“Intelligent Crop Recommendation System”

by Aditi Singh

A PROJECT REPORT

on

"Intelligent Crop Recommendation System"

Submitted to

KIIT Deemed to be University

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
INFORMATION TECHNOLOGY

BY

CHANDRIKA PAPNEJA	20051001
DEBASHREE CHAKRABORTY	20051139
ADITI SINGH	20051629

UNDER THE GUIDANCE OF
DR. AMBIKA PRASAD MISHRA

SCHOOL OF COMPUTER ENGINEERING
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
BHUBANESWAR, ODISHA - 751024

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School of Computer Engineering

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CERTIFICATE

This is certify that the project entitled

“INTELLIGENT CROP RECOMMENDATION SYSTEM”

submitted by

CHANDRIKA PAPNEJA	20051001
DEBASHREE CHAKRABORTY	20051139
ADTI SINGH	20051629

is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering OR Information Technology) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2022-2023, under our guidance.

Date: 05/05/2024

(Guide Name)

DR. AMBIKA PRASAD MISHRA

Acknowledgements

We are profoundly grateful to **DR. AMBIKA PRASAD MISHRA** of **KIIT UNIVERSITY** for his expert guidance and continuous encouragement throughout to see that this project rights its target since its commencement to its completion. His suggestions have helped us to overcome many challenges during this project and helped us to achieve desired output.

CHANDRIKA PAPNEJA
DEBASHREE CHARABORTY
ADITI SINGH

ABSTRACT

The agriculture industry is one of the mainstays of the Indian economy and contributes significantly to the country's GDP. However, the farming community faces several challenges that hinder growth, including the lack of access to modern technology and accurate information about soil conditions. To overcome these challenges, our project focused on developing a crop recommendation system that takes into account various soil parameters important for agriculture.

Our project aimed to provide farmers with recommendations for crops that are well-suited for their particular region based on the unique soil characteristics. The system considers different parameters such as soil texture, pH level, nutrient content, and moisture levels to make personalized recommendations. By analyzing the soil features of four different regions in India. We were able to develop a comprehensive dataset of crop recommendations that can help farmers increase yield and profitability.

The significance of this project lies in its potential to revolutionize the agriculture industry by providing farmers with easy access to information about different crops and soil characteristics in their region. With the help of our crop recommendation system, farmers can make informed decisions about what crops to grow and how to optimize their yields. This solution has the potential to improve the overall efficiency of the agriculture sector in India and promote sustainable farming practices.

Our project also aimed to address the issue of misinformation related to agriculture. By educating farmers about the latest developments in the field of modern agriculture, we hope to inspire them to adopt new and innovative practices that will lead to higher productivity and better outcomes. Overall, our project has immense potential to benefit the agro-based economy of India and transform the lives of millions of farmers across the country.

Keywords: Soil characteristics, Agricultural Sector, Farmers educated, Increased Crop Yield, Crop Recommendation.

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Chapter 1

Introduction

Agriculture has been the lifeblood of India for centuries, providing sustenance to millions of people across the country. Today, agriculture remains the backbone of India's economy, contributing significantly to its GDP and employing more than half of the country's workforce. Despite its importance, Indian agriculture faces a range of challenges that have hindered its growth and productivity.

One of the most significant challenges is the lack of access to timely and accurate information about crop selection and management practices. Farmers often make decisions based on traditional knowledge or anecdotal evidence, which can result in suboptimal yields and reduced profitability. Additionally, farmers may lack the resources or infrastructure necessary to test soil quality, monitor weather patterns, or access market data, further limiting their ability to make informed decisions.

To address these challenges, we have developed a revolutionary crop recommendation system that leverages the power of Machine Learning(ML) to provide personalized recommendations to farmers. Our system analyzes a range of data sources, including weather patterns, soil quality, and historical crop yields, to provide tailored advice on crop selection, planting times, fertilization, irrigation, and pest management.

With our crop recommendation system, farmers can make informed decisions about crop selection and management, increasing their productivity, reducing costs, and improving their profitability. By leveraging the latest advances in AI technology, we believe that our system has the potential to revolutionize agriculture in India and help millions of farmers achieve greater success and prosperity.section must discuss the current need of the project and details about the gaps present in current available solutions.

Figure 1.1: Crop growth depends on soil texture

Chapter 2

Basic Concepts/ Literature Review

A crop recommendation system is an intelligent software system that helps farmers make informed decisions about which crops to plant based on a variety of factors such as climate, soil type, and market demand. A new crop recommendation system that utilizes machine learning algorithms and dataset of the four states in India.

In Crop recommendation using Random Forest Classifier based on soil dataset collected of N, P, K, pH, humidity,temperature is a promising area of research that has gained significant attention in recent times. The goal of this project is to develop an intelligent crop recommendation system that can provide accurate recommendations for the best crop suited for a particular region based on soil characteristics.

2.1)Necessary tools and techniques:

The following are some additional details related to the tools and techniques used in this project:

- **Random Forest Classifier:** The Random Forest Classifier algorithm is one of the most popular machine learning algorithms used for classification tasks. It works by building multiple decision trees on randomly selected subsets of the data and aggregating their predictions to obtain a final prediction.

- **Soil Sampling Techniques:** Soil sampling techniques such as grid sampling, transect sampling, and zone sampling are used to collect representative soil samples from different locations in a region. These samples are then analyzed in the laboratory to determine the soil properties such as N, P, K, pH, and humidity.

- **Data Preprocessing Techniques:** Data preprocessing techniques such as data cleaning, normalization, and feature selection are used to prepare the soil dataset for analysis by the Random Forest Classifier algorithm.

- **Feature Importance:** The Random Forest Classifier algorithm provides a feature importance score for each variable used in the model, which helps identify the most relevant features for predicting the best crop suited for a particular region.

Chapter 3

Problem Statement / Requirement Specifications

The need for crop recommendation arises due to increasing population, climate change, soil degradation, limited resources, and variability in crop performance. With the global population increasing, there is a growing demand for food production, which crop recommendation can help optimize. Climate change has made it difficult to predict weather patterns, and crop recommendation takes into consideration current weather data to suggest crops suitable for prevailing conditions.

3.1 Project Planning

- Identify the specific crops that will be recommended based on factors such as climate, soil type and other environmental conditions.

- Determine the data sources needed to provide relevant information for the recommendation process, such as satellite imagery, weather records, soil reports and crop yields from past years.

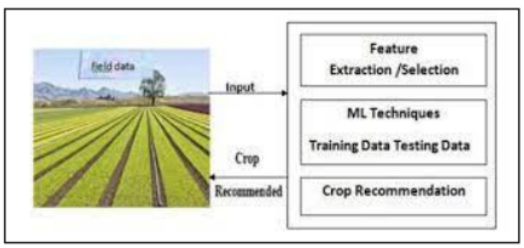

Figure 3.1- Planning of the Project

- Develop algorithms that can process the data and generate recommendations based on established criteria, such as optimal planting times, ideal fertilizer applications and expected crop yields.

- Implement a user-friendly interface that allows farmers to input their location and receive customized crop recommendations based on the analyzed data.about the steps to be followed while planning to execute the project development. It can be represented using list of requirements of the user or features to be developed.

3.2 Project Analysis

The analysis phase of a crop recommendation project involves understanding the requirements and goals, gathering and analyzing data, developing an algorithm for making recommendations based on various factors, and testing and refining the system over time to ensure accuracy and user satisfaction. It is a crucial step in the development process that sets the foundation for a successful and effective crop recommendation engine.
The four key points to consider during the project analysis phase of a crop recommendation system:

- ❖ **Understand the requirements:** The first step is to fully understand the requirements and goals of the project, including the target crop, geographic location, environmental factors, and other key variables.

- ❖ **Gather and analyze data:** Once the requirements are understood, it's important to gather and analyze relevant data, such as soil type, climate conditions, and historical yield data to help inform the recommendation engine.

1	N(kg/ha)	P(kg/ha)	K(kg/ha)	Rainfall(mn	temperatur	humidity(%	pH	crop
2	80	40	40	1200	25	70	6.5	Rice
3	100	60	60	1100	26	75	6.2	Rice
4	120	80	80	1300	28	80	6.8	Rice
5	140	100	100	1400	30	85	7.2	Rice
6	160	120	120	1500	32	90	7.5	Rice
7	180	140	140	1600	34	95	7.8	Rice
8	200	160	160	1700	36	100	8	Rice
9	220	180	180	1800	38	70	8.2	Rice
10	240	200	200	1900	40	75	8.4	Rice
11	260	220	220	2000	42	80	8.6	Rice
12	280	240	240	2100	44	85	8.8	Rice
13	300	260	260	2200	46	90	9	Rice
14	320	280	280	2300	48	95	9.2	Rice
15	340	300	300	2400	50	100	9.4	Rice
16	360	320	320	2500	25	70	6	Rice
17	380	340	340	2600	26	75	6.3	Rice
18	400	360	360	2700	28	80	6.6	Rice
19	420	380	380	2800	30	85	6.9	Rice
20	440	400	400	2900	32	90	7.2	Rice
21	460	420	420	3000	34	95	7.5	Rice
22	480	440	440	3100	36	100	7.8	Rice

UP_dataset100

Figure 3.2-Gathering dataset for the Project

- ❖ **Develop the recommendation algorithm:** Based on the data analysis, a recommendation algorithm can be developed that takes into account various factors to provide accurate and reliable crop recommendations.

- ❖ **Test and refine the system:** Finally, the crop recommendation system should be rigorously tested and refined over time to ensure that it is providing accurate recommendations and meeting the needs of users. This may involve incorporating new data sources or fine-tuning the algorithms based on user feedback.

3.3 System Design

3.3.1 Design Constraints

i. **Dataset of four states:** Firstly, the variables included in the dataset (N, P, K, pH, humidity, temperature) are all key factors that can affect crop growth, yield, and quality. By analyzing these variables for different regions, it is possible to identify which crops are likely to grow well in those areas and make appropriate recommendations to farmers.

ii. **Google CoLab:** is a cloud-based platform that provides a free environment for running Python code. It offers several benefits that make it an attractive option for building crop recommendation systems. The use of Google Colab can accelerate the development process of crop recommendation systems and reduce the overhead cost associated with building and maintaining a dedicated infrastructure.

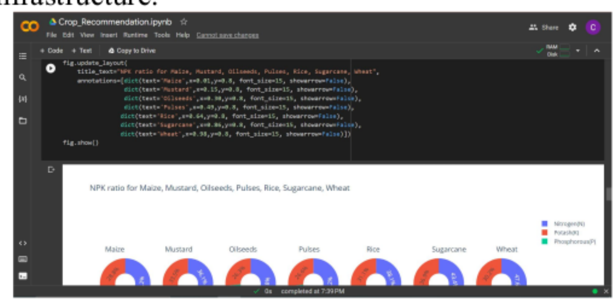

Figure 3.3-Google Colab where code runs

iii. **Exploratory Data Analysis(EDA):** This has been performed on this dataset to gain insights into these parameters and their relationship with crop recommendation. During the EDA, it was observed that the distribution of each parameter varied significantly, and some parameters showed a strong correlation with certain crops. For instance, high levels of nitrogen were found to be ideal for wheat, while low levels of pH were suitable for potatoes.

iv. **Random Forest Classifier:** Random Forest Classifier is a type of machine learning algorithm that can be used in crop recommendation systems to predict suitable crops based on input variables such as N, P, K, pH, humidity, and temperature.In this approach, the dataset containing information on these variables from different regions is divided into training and testing sets.

Chapter 4

Methodology

Exploratory Data Analysis:-

By importing libraries such as Pandas, Numpy, Matplotlib, and Sklearn, you have access to tools necessary for data handling, visualization, and model development. These libraries provide a wide range of pre-built functions that can be used for tasks such as loading data, processing data, and evaluating models.

```
import pandas as pd
import numpy as np
import random

import matplotlib.pyplot as plt
import seaborn as sns

import plotly.graph_objects as go
import plotly.express as px
from plotly.subplots import make_subplots

colorarr = ['#0592D0','#Cd7f32', '#E97451', '#Bdb7 Loading... 535', '#C2b280', '#808000','#C2b280', '#E4d008', '#9acd32', '#Eedc82', '#E4d96f',
          '#32cd32','#39ff14','#00ff7f', '#008080', '#36454f', '#F88379', '#Ff4500', '#Ffb347', '#A94064', '#E75480', '#Ffb6c1', '#E5e4e2',
          '#Faf0e6', '#8c92ac', '#Dbd7d2','#A7a6ba', '#B38b6d']
```

Figure 4.1- EDA code for the dataset

After loading the dataset into a Pandas data frame, it's important to inspect the first few rows of the dataset using the head() function. This step helps to understand the values assigned to each independent and dependent feature in the dataset. By doing this, we can ensure that the data has been loaded correctly and matches our expectations.

```
cropdf = pd.read_csv("br_jh_up.csv")
cropdf.head()
```

	N	P	K	rainfall	temperature	humidity	ph	label
0	80	40	40	1200	25.0	70	6.5	Rice
1	100	60	60	1100	26.0	75	6.2	Rice
2	120	80	80	1300	28.0	80	6.8	Rice
3	140	100	100	1400	30.0	85	7.2	Rice
4	160	120	120	1500	32.0	90	7.5	Rice

Figure 4.2-Reading the dataset from csv file

Checking for NULL values is also a crucial step in the data analysis process. Null values can lead to errors during data analysis, and therefore, it's essential to handle them properly. Depending on the analysis requirements, missing values can either be imputed or removed from the dataset.

```
[ ] cropdf.isnull().any()

    N              False
    P              False
    K              False
    rainfall       False
    temperature    False
    humidity       False
    ph             False
    label          False
    dtype: bool
```

Figure 4.3-Code to check presence of null values

Visualizing the correlation between features using a heatmap is an excellent approach to identify highly correlated variables. Highly correlated variables can cause multicollinearity, which impacts model accuracy. Reducing the number of features by removing one of the highly correlated variables or using dimensionality reduction techniques such as principal component analysis (PCA) can help reduce model complexity and improve its accuracy.

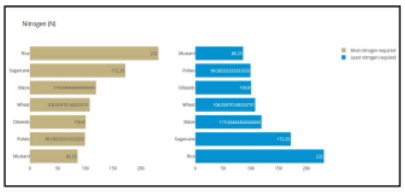

Figure 4.4-Nitrogen analysis

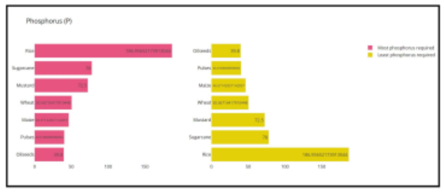

Figure 4.5- Phosphorus analyis

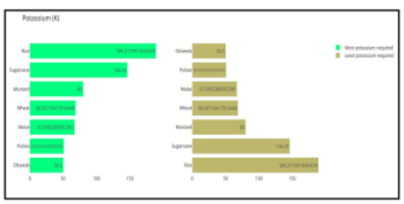

Figure 4.6-Potassium analysis

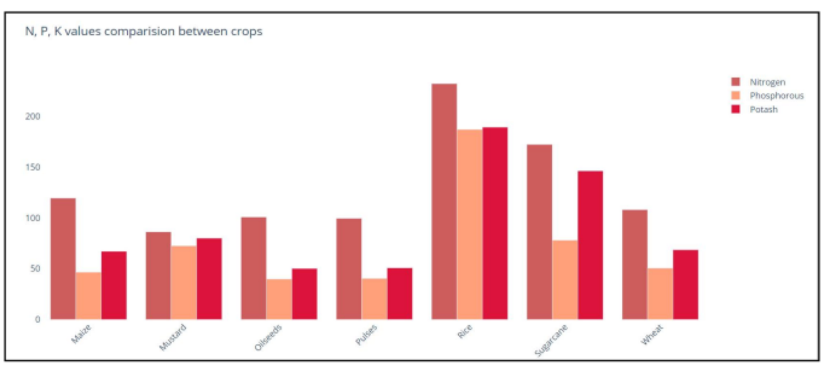

Figure 4.7- Histogram representation of N,P,K values in different types of crop

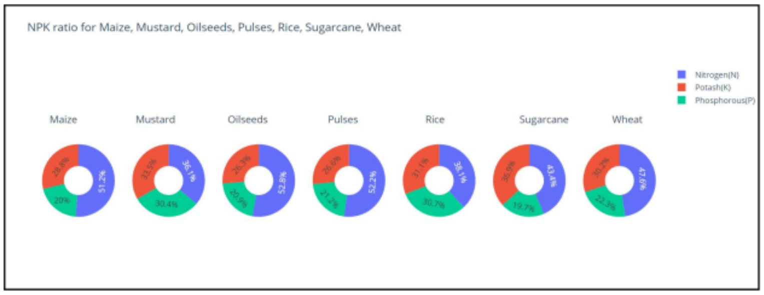

Figure 4.8- PieChart representation of
N,P,K values of different types of crop

A scatterplot graph can be a useful tool in a crop recommendation system as it allows for the visualization of the relationship between two variables. For example, a scatterplot could be used to plot the relationship between soil pH and crop yield. The x-axis could represent soil pH levels, while the y-axis could represent crop yield. Each data point on the graph would represent a particular measurement of soil pH and crop yield. By looking at the scatterplot, it may be possible to identify patterns or trends in the data.

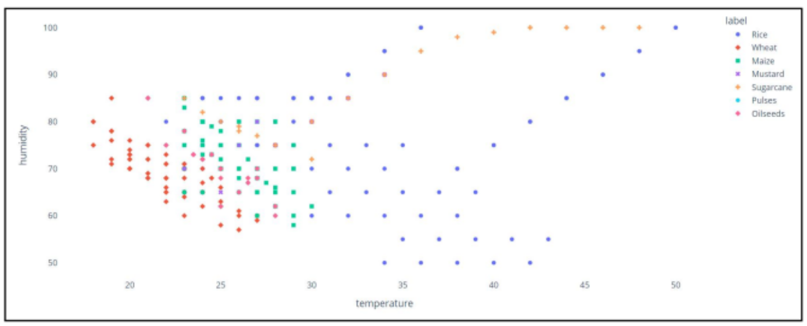

Figure 4.9- Scatter Plot for different types of crop

A grouped bar chart is created using the Plotly Express library to compare the average rainfall, temperature, and humidity for different crops. The crop_summary data frame is used as the input, with the crop types serving as the x-axis values and the average values of the three columns as the y-axis values. The plot's layout is updated to include a title, set the background color to white, and remove grid lines on both axes. Finally, the resulting chart is displayed using the show() method of the fig object created by px.bar().

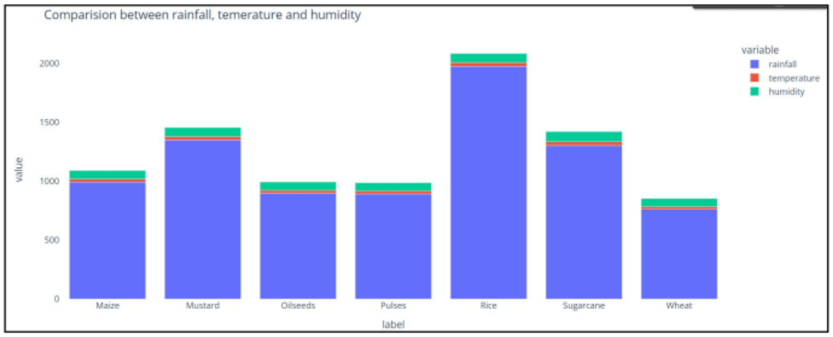

Figure 4.10- Histogram comparision of rainfall,temperature and humidity

This Python code creates a figure with three subplots using the matplotlib and seaborn libraries. Each subplot is a histogram of a nutrient level (N, P, K) for a given crop.

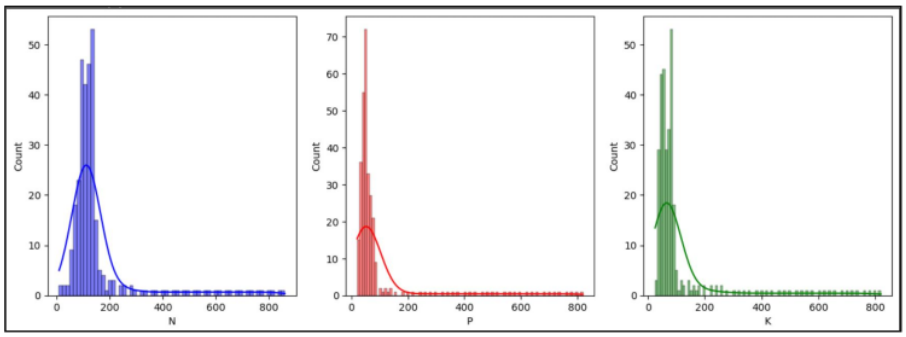

Figure 4.11- SubPlot of N,P,K for a given crop

The first subplot (top left) is a scatter plot with nutrient level "N" on the x-axis and uses markers ("o") to display the data points. The second subplot (top middle) is a bar chart showing the amount of nutrient "P" for each crop type. The third subplot (top right) is a histogram displaying the distribution of nutrient "K" levels across crops. The fourth subplot (top right) is a scatter plot showing the relationship between rainfall and temperature for all crops, with the color "r" representing the data points.

The bottom-left subplot is a box plot displaying the distribution of humidity levels across all crops. The bottom-middle subplot is a pie chart showing the frequency distribution of pH values in all crops. The bottom-right subplot is a violin plot displaying the distribution of nutrient "N" levels across crops. Finally, the last subplot displays a small image.

Overall, this code generates a diverse set of visualizations that summarize different aspects of the crop data, providing insights into its distribution and relationships between variables.

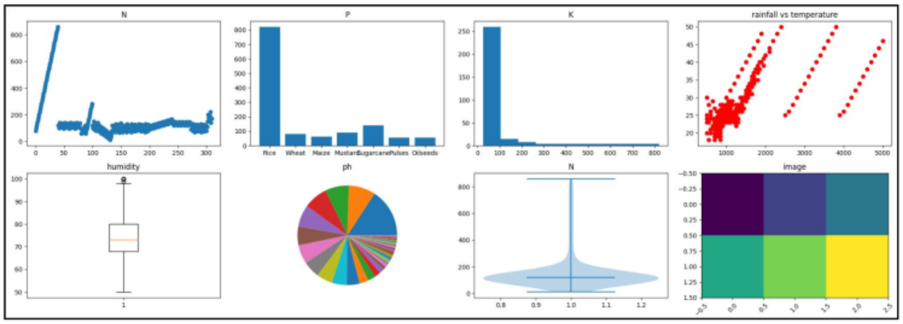

Figure 4.12- Detailed Analysis of the dataset

Lastly, we plotted the heatmap for features to understand the correlation between two features. The heatmap provided insight into variables that had high correlations with one another, and we attempted to minimize the correlation between two variables. This aids in decreasing model complexity and improving its accuracy.

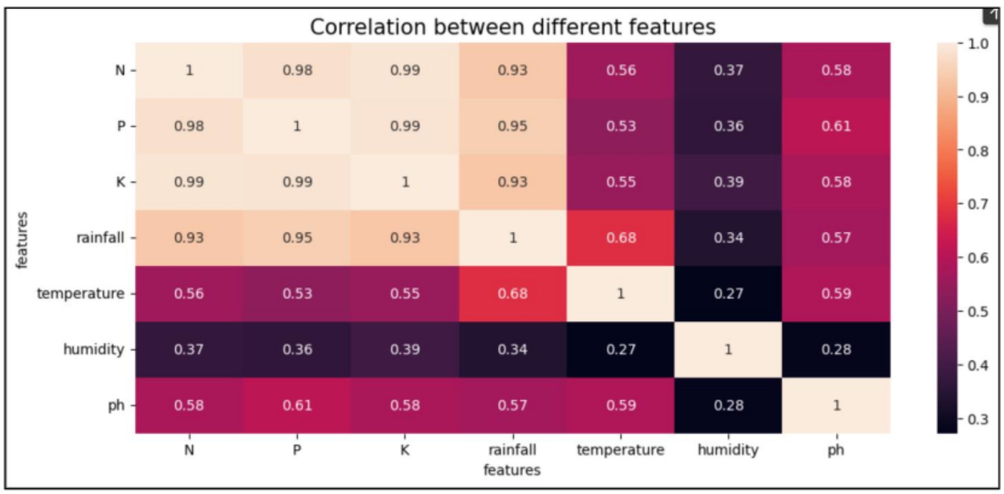

Figure 4.13- HeatMap Plotted for correlation analysis

Chapter 5

Models and Result Analysis

5.1)Logistic Regression:

Logistic regression is a type of supervised learning algorithm commonly used for binary classification problems, where the goal is to predict one of two possible outcomes based on a set of input features.The dataset is divided into training and testing sets (Xtrain and X1test respectively) along with their corresponding labels (Ytrain and Y1test). The logistic regression algorithm is trained on the training set to learn the relationship between input features and output labels. Once the model is trained, it is used to predict the labels for the test data.

```
[ ] from sklearn.linear_model import LogisticRegression

    LogReg = LogisticRegression(random_state=99)

    LogReg.fit(Xtrain,Ytrain)

    predicted_values = LogReg.predict(X1test)

    y = metrics.accuracy_score(Y1test, predicted_values)
    print("Logistic Regression's Accuracy is: ", y)

    Logistic Regression's Accuracy is:  0.6559139784946236
```

Figure 5.1- Logistic Regression Code and Accuracy

5.2)Naive Baye's :

Naive Bayes is a type of probabilistic classifier that is based on applying Bayes' theorem with the "naive" assumption of independence between every pair of features. It is used to build a classification model similar to the logistic regression example. The dataset is split into training and testing sets (Xtrain and X1test respectively), and the Naive Bayes algorithm is trained on the training set to learn the relationship between input features and output labels. Once the model is trained, it is used to predict the labels for the test data.

```
[ ] from sklearn.naive_bayes import GaussianNB

    NaiveBayes = GaussianNB()

    NaiveBayes.fit(Xtrain,Ytrain)

    predicted_values = NaiveBayes.predict(X1test)
    x = metrics.accuracy_score(Y1test, predicted_values)
    print("Naive Bayes's Accuracy is: ", x)

    Naive Bayes's Accuracy is:  0.5591397849462365
```

Figure 5.2- Naive Bayes' Code and Accuracy

5.3) Decision Tree Classifier:

The model is trained using the fit() method on the training data and corresponding labels, and then tested on a separate set of test data using the predict() method.

```
[ ]  from sklearn.tree import DecisionTreeClassifier

     dtree = DecisionTreeClassifier()

     dtree.fit(Xtrain,Ytrain)

     dtpred= dtree.predict(X1test)

     d = metrics.accuracy_score(Y1test, dtpred)
     print("Decision tree's Accuracy is: ", d)

     Decision tree's Accuracy is:  0.9139784946236559
```

Figure 5.3- Decision Tree Code and Accuracy

The accuracy of the model is evaluated using the accuracy_score() method from the metrics module and printed to the console. Decision Trees are a popular machine learning algorithm used for classification and regression tasks, and this code demonstrates how to implement and evaluate a basic decision tree classifier model in Python.

5.4)Random Forest Classifier:

The random forest algorithm is a type of ensemble learning technique, which involves combining several individual models to produce a collective result. In this case, each tree in the forest is trained on a random subset of the training data, which helps to reduce overfitting and improve the performance of the overall model.

```
[ ]  testdf = pd.read_csv("Mp_dataset.csv")

[ ]  X1train, X1test, Y1train, Y1test = train_test_split(features,target,test_size = 0.3,random_state =99)

[ ]  np.random.seed(99)

[ ]  rt = RandomForestClassifier()
     rt.fit(Xtrain,Ytrain)
     rtpred = rt.predict(X1test)

[ ]  r1 = metrics.accuracy_score(Y1test, rtpred)
     print("Random forest's Accuracy is: ", r1)

     Random forest's Accuracy is:  0.9247311827956989
```

Figure 5.4- Random Forest Classifier Code and Accuracy

The code creates an instance of the RandomForestClassifier class from the Scikit-learn library, fits the model using the fit() method with training data (Xtrain) and corresponding labels (Ytrain), and then uses the predict() method to obtain the predicted labels for the test set (X1test). The resulting predicted labels are stored in rtpred.

Comaparsion of all models:

The four machine learning algorithms - Logistic Regression,Naive Bayes, Decision Tree and Random Forest were evaluated and their accuracy scores were compared. The accuracy scores were then plotted in a bar chart to visualize the results.

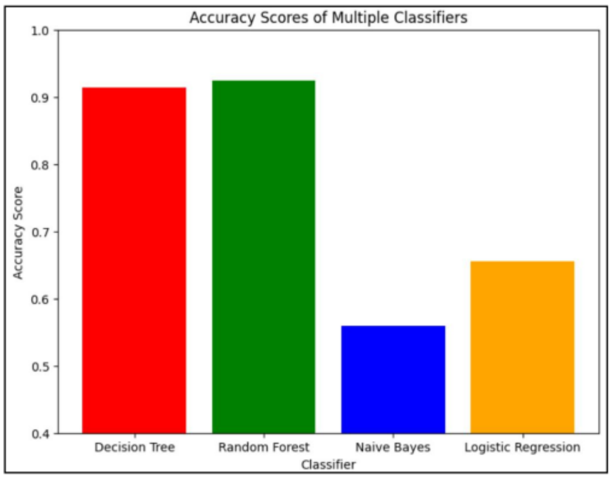

Figure 5.5- Comparision of the accuracy of the 4 models

From the plot, we can observe that the Random Forest classifier has the highest accuracy score among the four classifiers with accuracy of 92.417%.
This means that it performs better than the other classifiers in predicting the outcome of the crop recommendation problem.

Therefore, based on this evaluation, we can conclude that the Random Forest algorithm is best suited for crop recommendation tasks. four machine learning algorithms - Decision Tree, Random Forest, Naive Bayes, and Logistic Regression - were evaluated and their accuracy scores were compared. The accuracy scores were then plotted in a bar chart to visualize the results.

Chapter 6

Conclusion and Future Scope

6.1 Conclusion

In conclusion, using machine learning algorithms for crop recommendation can greatly benefit farmers by increasing their crop yields and profits while also promoting sustainable farming practices. Among the evaluated algorithms, Random Forest proved to be the most accurate in predicting crop outcomes. By harnessing the power of data analysis and automation, farmers can make better decisions about which crops to grow based on local soil and climate conditions. This not only saves time and effort but also contributes to a healthier ecosystem by reducing the need for excessive use of fertilizers and pesticides. In essence, intelligent crop recommendation is a win-win solution for farmers and the environment alike.

6.2 Future Scope

The future of crop recommendation looks promising with the continued advancements in technology and machine learning algorithms. Some potential areas for development and improvement include:

- **Personalization**: As machine learning algorithms become more sophisticated, they can be tailored to individual farmers' needs based on their specific soil, weather, and crop history data. This can lead to more accurate and personalized recommendations for each farmer.

- **Integration with IoT:** By integrating crop recommendation systems with Internet of Things (IoT) devices such as sensors and drones, farmers can collect real-time data on soil moisture levels, temperature, and other environmental factors that can influence crop growth. This can optimize resource utilization and increase efficiency.

- **Mobile Applications:** The development of mobile applications that integrate crop recommendation algorithms can provide farmers with easy access to recommendations and insights on-the-go. This can increase adoption rates of these technologies among small-scale farmers who may not have access to traditional desktop computers.

Overall, the future of crop recommendation holds immense potential in assisting farmers to make informed decisions about crop selection and management.

References

[1] https://www.warse.org/IJATCSE/static/pdf/file/ijatcse501032021.pdf
International Journal of Advanced Trends in Computer Science and Engineering
Research Paper referred in this project.

et/publication/358953447
Suitable Crop Suggesting System Based on N.P.K. Values Using Machine Learning Models .

INDIVIDUAL CONTRIBUTION REPORT:

INTELLIGENT CROP RECOMMENDATION SYSTEM

CHANDRIKA PAPNEJA
20051001

Abstract: This study developed a crop recommendation system to assist farmers in making informed decisions about which crops to cultivate. The system utilizes data on crops grown across multiple states in India and employs the random forest algorithm for high accuracy. Key parameters such as soil type, rainfall, temperature, and nutrient content are considered for crop selection. The system has the potential to increase farmers' success and profitability while reducing the risk of crop failure. The crop recommendation system developed in this study seeks to address the challenges faced by farmers in making informed decisions about which crops to cultivate. It does so by utilizing a dataset that includes data on crops grown across multiple states in India, including Bihar, Uttar Pradesh, Jharkhand, and Madhya Pradesh.

Individual contribution and findings:

To start, I obtained information from multiple online sources regarding a set of distinct characteristics related to soil nutrient levels, rainfall, and temperature within the region of Bihar. Once this data had been collected, I compiled it into a comprehensive dataset for further analysis.Based on the insights gained from the EDA, I then employed various machine learning (ML) models to determine which one yielded the most accurate results. Through a process of testing and evaluation, I ultimately identified the model that provided the highest accuracy score.

Individual contribution to project report preparation:

My primary contribution focused on writing the Python code for four different machine learning models - Random Forest Classifier, Naive Bayes, Decision Tree, and Logistics Regression. I also analyzed the accuracy of these models in predicting suitable crops based on soil and weather conditions. My role involved selecting appropriate features from the dataset, preprocessing the data, and training the models to provide accurate crop recommendations.Overall, my contributions were essential in establishing the effectiveness of different machine learning algorithms for crop recommendation systems.

Individual contribution for project presentation and demonstration:

As a contributor to the project presentation and demonstration, my primary role was in creating clear and concise slides related to the methodology, data parameters, and code snippets used in the project. I provided detailed explanations of the data preprocessing techniques employed and highlighted the crucial features necessary for accurate crop recommendations. Additionally, I included relevant code snippets to demonstrate the technical aspects of the project.aking this further, I have also put a hand in gathering information for a well structured PowerPoint presentation for the same.

Full Signature of Supervisor: ……………………………… Full signature of the student: ………………………………..

INDIVIDUAL CONTRIBUTION REPORT:

INTELLIGENT CROP RECOMMENDATION SYSTEM

DEBASHREE CHAKRABORTY
20051139

Abstract: Agriculture is the backbone of our economy, and farmers across the world face daunting challenges in selecting the right crops to grow. To address this issue, we propose a crop recommendation system that takes into account four state soil parameters, temperature, and humidity to suggest the best crop to be grown. The proposed system is designed to help farmers make informed decisions about crop selection, thereby increasing their productivity and income. The proposed crop recommendation system employs machine learning algorithms to analyze soil parameters, temperature, and humidity data to provide accurate crop recommendations for farmers. The user-friendly interface allows for input of data and feedback to continually improve the system's accuracy. This innovative solution aims to empower farmers to make informed decisions, increase productivity, and contribute to the growth of the agricultural sector.

Individual contribution and findings:

As a contributor to this project, I have researched and studied different machine learning algorithms that can be used for crop recommendation systems. Specifically, I have explored K-Nearest Neighbors (KNN), Naive Bayes, Gaussian Process Regression, and Ensemble Methods.Further, I have collected soil parameters and weather details for Uttar Pradesh and Jharkhand ensuring that the majorly grown crops are covered as per their production.
Overall, my contributions to the project have included researching and evaluating different machine learning algorithms

Individual contribution to project report preparation:

I played an active role in writing various sections of the report. Specifically, I contributed to the abstract, introduction, problem statement, specification, and conclusion.
My contributions involved crafting clear and concise language that effectively conveyed the purpose and significance of the project, as well as outlining the challenges and goals of the crop recommendation system.

Individual contribution for project presentation and demonstration:

In the project presentation and demonstration, I made significant contributions to several key aspects of the project, including the introduction, problem statement, template design, literature review, and conclusion.
Regarding the template design, I worked closely with the team to produce a visually attractive and user-friendly interface for the crop recommendation system, ensuring that it would be simple for farmers to input their data and receive reliable recommendations.

Full Signature of Supervisor: ……………………………

Full signature of the student: ………………………………..

INDIVIDUAL CONTRIBUTION REPORT:

INTELLIGENT CROP RECOMMENDATION SYSTEM

ADITI SINGH
20051629

Abstract: Agriculture is the backbone of India's economy, and farmers face numerous challenges in selecting the right crops to grow. To address this issue, we propose a crop recommendation system that takes into account four state soil parameters in India and uses Random Forest machine learning algorithm to provide accurate crop recommendations. The proposed system is designed to help farmers make informed decisions about crop selection, thereby increasing their productivity and income.We envision that this crop recommendation system will be an innovative solution to one of the most pressing issues facing farmers in India today.

Individual contribution and findings:

As a contributor, I focused on analyzing the Madhya Pradesh dataset and exploring different machine learning models suitable for crop recommendation systems such as ANNs, CNNs, RNNs, LSTM, GBMs and XGBoost.

Additionally, I conducted a detailed exploratory data analysis (EDA) to preprocess the relevant data by addressing missing values, outliers, and other anomalies that may affect the accuracy of the crop recommendations. Overall, my findings suggest that there is no one-size-fits-all solution when it comes to selecting the best machine learning algorithm for a crop recommendation system.By utilizing appropriate machine learning algorithms and preprocessing techniques, a reliable and accurate crop recommendation system can be developed to assist farmers in making informed decisions about crop selection.

Individual contribution to project report preparation:

My primary contribution focused on the methodology section, specifically outlining the step-by-step process of exploratory data analysis (EDA), data cleaning, and preprocessing for the Madhya Pradesh dataset. I included relevant screenshots of my code to illustrate the procedures in a clear and concise manner. In my role, I emphasized the importance of EDA as a crucial first step in any data analysis project. This involved performing initial checks for missing or erroneous data and identifying potential outliers and anomalies.

Individual contribution for project presentation and demonstration:

My main role was in preparing the methodology slides and discussing the future scope of the crop recommendation system. I contributed to outlining the step-by-step process of data analysis and preprocessing, as well as highlighting the key considerations for developing an effective recommendation system.

Full Signature of Supervisor: ……………………………

Full signature of the student: ……………………………..

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