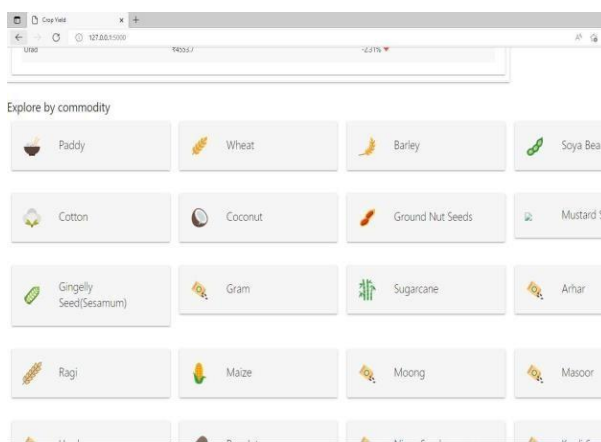
In this module, crop values are predicted by using applying system learning algorithms to the accrued and trained statistics. So that we can find the minimal and most yield fee for any area, ie. Based totally on enter.

Accuracy on Test Set

We got an accuracy of 90.7% on test set.

Screenshots





CONCLUSION

Finally, decision tree and random forest algorithms are effective tools for crop selection and yield prediction in agriculture. These algorithms can analyse massive amounts of data and make accurate predictions based on variables such as weather, soil type, and crop variety. The decision tree algorithm is useful for identifying the most important factors influencing crop yield, whereas the random forest algorithm is useful for predicting crop yields based on multiple variables. The use of these algorithms in agriculture can boost crop productivity, reduce resource waste, and increase farmer profits. We can expect decision tree and random forest algorithms to play an increasingly important role in agriculture and other fields as technology advances.

FUTURE SCOPE

These algorithms can be improved in the future by incorporating more data sources, such as satellite imagery, drone data, and IoT sensors. Furthermore, using machine learning models in precision agriculture can assist farmers in making real-time decisions and optimising crop yields. Overall, the future prospects for Agriculture Crop Selection and Yield Prediction using Decision Tree and Random Forest algorithms are vast and promising, and these algorithms will continue to play an important role in transforming the agricultural sector.

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