YESHWANTRAO CHAVAN COLLEGE OF ENGINEERING, NAGPUR.

(An autonomous Institution Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

2022-23

IOT and Machine Learning Integrated Solution for Precision Agriculture

NAME OF STUDENT: Adwait Tikekar, Aditya Gourshettiwar, Atharva Gujar, Rishit Banyal, Shivam Dhamange

NAME OF GUIDE: Prof. Amruta Tapas Paul

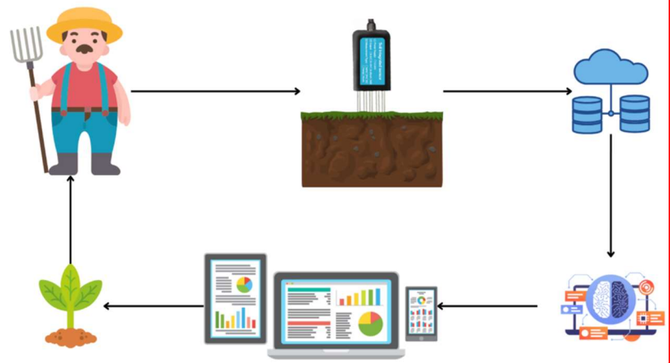
Abstract: This project introduces a hardware-software solution for precision agriculture, featuring an IoT device capturing soil nutrient levels and environmental data, integrated with an Android app. Utilizing machine learning algorithms, the system provides real-time crop recommendations based on the collected data, empowering farmers to optimize productivity and sustainability.

Introduction:

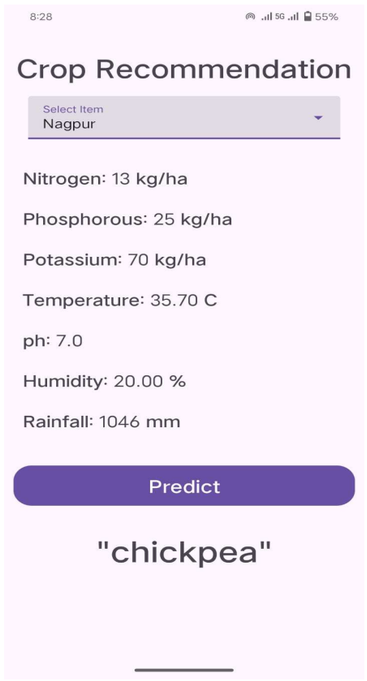
Agriculture, being the backbone of many economies, faces significant challenges in optimizing productivity while ensuring sustainable practices. In response to these challenges, this project presents a comprehensive hardware and software solution aimed at enhancing agricultural productivity. The proposed solution integrates IoT technology and machine learning algorithms to provide Crop Recommendation System. By leveraging sensors for soil composition (NPK and pH) and atmospheric conditions (temperature, humidity, rainfall), coupled with an Android application, the system offers farmers actionable insights for crop selection. Through this project, we explore the implementation and effectiveness of these systems in aiding farmers to make informed decisions, ultimately contributing to increased yields and resource efficiency in agriculture.

Simulated Designs:

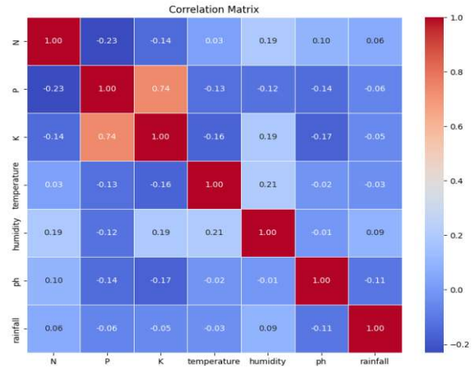
Utilizing an IoT device equipped with a 7-in-1 Soil NPK Sensor and DHT11 sensor, our solution gathers comprehensive soil nutrient and environmental data. This data is seamlessly transmitted to a central database via ESP32 WIFI Module and RS485 Module. Integrated with a crop recommendation ML model hosted on Render via Flask API, our Android app delivers real-time crop recommendations based on the analysed data, empowering farmers to optimize agricultural productivity.

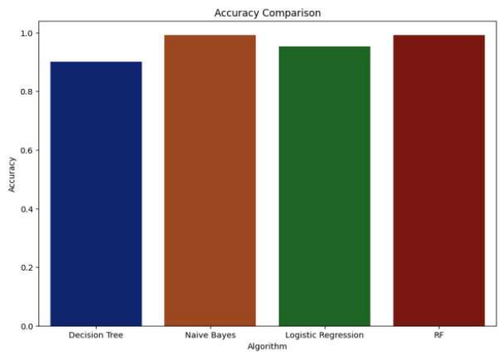


Simulation Result:



ML Model Results of Crop Recommendation System





1. A decision tree is a structured algorithm in which the data is divided into small subsets based on the input values, with the goal of predicting target variables.
2. Gaussian Naive Bayes is an algorithm based on Bayes' theorem that calculates probability by making a "naive" assumption about the independence of features.
3. Logistic regression is a popular algorithm for multi-class classification functions where it gives the probability of each class as a function of the input feature.
4. Random forest is a powerful algorithm which is widely used in many classification problems.

Conclusion and Future Scope:

Conclusion: The integration of hardware and software components in this agricultural productivity solution offers farmers valuable insights into soil health and environmental conditions crucial for optimal crop growth. By leveraging IoT technology, real-time data collection, and machine learning algorithms, the system empowers farmers with informed decision-making, ultimately leading to improved yields and sustainable farming practices.

Future Scope:

1. Scaling Up Implementation
2. Integration of Additional Sensors
3. Enhanced Machine Learning Models

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3									3	3
CO2			3		3	3	2			3			3	3
CO3				3								3	3	3
CO4									3		2	3	3	3

Signature of Guide