Project Report - TEAM CHALLENGERS

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

Introduction : A simple Machine Learning based Web Application that recommends the best crop to grow based on the parameters like Temperature, Humidity, NPK (Nitrogen, Phosphorus and Potassium), and the pH level in the soil. Based on the crop, the model can also predict the amount of yield/revenue based on the parameters such as State, City, Area of the land, Crop Type. The above two predictions are made for large-scale crops, temperature, and weather conditions.

We have integrated a fertilizer prediction model for the prediction of fertilizer for a given

set of crops, NPK values, soil type, and weather conditions respectively. This is only for small lands or basic crops as this dataset is minimal compared to the prior ones. One can also get real-time weather updates of a particular location (Example: A Land owned by a Farmer) from the coordinates of that location. We have integrated an Agro API through which a farmer can have a view of his land in a dashboard.
This dashboard can help farmers find the crops, yield, fertilizers for their farm land. It can also help them in suggesting various crops according to the weather conditions. The real time weather and land conditions helps the farmers have a view of his hand and the weather condition with images that get updated every 3-4 hours.

Motivation

- Farming is one of the major sectors that influences a country's economic growth.
- In-country like India, the majority of the population is dependent on agriculture for their livelihood. Many new technologies, such as Machine Learning and Deep Learning, are being implemented into agriculture so that it is easier for farmers to grow and maximize their yield. It has also helped in optimizing the labor work that has been put rigorously by farmers.

LITERATURE SURVEY:

PROBLEM :

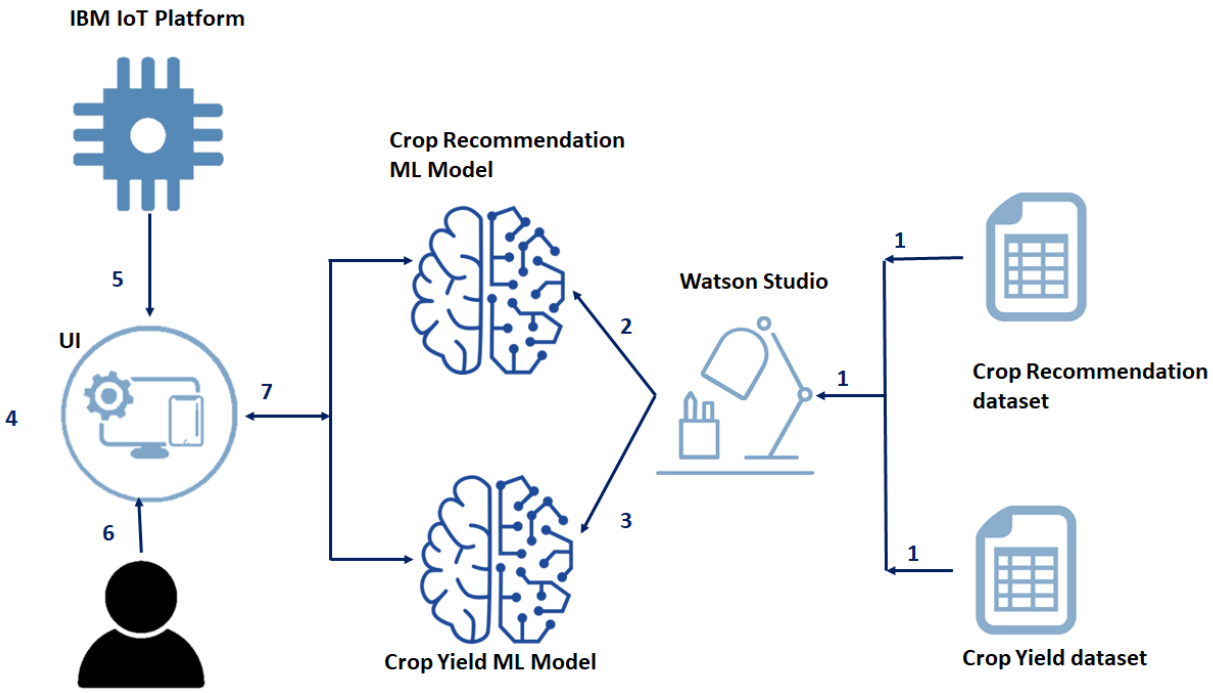
Farmers are facing problems due to the enormous weather conditions and sometimes due to poor soil quality because of the chemicals and different pesticides. And they don't know about the profit of their ripening crop. There are many existing solutions to the above problems innovated earlier in time. After some research we have devised a solution where the parameters related to

agricultural land can be monitored and used in a single dashboard for ease of use.

SOLUTION :

We came up with the solution, where we suggest crops according to the climatic conditions and also predict the yield that can be generated from which farmers can get an overview about the crop they should use and also the fertilizer that can be used for the soil. This would result in time saving and optimizing the labor work which could in turn be profitable for them.

Theoretical Analysis



Hardware/Software Requirements:

IBM Watson Studio , Auto AI

NodeRed

OpenWeatherMap API - https://openweathermap.org/ (A scientific yet simple method of weather forecast and machine learning).

Agro API - https://agromonitoring.com/ (API for natural integration of satellite images to agricultural applications and machine learning) .

Cloud Foundry Service.

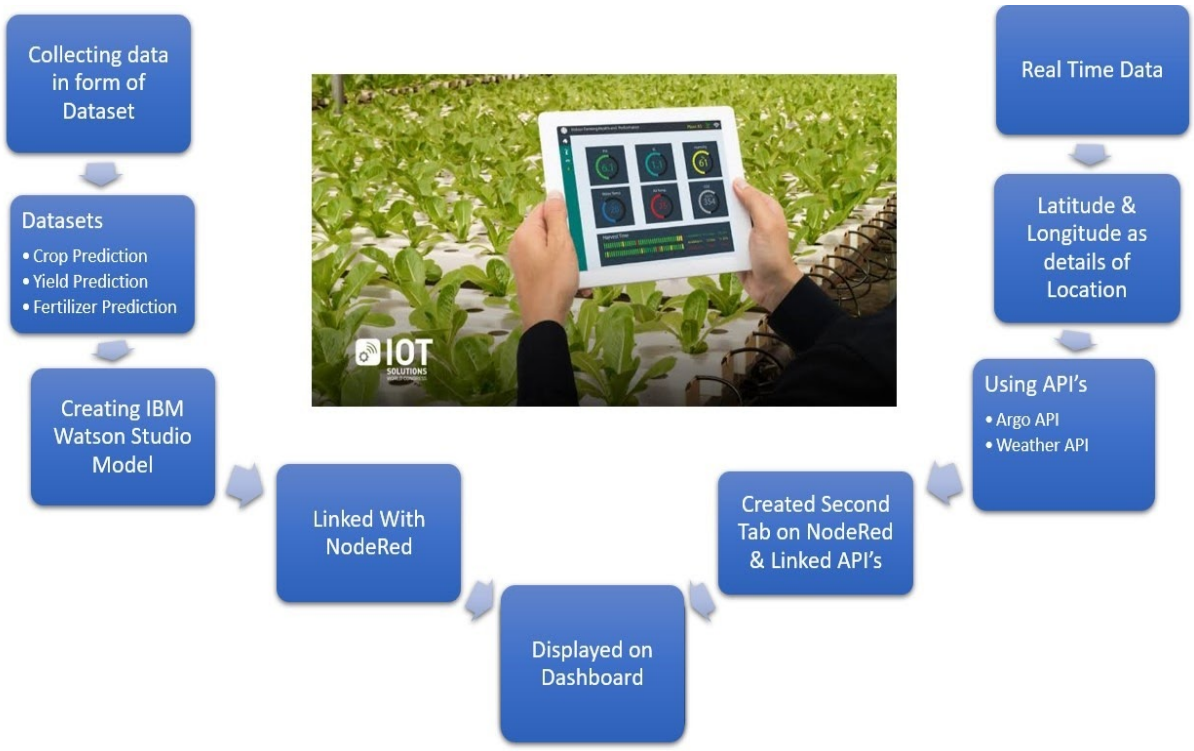
Experimental Investigation:

The team explored the many data sources which are available for India and the ICAR (Indian Council For Agricultural Research) website to gain insights into the current agriculture situations and techniques. Apart from the solution, we came to know about the other problems which are facing the farmers and we will try to come up with the other problems also.

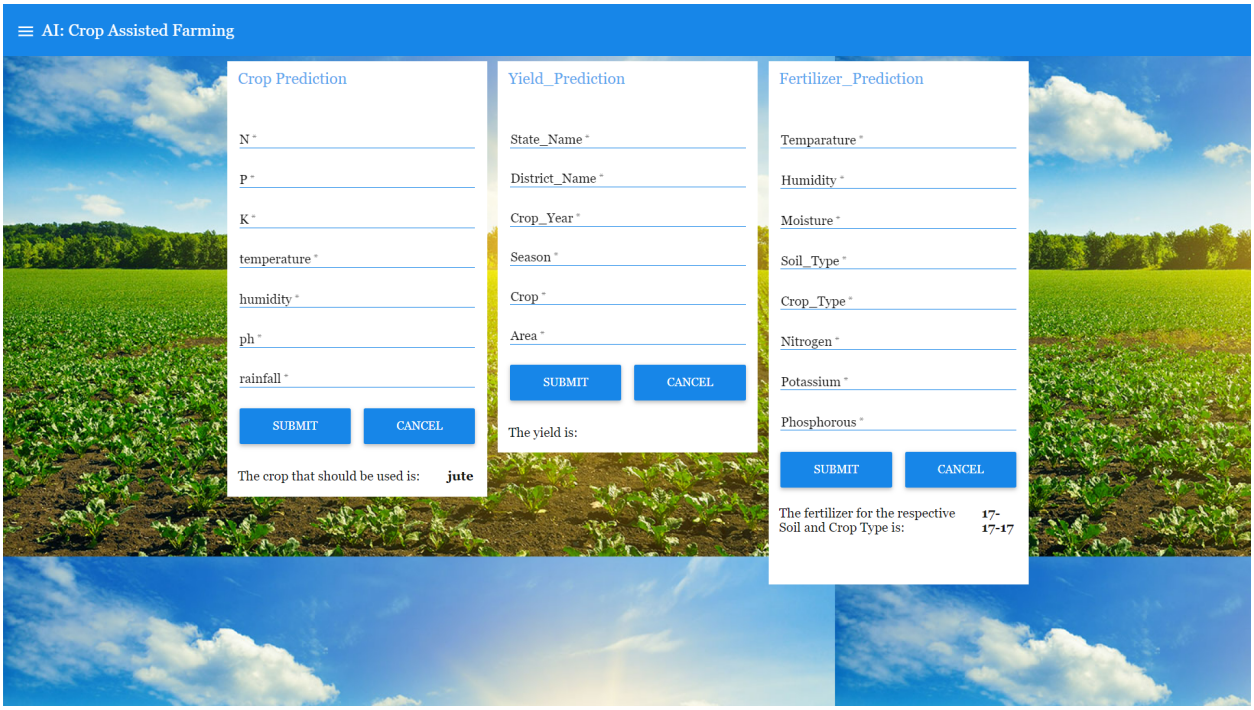
We explored different APIs to enhance the working of the project, APIs we used are agro API and Weather API.

FLOWCHART:

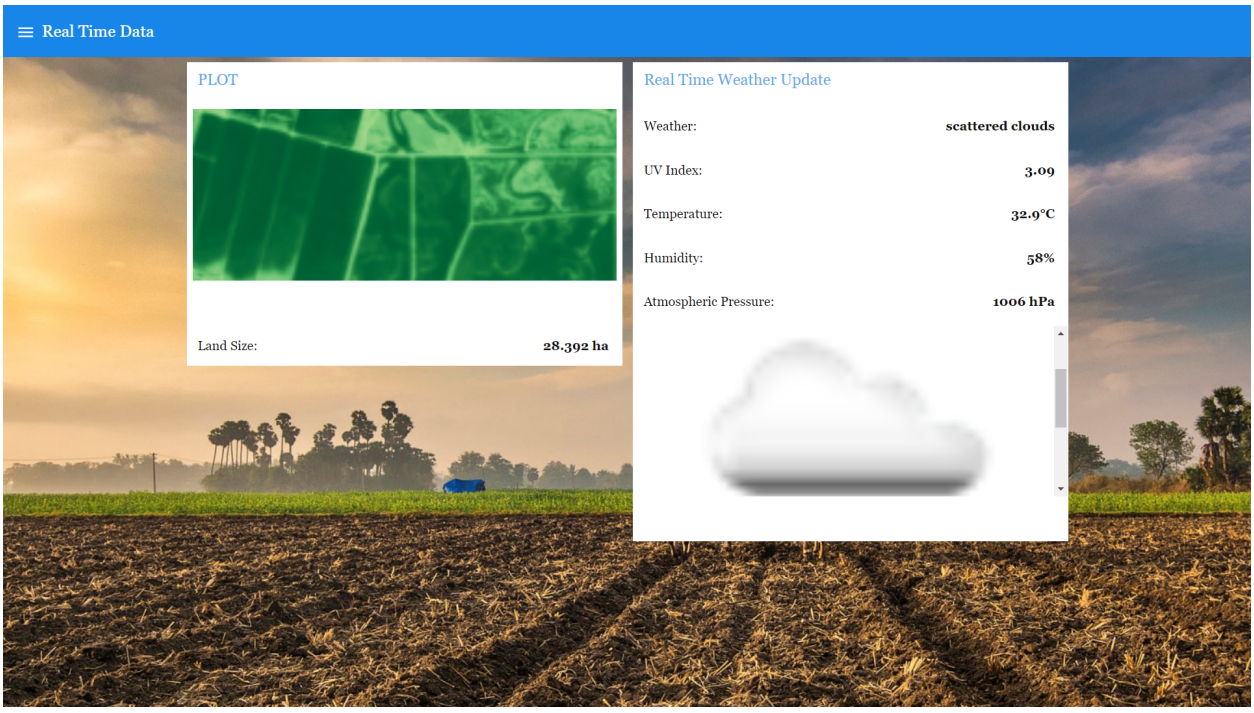
The process followed for achieving the solution is shown in the flowshart given below:



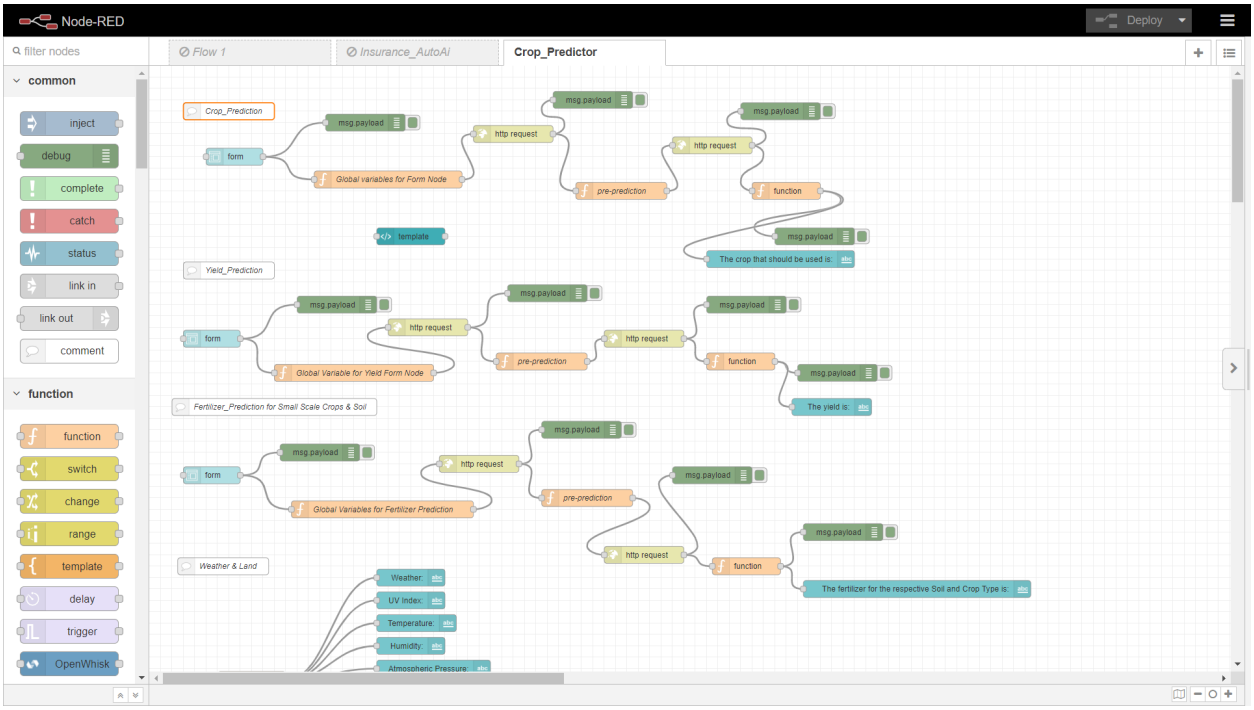
RESULT: The first TAB shows 3 parameters : Crop, Yield, and Fertilizer.



The second TAB shows the real time Weather and Land Conditions



Node Red Flow Screenshot:



ADVANTAGES	DISADVANTAGES
Farmers can view their fields from anywhere around.	Due to the abnormal changes / fluctuations in weather conditions, we can't predict the most valuable crop.
As India has many different seasons and temperatures so our project can predict the crop before the farmer can think.	The fertilizer prediction can only be made for a small scale of land or crops as the dataset of it is minimal.
Farmers from all over India can easily access this web application.	The farmers have to be trained on how to use this dashboard which can be delivered to them by well-trained employees.

This web application provides real time weather updates of a particular location (Latitudes, Longitudes) and also shows a part of land in the dashboard through a given set of coordinates.	
We can see the real image of the cloud conditions of a particular area that gets updated every 3-4 hours.	

Applications:

Agricultural and Farming Sectors.

It can be further used for research areas that can be implemented for ease of work and optimization of labour.

User Friendly Dashboard - Can be accessed anywhere without any trouble.

Real Time APIs - Can predict accurate weather changes that can help the farmer deal with his land accordingly.

Conclusion:

This project will make farming AI-assisted by helping farmers predict the best possible crop to grow based on different natural parameters at that particular time, predict the yield, help farmers select the fertilizer to be used, and show the real-time situation of the field on the website. In this project, we have trained Auto AI models for prediction in IBM Watson Studio and linked them with NodeRed to display the results on the WebPage. We have integrated OpenWeather API with NodeRed to show the real-time weather conditions of the farmer's field. Farmers can see the satellite view of their field on the Dashboard as we have used Agro API. This project will help the farmers to monitor the crops properly and increase

productivity on a large scale.

Future Scope:

As India is a vast market of agriculture and has 5th rank in agriculture production, If we see our current scenario then we can state that every industry is moving towards technology and investing their most of the efforts to build the online presence to make the best use of the sources. Our project is a small contribution to the agriculture sector. If our youth pay attention to the agriculture sector as much as they are putting their efforts into other fields then we can save the hard work of farmers by giving them facilities to improvise their production time.

We have come up with two important improvisations that can enhance the dashboard with vast functionalities.

1. **Prediction of Crop Disease**: We want to add a TAB where one can predict the type of disease the crop is going through the image of the same. For this, we have a huge dataset which we couldn't train as the CUH allotted for the academic initiative account was not enough.

2. **Integration of Seed Corporation Houses in a Locality:** In future enhancements, we want to add an API for real-time global map (or) map of India where a farmer can search for all the seed corporation houses nearby in his locality and purchase the seeds for his crop. The map can be pushed with the location of all the seed corporation houses in India along with their contact so that it would be efficient for the farmer to go and purchase the desired seeds and fertilizer. It may lead to productivity in time management.

Bibliography:

1. Datasets from Kaggle

2. Data.gov, Datahub.io

3.Youtube reference videos, Github