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IBM HACK CHALLENGE 2021

AI-Assisted Farming for Crop Recommendation & Farm Yield Prediction Application

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1 INTRODUCTION

1.1 Overview

The system's idea is to help farmers to decide the right crop to sow in their field and forecast the yield and revenue. Based on the previous climatic records, climate of the region is decided accordingly the crop to be grown is decided. Based on the amount of crops cultivated, the yield is calculated. Factors influencing the crop's growth are taken into account. Depending on the yield, the generated revenue is found.

1.2 Purpose

Most of the farmers practice traditional farming patterns to decide the crops to be cultivated. AI systems helps to improve the harvest quality and accuracy, which is known as precision agriculture. Through this system, we can increase the productivity which in turn generates huge amount of revenue. The solution to this Challenge can be a crop recommendation system that helps farmers to decide the right crop to sow in their field and forecast the yield & revenue.

2 LITERATURE SURVEY

2.1 Existing problem

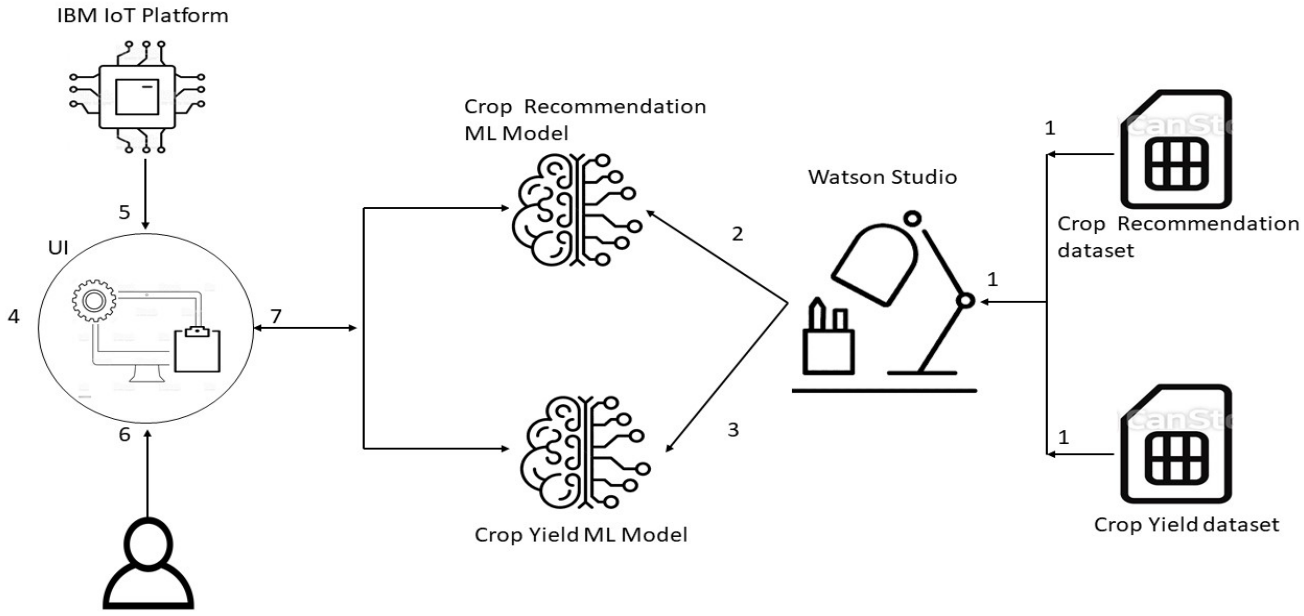
Farmers don't have the resources that could recommend about the best crops to be cultivated based on climatic parameters and also predicts the yield and revenue that would be generated in the cultivated land. In order to reach out the resource, we are developing it.

2.2 Proposed solution

An application that recommends the farmers about the best crops to be cultivated based on climatic parameters and also predicts the yield and revenue that would be generated in the cultivated land. We need to look for ways to help farmers minimize their risks, or at least make them more manageable. Implementing artificial intelligence in agriculture on a global scale is one of the most promising opportunities.

3 THEORITICAL ANALYSIS

3.1 Block diagram



3.2 Hardware / Software designing

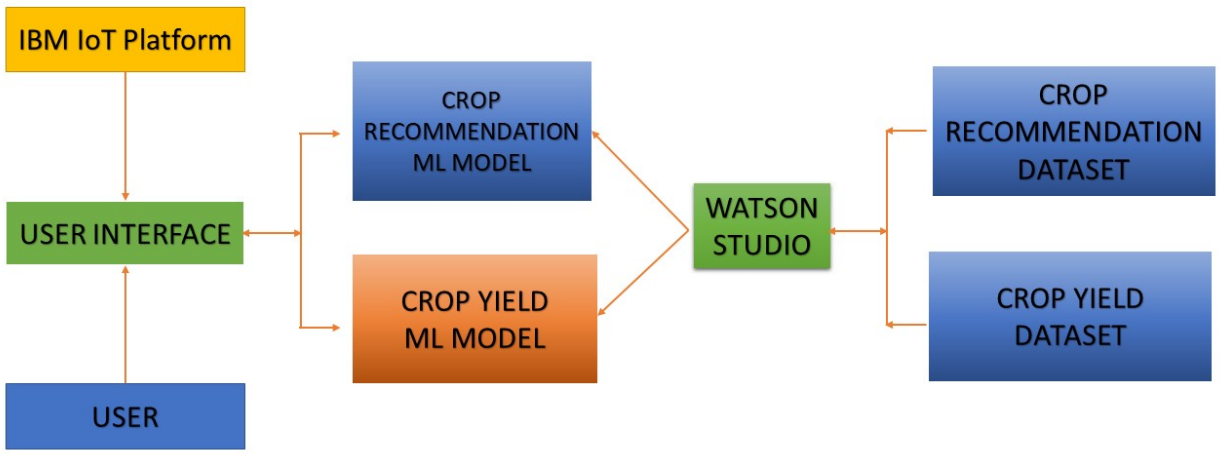
IBM Services

- IBM CLOUD
- WATSON STUDIO
- AUTO AI
- WATSON MACHINE LEARNING
- NODE RED (LOCAL HOST)
- IOT

4 EXPERIMENTAL INVESTIGATIONS

India is very vast in terms of agricultural concepts as every region in terms of weather, soil fertility, climatic situation and the methods used to cultivate the crop is different. Thus, it becomes difficult to predict any factor related to farming, it may lead to an unexpected outcome.

5 FLOWCHART



6 RESULT

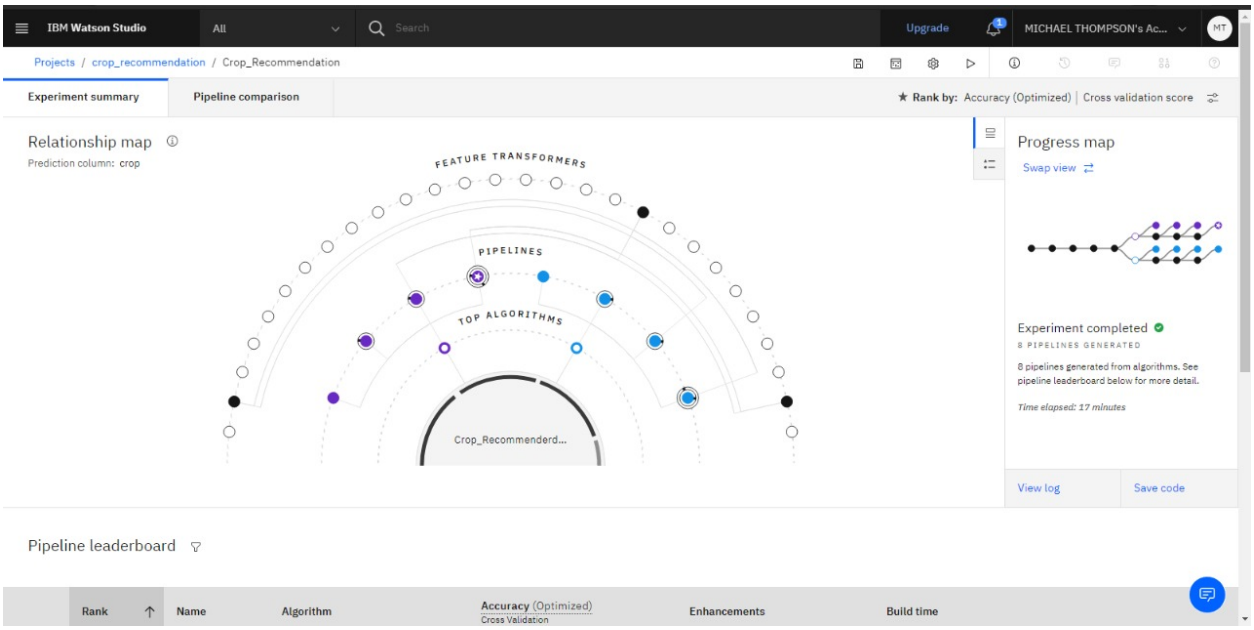
- Auto AI Model is successfully built using given datasets with an accuracy of 99.1%.
- Node Red has been downloaded using node red services - https://nodered.org/docs/getting-started/windows
- IoT Platform is integrated with Node Red Dashboard UI.

(**NOTE:** Node Red was being local host as Cloud Foundry server was down)

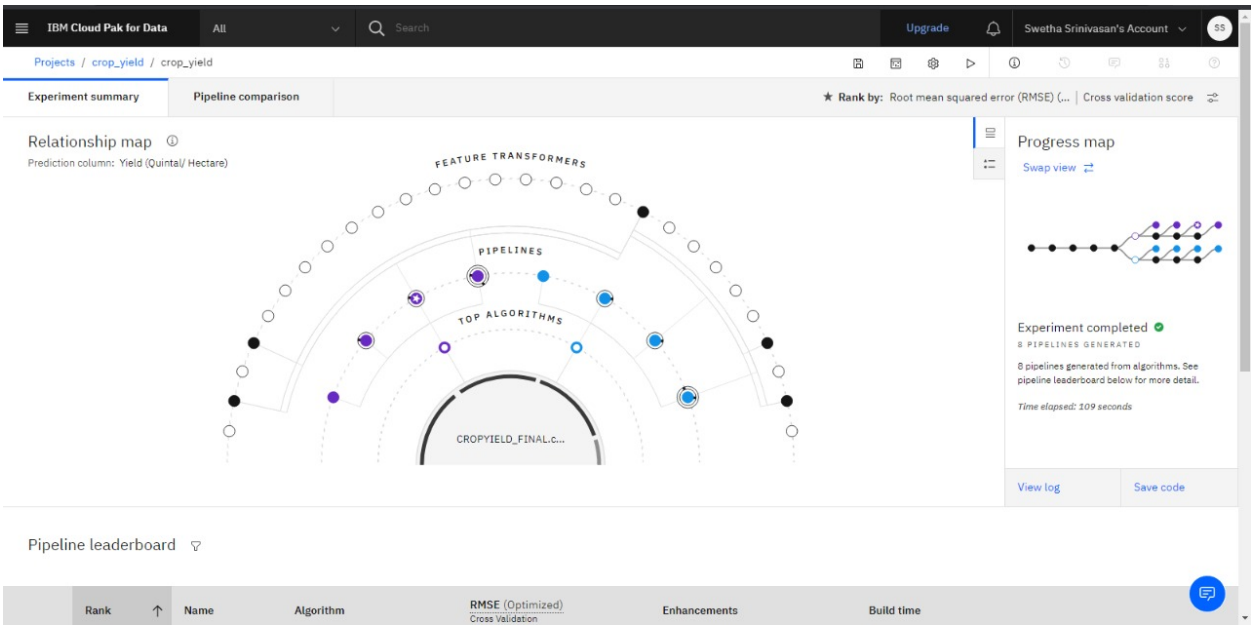
WATSON STUDIO DEPLOYMENT SPACES

MACHINE LEARNING MODELS :

1. LGBM CLASSIFIER MODEL FOR CROP RECOMMENDATION

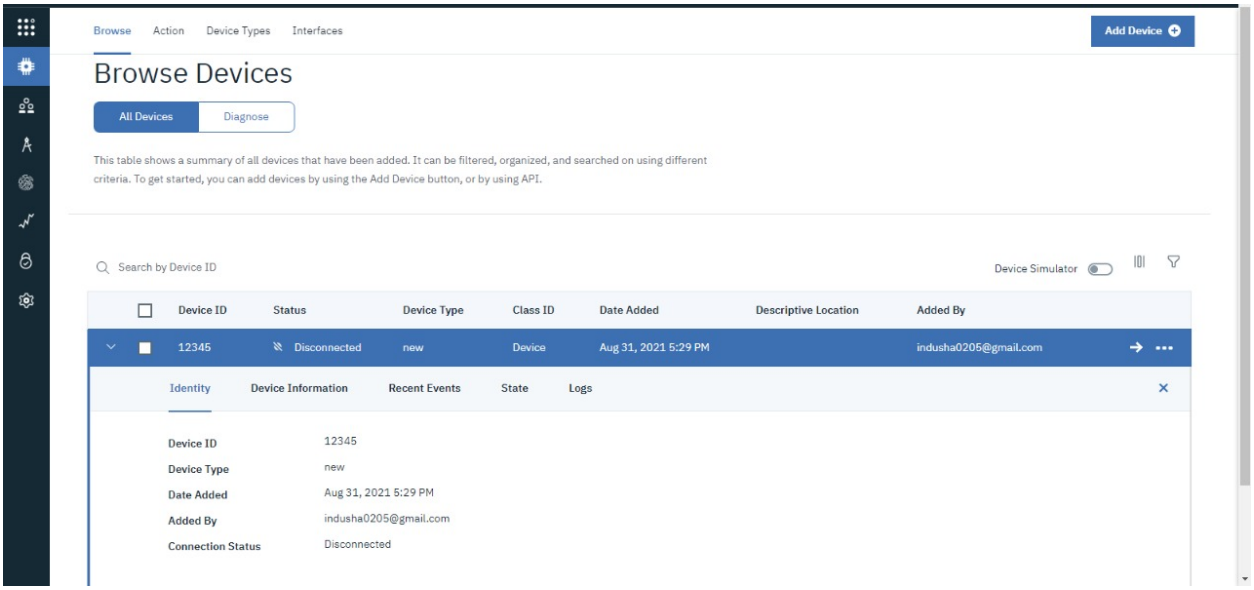


2. **LINEAR REGRESSION MODEL FOR CROP YIELD:**

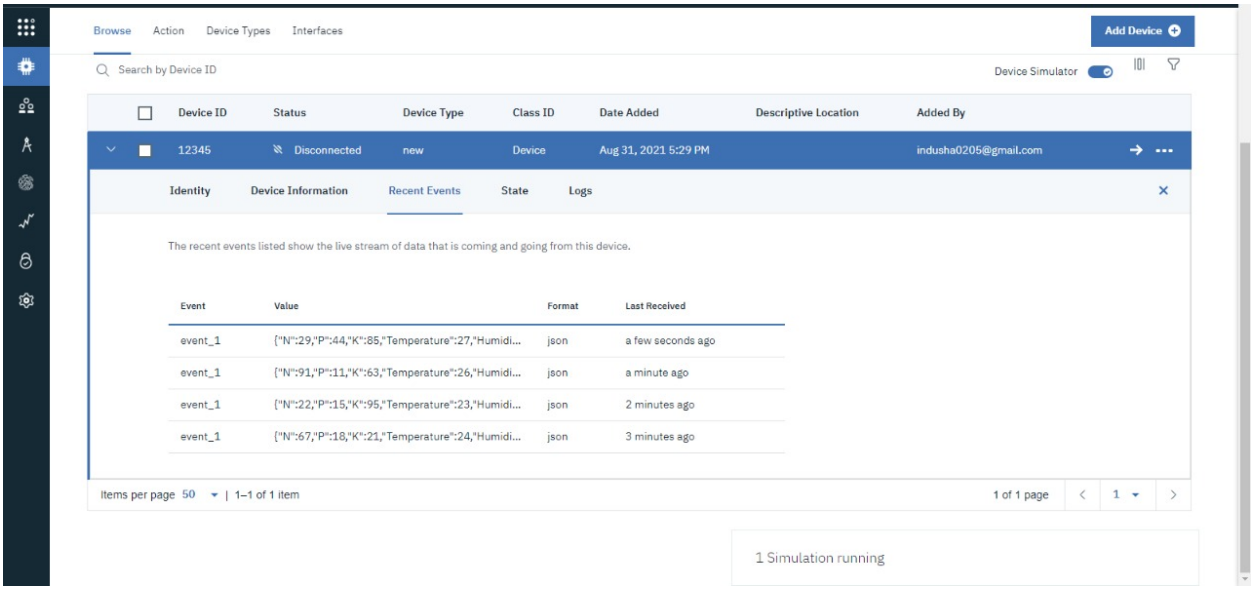


WATSON IoT PLATFORM

1. **IOT DEVICE :**

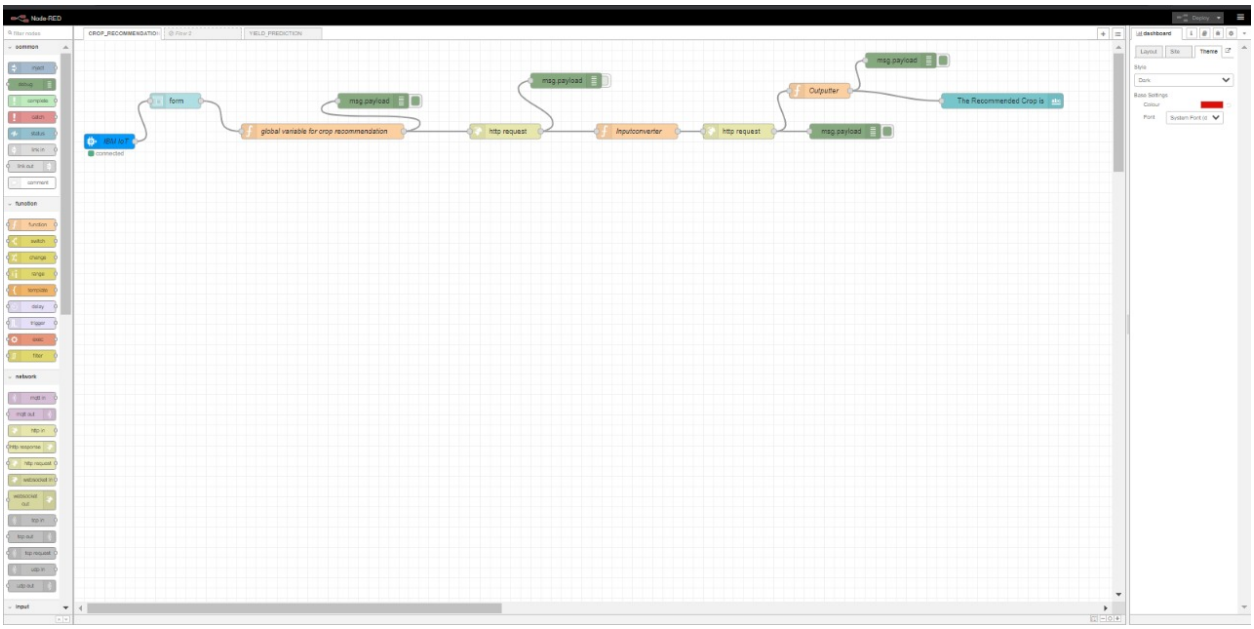


2. RECENT EVENTS ON THE DEVICE (SIMULATION):

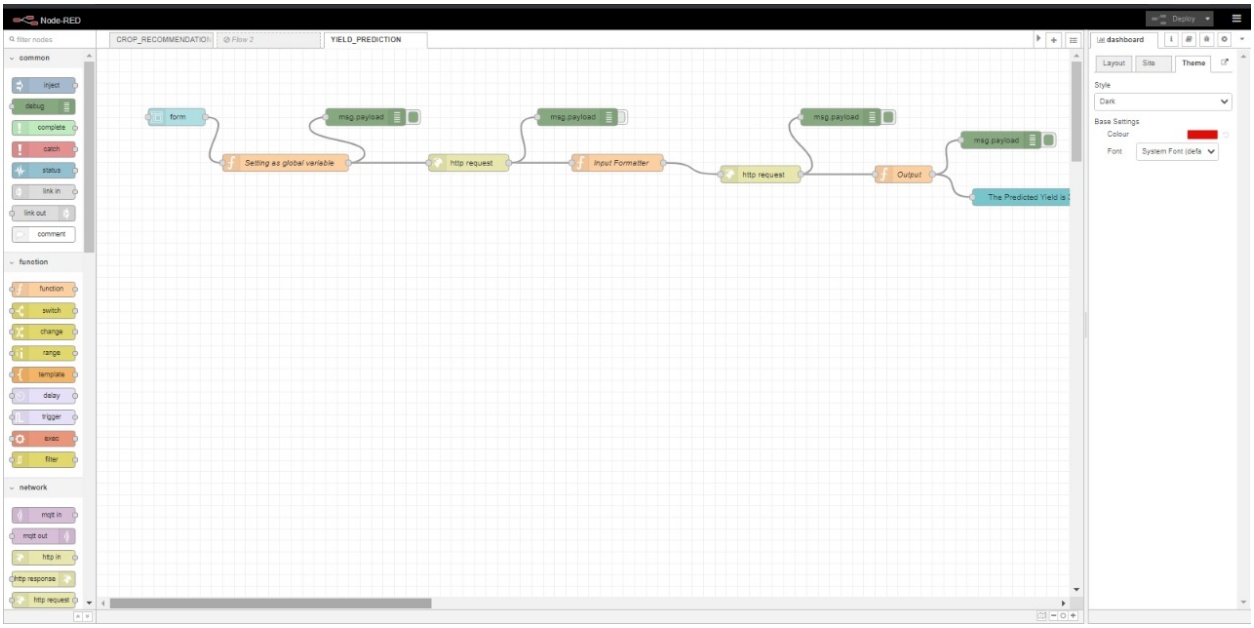


NODE RED FLOWS

1. NODE RED - CROP RECOMMENDATION

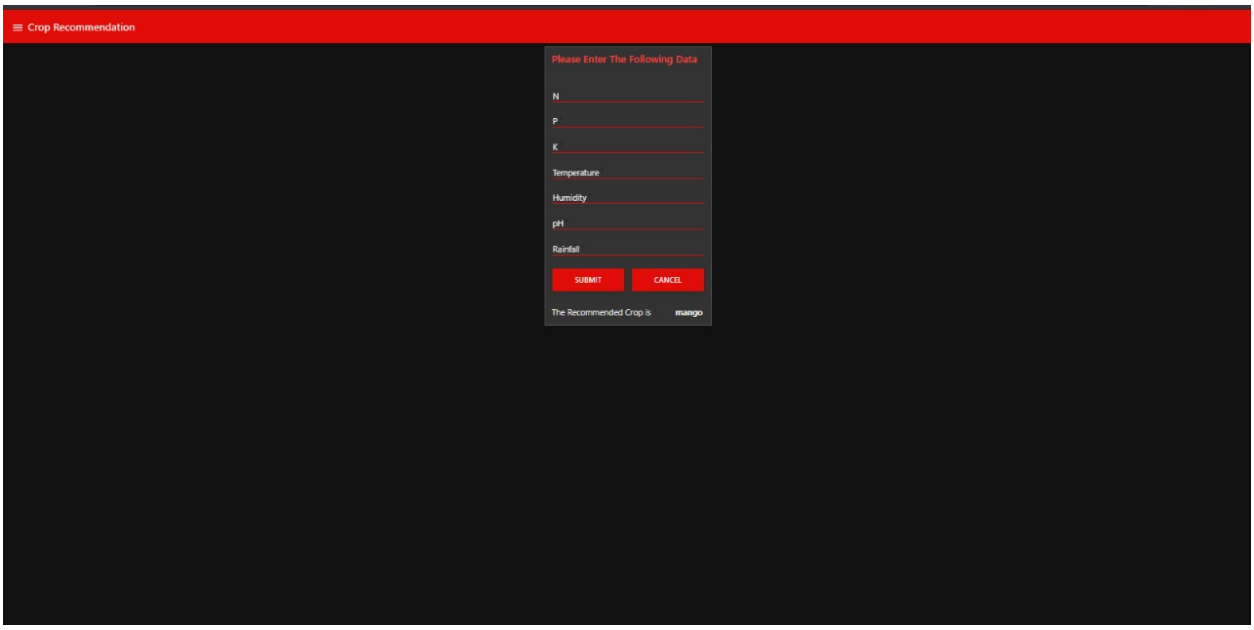


2. NODE RED - CROP YIELD

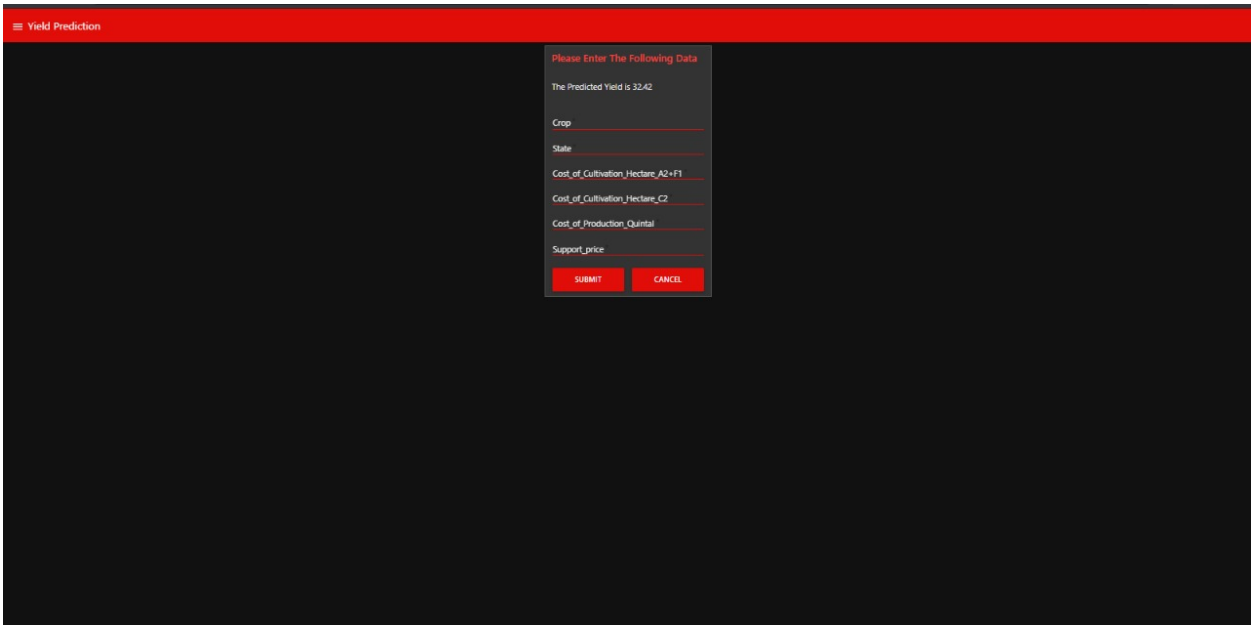


USER INTERFACE

1. CROP RECOMMENDATION



2. CROP YIELD



7 ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Accurate Recommendations achieved using Watson Studio - 99.1%.
- IoT sensor give real time predictive analysis which is displayed on the dashboard.
- The result is based on large number of data collected in past thus the accuracy is high.
- The system helps farmers to take decisions to sow the crop.
- Artificial Intelligence can improve plant breeding and crop management practices.
- It promotes digital farming .

DISADVANTAGES:

- The result does not cover all the regions of India.
- The result does not cover each and every agricultural product harvested in all the regions.
- Crop Sense Sensors require Internet services to connect to the Cloud and it might not be available in all regions.

8 APPLICATIONS

- The system can be used to get suitable crop to sow in the field.
- The System can also be used to predict the crop yield.
- The System can be used to fetch loT feed from loT device which helps to monitor Soil and Weather condition.
- The modernization of farming can improve the society as a whole. Standing in the sun for hours in a day is no longer necessary if irrigation and fertilizer systems are automated.
- Automated Farming can be an upcoming industry which can create new jobs and increase the GDP and productivity of the nation leading to surplus.

9 CONCLUSION

The proposed solution consists the analysis done by IBM cloud based service IBM Auto Al and it recommends the Crop to sow and estimate the Yield. It displays output using the Node RED dashboard User Interface. Any user with understanding of Internet will be able to use this system.

10 FUTURE SCOPE

- Suitable fertilizer and pesticide recommendation system can be implemented along with this system.
- In addition to this system, cultivation cost can also be predicted.
- Soil nutrient booster or fertilizer recommendation system will be beneficial if system detect any soil nutrient deficiency.
- Pest/Disease Detection using Cameras and Surveillance systems for crops so that farmers can be alerted on the presence of rodents/pests on their farms. This way, the damage caused by pests/diseases can be prevented before it happens.

11 BIBILOGRAPHY

1. Dataset for Crop Recommendation:

https://www.kaggle.com/siddharthss/crop-recommendation dataset

2. Dataset for Crop Yield:

https://github.com/shreyzo/Crop-yield-and-profitability-prediction/blob/main/crop production.csv

3. Project Deployment in GitHub:

https://github.com/smartinternz02/SBSPS-Challenge-5485-AI-Assisted-Farming-for-Crop-Recommendation-Farm-Yield-Prediction-Application