PROJECT REPORT

CROP RECOMMENDATION SYSTEM

Crop Recommendation System for agriculture is based on various input parameters. This proposes a hybrid model for recommending crops to south Indian states by considering various attributes such as soil type, Rainfall, Groundwater level, Temperature, Fertilizers, Pesticides and season.

The recommender model is built as a hybrid model using the classifier machine learning algorithm. Based on the appropriate parameters, the system will recommend the crop.

Technology based crop recommendation system for agriculture helps thefarmers to increase the crop yield by recommending a suitable crop for their land with the help of geographic and the climatic parameters.

The proposed hybrid recommender model is found to be effective in recommending a suitable crop. Crop yield production value updation has a positive practical significance for guiding agricultural production and fornotifying the change in market rate of crop to the farmer.

The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production. Different types of land condition. So the quality of the crops are identified using ranking process. By this process the rate of the low quality and high quality crop is also notified.

The usage of ensemble of classifiers paves a path way to make a better decision on predictions due to the usage of multiple classifiers. Further, a ranking process is applied for decision making in order to select the classifiersresults. This system is used to predict the cost of crop which is yielded for further.

AIM AND SCOPE OF THE PRESENT INVESTIGATION

Aim:

Our Aim from the project is to make a ML model which takes student data trains itself using various Machine Learning techniques and Algorithms(Random Forest, Decision Tree) and predict the yield and best fertilizer that suits for the crops in virtual environment by considering the overall factors that contribute in his overall yield.
Secondly, to learn the required tech stacks and use it to make model with an python application and lastly to execute it get output about yield and best fertilizerfor the crop.

Scope:

This Project can be used to get the student performance with more accuracy thanany other model published earlier and we can also make some mobile or web application based on the model.

PROPOSED SYSTEM

In proposed system, the data analysis technology is used to update the crop yield rate change. The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production. Different types of land condition. So the quality of the crops are identified using ranking process. By this process the rate of the low quality and high quality crop is also intimated. The usage of ensemble of classifiers paves a path way to make a better decision on predictions due to the usage of multiple classifiers. Further, a ranking process is applied for decision making in order to select the classifiers results. This system is used to predict the cost of the fertilizers for further. This project uses Ensemble of classifiers such as Decision tree and Random forest classifier. In addition, this project uses Ranking technique.

ADVANTAGES OF PROPOSED SYSTEM

- **Increased Yield and Productivity:** Crop recommendation systems analyze various factors such as soil type, climate, weather conditions, and historical data to suggest the most suitable crops for a particular region. This can lead to higher yields and increased agricultural productivity.
- **Optimized Resource Allocation:** By recommending crops based on local conditions, these systems help farmers allocate resources such as water, fertilizers, and pesticides more efficiently. This reduces wastage and promotes sustainable agricultural practices.
- **Risk Mitigation:** Crop recommendation systems take into account weather patterns and climate data, allowing farmers to choose crops that are more resilient to adverse conditions such as droughts, floods, or extreme temperatures. This helps in minimizing risks associated with crop failure.
- **Improved Profitability**: When farmers grow crops that are well-suited to their environment, they are more likely to have successful harvests. This leads to increased income and improved profitability for farmers.
- **Enhanced Soil Health**: Crop recommendations take into account soil properties and nutrient levels. Growing crops that are appropriate for the soil type can improve soil health over time and reduce the need for excessive fertilization.
- **Time and Labor Savings:** With accurate crop recommendations, farmers can save time and effort by focusing on crops that are more likely to thrive in their specific environment. This can also lead to reduced labor costs.

EXPERIMENTAL OR MATERIALS AND METHODS;ALGORITHAMS USED.

RANDOM FOREST ALGORITHAM:

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML. It is based on the concept of ensemble learning**,** which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model.

As the name suggests, **"**Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset."

Instead of relying on one decision tree, the random forest takes the predictionfrom each tree and based on the majority votes of predictions, and it predicts the final output.

The greater number of trees in the forest leads to higher accuracy and preventsthe problem of over fitting.

Random Forest works in two-phase first is to create the random forest by combining N decision tree, and second is to make predictions for each tree created in the first phase.

The Working process can be explained in the below steps:

Step-1: Select random K data points from the training set.

Step-2: Build the decision trees associated with the selected data points.

Step-3: Choose the number N for decision trees that you want to build.

Step-4: Repeat Step 1 & 2.

Step-5: For new data points, find the predictions of each decision tree, and assign the new data points to the category that wins the majority votes.

DECISION TREE:

Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome**.**
In a Decision tree, there are two nodes, which are the **Decision Node** and **Leaf Node.**

Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches.

The decisions or the test are performed on the basis of features of the given dataset. It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions.

It is called a decision tree because, similar to a tree, it starts with the root node, which expands on further branches and constructs a tree-like structure.

In order to build a tree, we use the CART algorithm**,** which stands for Classificationand Regression Tree algorithm**.**

A decision tree simply asks a question, and based on the answer (Yes/No), it further split the tree into subtrees.

The complete process can be better understood using the below algorithm:

Step-1: Begin the tree with the root node, says S, which contains the complete dataset.

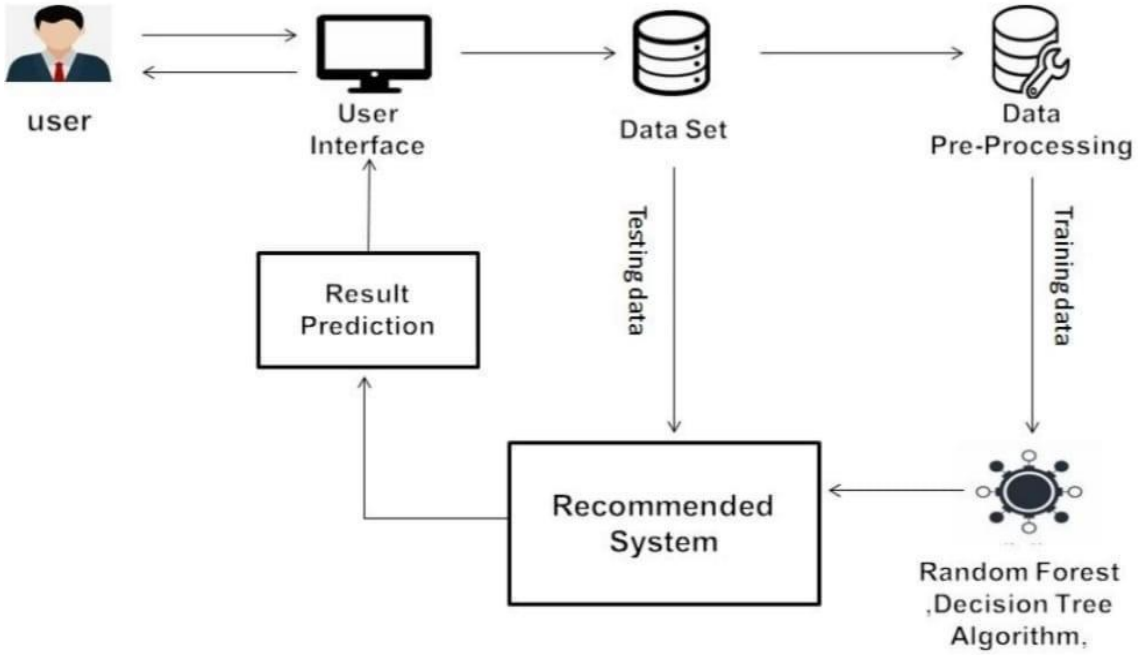
Step-2: Find the best attribute in the dataset using Attribute Selection Measure (ASM).

Step-3: Divide the S into subsets that contains possible values for the best attributes.

Step-4: Generate the decision tree node, which contains the best attribute.

Step-5: Recursively make new decision trees using the subsets of the dataset created in step -3. Continue this process until a stage is reached where youcannot further classify the nodes and called the final node as a leaf node.

SYSTEM ARCHITECTURE:



SYSTEM REQUIREMENTS:

HARDWARE REQUIREMENTS:

- System: Pentium Dual Core.
- Hard Disk: 40 GB.
- Monitor: 15’ LED
- Ram: 4 GB

SOFTWARE REQUIREMENTS:

- **Operating system: Windows 7/10.**
- **Coding Language: Python.**

SOFTWARE ENVIRONMENT

Python:

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

- **Python is Interpreted** − Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similarto PERL and PHP.

- **Python is Interactive** − You can actually sit at a Python prompt andinteract with the interpreter directly to write your programs.

- **Python is Object-Oriented** − Python supports Object-Oriented style or technique of programming that encapsulates code within objects.

Python is a Beginner's Language − Python is a great language for the beginner-level programmers and supports the development of a wide rangeof applications from simple text processing to WWW browsers to games.

Python Features:

Python's features include −

- **Easy-to-learn** − Python has few keywords, simple structure, and a clearly defined syntax. This allows the student to pick up the language quickly.

- **Easy-to-read** − Python code is more clearly defined and visible to the eyes.

- **Easy-to-maintain** − Python's source code is fairly easy-to-maintain.

- **A broad standard library** − Python's bulk of the library is very portable andcross-platform compatible on UNIX, Windows, and Macintosh.

- **Interactive Mode** − Python has support for an interactive mode which allows interactive testing and debugging of snippets of code.

OBJECTIVE

- Data set collection from various sources.
- Data parsing and cleansing technique is applied to make the raw data into processing data.
- The data collected is subject to machine learning system along with run time analysis makes an efficient crop value updation system.
- Usage of Ensemble of classifiers makes the model more robust and efficient.
- Ranking technique used in the project helps us to make efficient decisions.
- Creating a web application for user and collection of data.
- The main objective is to obtain a better variety of crops that can be grown over the season. The proposed system would help to minimize the difficulties faced by farmers in choosing a crop and maximize the yield.
- The model predicts the crop yield by studying factors such as Nitro

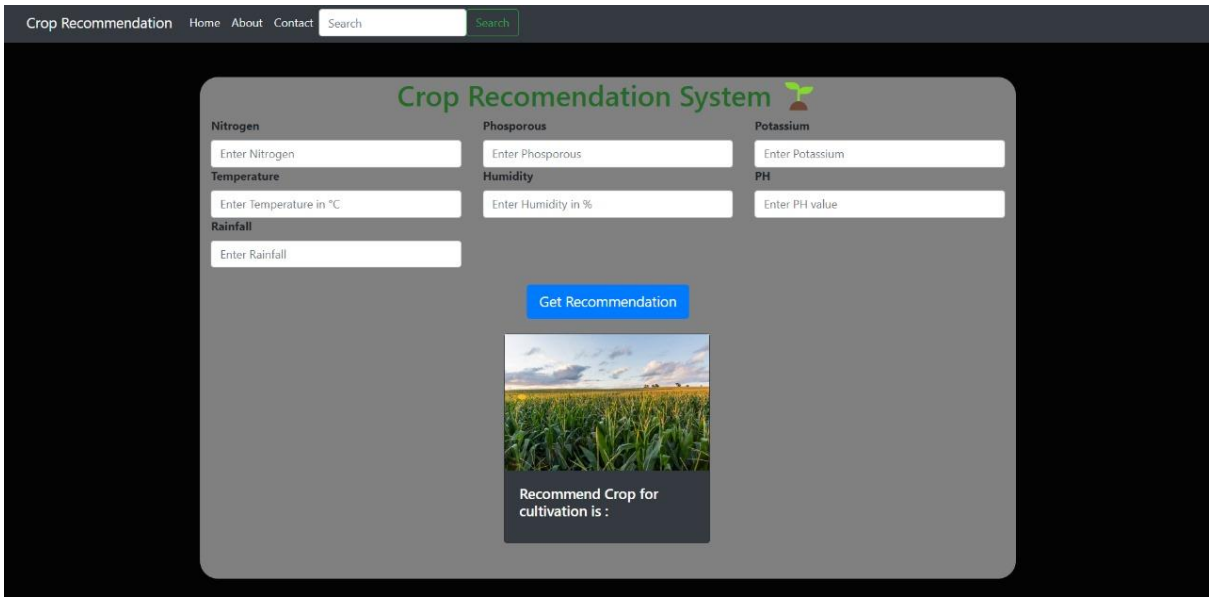
DATA USED :

	N	P	K	temperature	humidity	ph	rainfall	label
0	90	42	43	20.879744	82.002744	6.502985	202.935536	rice
1	85	58	41	21.770462	80.319644	7.038096	226.655537	rice
2	60	55	44	23.004459	82.320763	7.840207	263.964248	rice
3	74	35	40	26.491096	80.158363	6.980401	242.864034	rice
4	78	42	42	20.130175	81.604873	7.628473	262.717340	rice

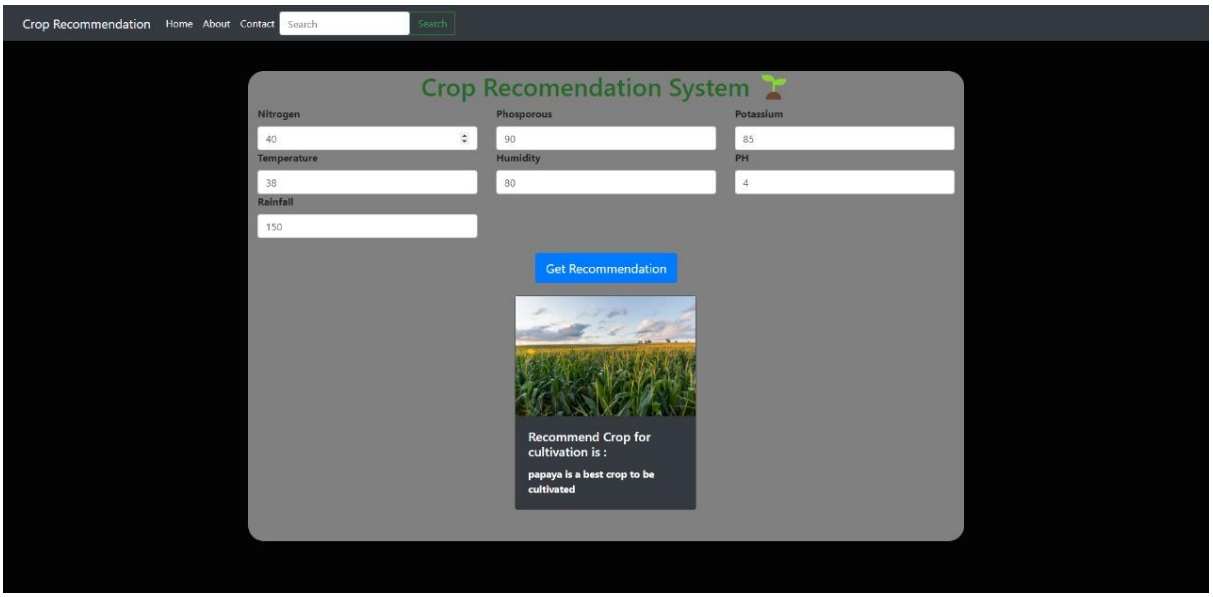
RESULTS AND DISCUSSIONS

In this project the data analysis technology is used to update the rate changethrough notification. Further, a ranking process is applied for decision making in order to select the classifiers results. This system is used to predict the costof the crop yield.

SCREENSHOTS:



RESULT:



CONCLUSION

This open attitude determines the degree and scope of information sharing. Bigdata analysis technology can effectively improve the crop yield production is updation. This project proposes a novel intelligent system for agricultural crop price prediction. The key idea is to use ensemble of classifiers for prediction. The usage of ensemble of classifiers paves a path way to make a better decision on predictions due to the usage of multiple classifiers. Further, a ranking process is applied for decision making in order to select the classifiers results. This system is used to predict the cost of the crop rate for further.

The solution will benefit farmers to maximize productivity in agriculture, reduce soil degradation in cultivated fields, and reduce fertilizer use in crop production by recommending the right crop by considering various attributes.

This would provide a comprehensive prediction on the basis of geographical, environmental and economic aspects.