

# **IBM HACK CHALLENGE**

**2021**

**Project Report**

**on**

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

**by**

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# **1. Introduction**

## **1.1 Overview**

In this project, a web application is developed in order to predict the crop , yield and price for the cultivated land based on climatic factors. The climatic parameters like N, P, K, humidity, temperature, Ph, rainfall are analysed to recommend the crop which in turn analysed along with cultivation cost and production cost to predict the yield and price.

- Project Requirements: IBM Initiative account ,Web Browser
- Technical Requirements: Watson Studio service, Machine Learning Service, Node-red service
- Software Requirements: Watson Studio Desktop , Web Browser
- Project Deliverables: AI-Assisted Farming for Crop Recommendation & Farm Yield Prediction Application
- Project Team: TECH ZILLAS
- Project ID: [SPS\\_PRO\\_2113](#)

## **1.2 Purpose**

This application recommends crops to the farmers with high accuracy which will never bring them to a situation of facing loss in most cases. With this farmers can see a tremendous increase in the crop productivity.

## 2. Literature Survey

### 2.1 Existing Problem

There are some crop recommendation in existence which have certain disadvantages as follows

- Inefficient choice of algorithm
- Improper analysis of dataset
- Investment of farmer was not considered
- Lack of accuracy in result

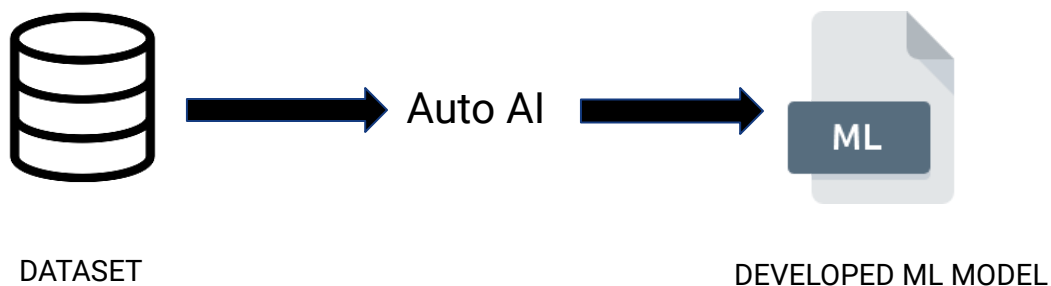
### 2.2 Proposed Solution

In the proposed solution, the model is developed and deployed in IBM Watson Studio. Therefore the algorithm with high accuracy is chosen with IBM capabilities. And before developing the model, the dataset is well analysed.

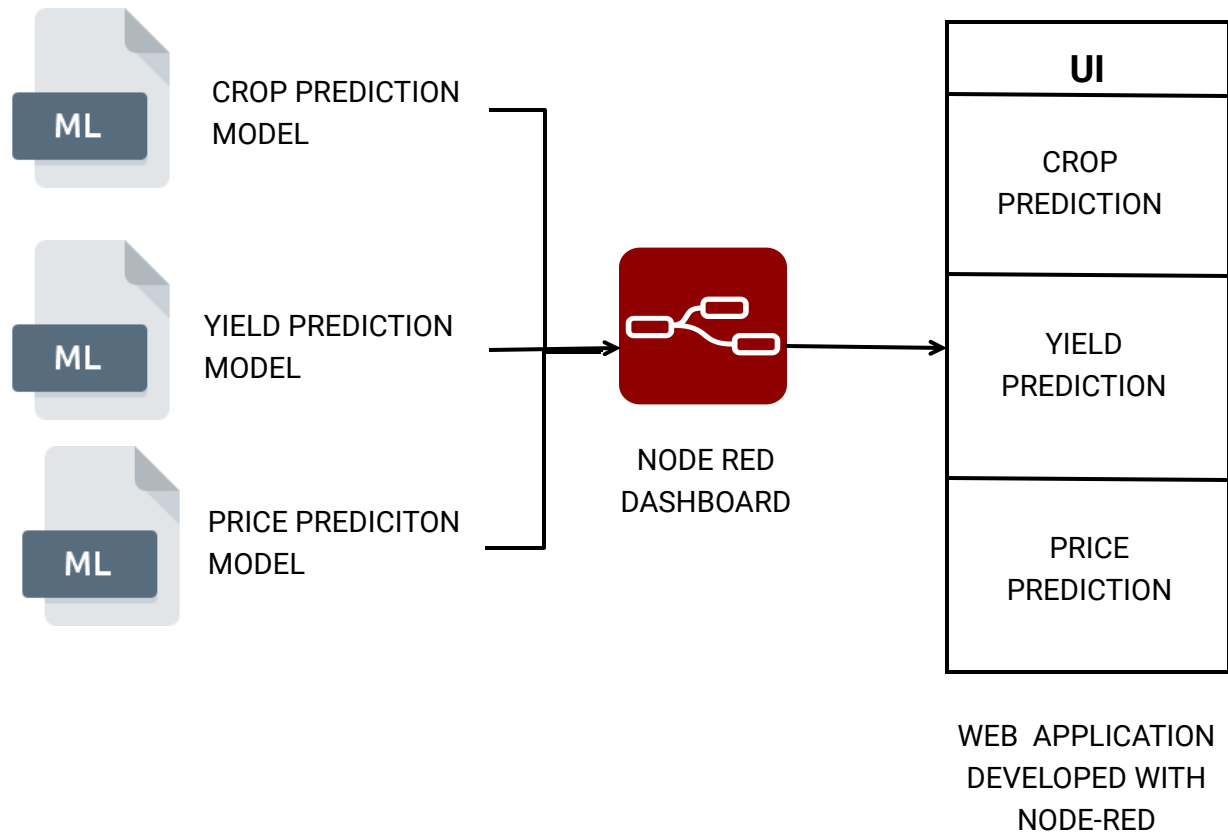
## 3. Theoretical Analysis

### 3.1 Block Diagram

Module 1:



## Module 2:



## 3.2 Hardware/Software Designing

### Hardware Requirements:

- Memory: 16GB of RAM
- Processor: 4-core or more
- Free disk space: 18.3 GB

### Software Requirements:

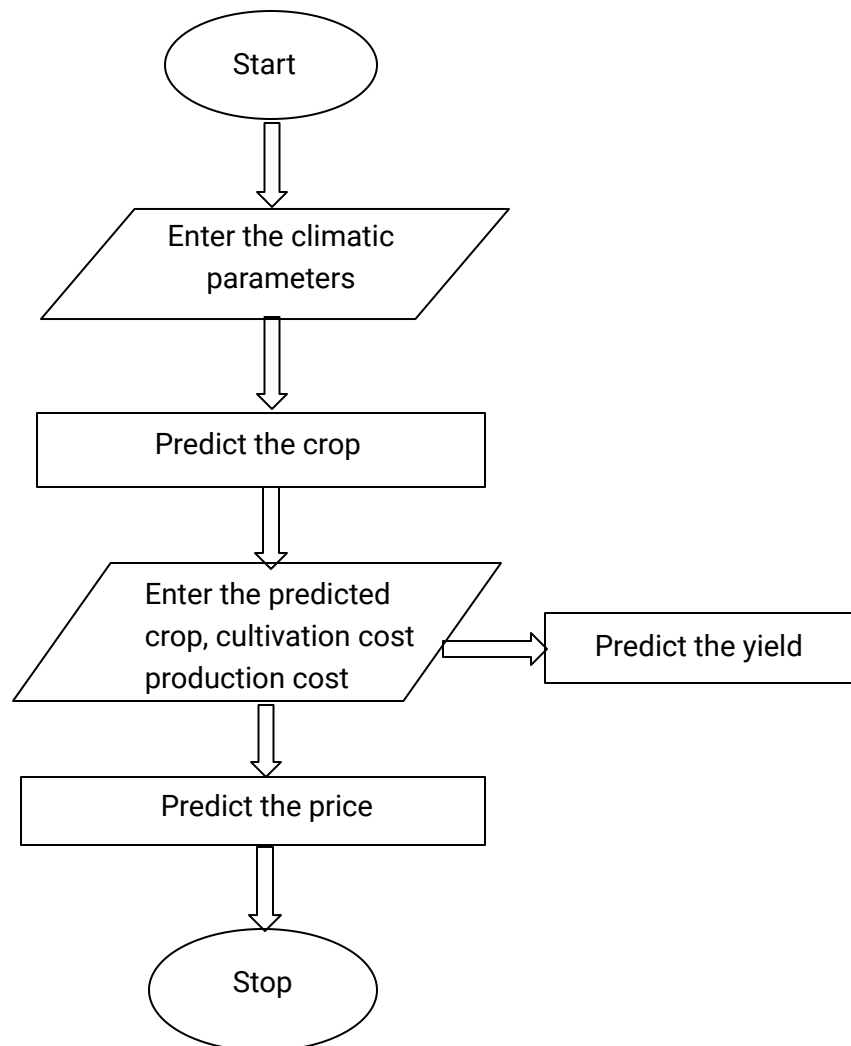
- Operating System: Microsoft Windows 10
- Watson Studio Desktop
- Web Browser

## 4. Experimental Investigations

The following is the analysis made while working on the solution

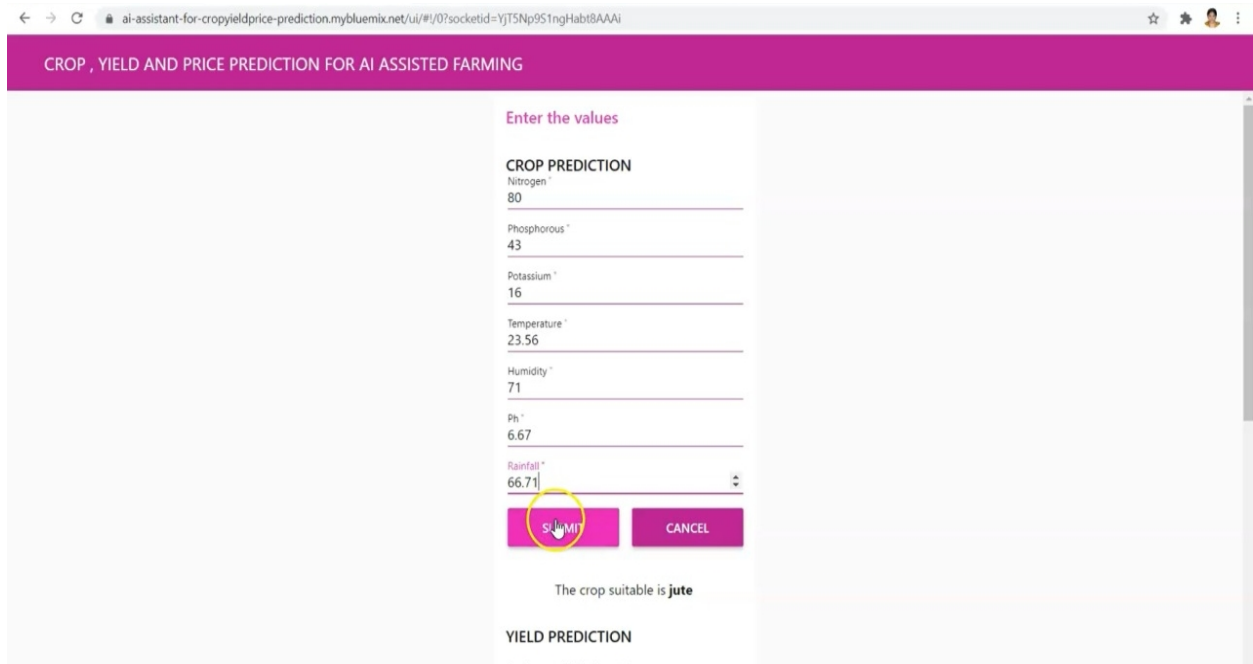
Climatic factors are the primary requirements for a crop. With the change in climatic conditions and increasing pollution, it is hard for famers to decide the crop to be cultivated. As climatic parameters are analysed to predict the crop with better yield, this application suggests the best suitable crop at right time. Farmers can see more profit at low risk. In this way, it meets the increasing demand of food for increasing population.

## 5. Flowchart



## 6. Result

- The required climatic parameters are entered.

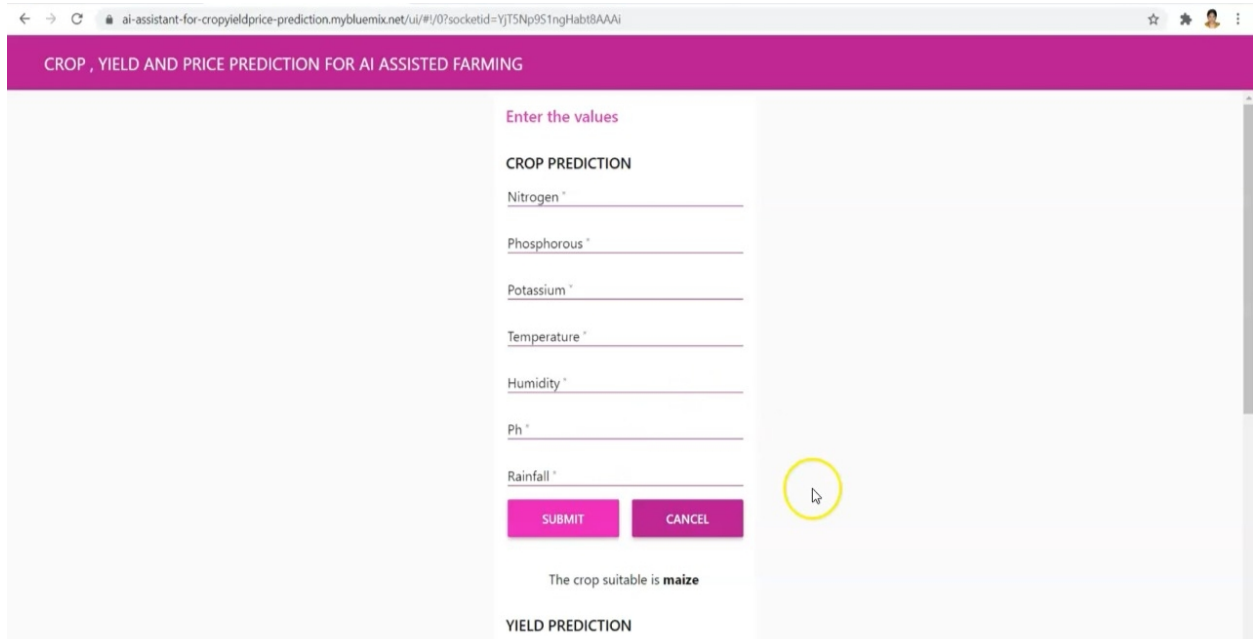


The screenshot shows a web browser window with the URL `ai-assistant-for-cropyieldprice-prediction.mybluemix.net/ui/#/0?socketid=yjTSNp9S1ngHabt8AAAI`. The page title is "CROP , YIELD AND PRICE PREDICTION FOR AI ASSISTED FARMING". The form is titled "Enter the values" and contains the following inputs:

Parameter	Value
Nitrogen *	80
Phosphorous *	43
Potassium *	16
Temperature *	23.56
Humidity *	71
Ph *	6.67
Rainfall *	66.71

The "SUBMIT" button is highlighted with a yellow circle. Below the form, the text "The crop suitable is **jute**" is displayed. The "YIELD PREDICTION" section is visible but empty.

- On clicking submit, the crop is predicted. In this example, the crop predicted is maize.



The screenshot shows the same web browser window as the previous one. The form is titled "Enter the values" and contains the following inputs:

Parameter	Value
Nitrogen *	
Phosphorous *	
Potassium *	
Temperature *	
Humidity *	
Ph *	
Rainfall *	

The "SUBMIT" button is highlighted with a yellow circle. Below the form, the text "The crop suitable is **maize**" is displayed. The "YIELD PREDICTION" section is visible but empty.

- The crop predicted , cultivation cost and production cost are entered to predict the yield.

The screenshot shows a web application interface for crop yield and price prediction. The header is a purple bar with the text "CROP , YIELD AND PRICE PREDICTION FOR AI ASSISTED FARMING". Below the header, there are input fields for "Ph" and "Rainfall", followed by "SUBMIT" and "CANCEL" buttons. The text "The crop suitable is **maize**" is displayed. The "YIELD PREDICTION" section has an input field for "Enter predicted crop" with "maize" entered, and input fields for "Crop cultivation cost" (20000) and "Crop production cost" (500). The "SUBMIT" button is highlighted with a yellow circle. Below the form, the text "The yield is 6.912020683288574" is shown. The "PRICE PREDICTION" section has an input field for "Enter predicted crop".

- On clicking submit, the yield is predicted. In this example, the yield predicted is 41.639.

The screenshot shows the same web application interface as the previous one, but with a different yield prediction. The "YIELD PREDICTION" section has the same input fields, but the "SUBMIT" button is no longer highlighted. Below the form, the text "The yield is 41.639923095703125" is shown. The "PRICE PREDICTION" section has the same input field.

- The crop predicted, cultivation cost and production cost are entered to predict the price.

The crop suitable is **maize**

**YIELD PREDICTION**

Enter predicted crop \*

Crop cultivation cost \*

Crop production cost \*

**SUBMIT** **CANCEL**

The yield is **41.639923095703125**

**PRICE PREDICTION**

Enter predicted crop \*

maize

Crop cultivation cost \*

20000

Crop production cost \*

581

**SUBMIT** **CANCEL**

The price is Rs. **2515**

- On clicking submit, the price is predicted. In this example, the price predicted is Rs.1850.

The crop suitable is **maize**

**YIELD PREDICTION**

Enter predicted crop \*

Crop cultivation cost \*

Crop production cost \*

**SUBMIT** **CANCEL**

The yield is **41.639923095703125**

**PRICE PREDICTION**

Enter predicted crop \*

Crop cultivation cost \*

Crop production cost \*

**SUBMIT** **CANCEL**

The price is Rs. **1850**



## **7. Advantages & Disadvantages**

Advantages:

- It is useful for farmers to reduce the loss.
- It is user friendly
- It gives accurate result

Disadvantages:

- The land for cultivation is not considered
- Difficult for farmers those who don't know to use mobile.

## **8. Applications**

- In predicting crops for crop rotation.
- In increasing food production.
- In adding minerals to the soil

## **9. Conclusion**

The proposed work 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 considering various attributes. This would provide a comprehensive prediction on the basis of geographical, environmental and the economic aspects.

## 10. Future Scope

- This system can be extended to consider market demand and availability of market infrastructure, expected profit and risk and post harvest storage and processing technologies.
- Large datasets with different attributes are analysed to improve the accuracy.
- Speech recognition can be included

## 11. Bibliography

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- Department of Agriculture Sri Lanka (2015), ‘Crop Suitability Recommendation for Grama Niladhari Divisions in Sri Lanka’, Natural Resources Management Center, Peradeniya.