IBM HACK CHALLENGE

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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

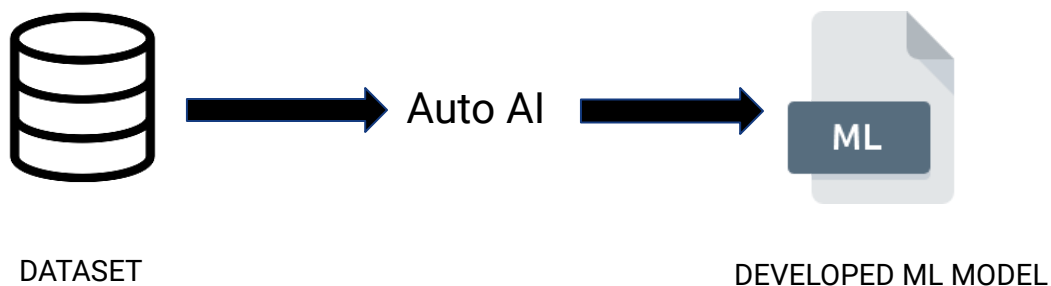- Investment of farmer was not considered

- 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.
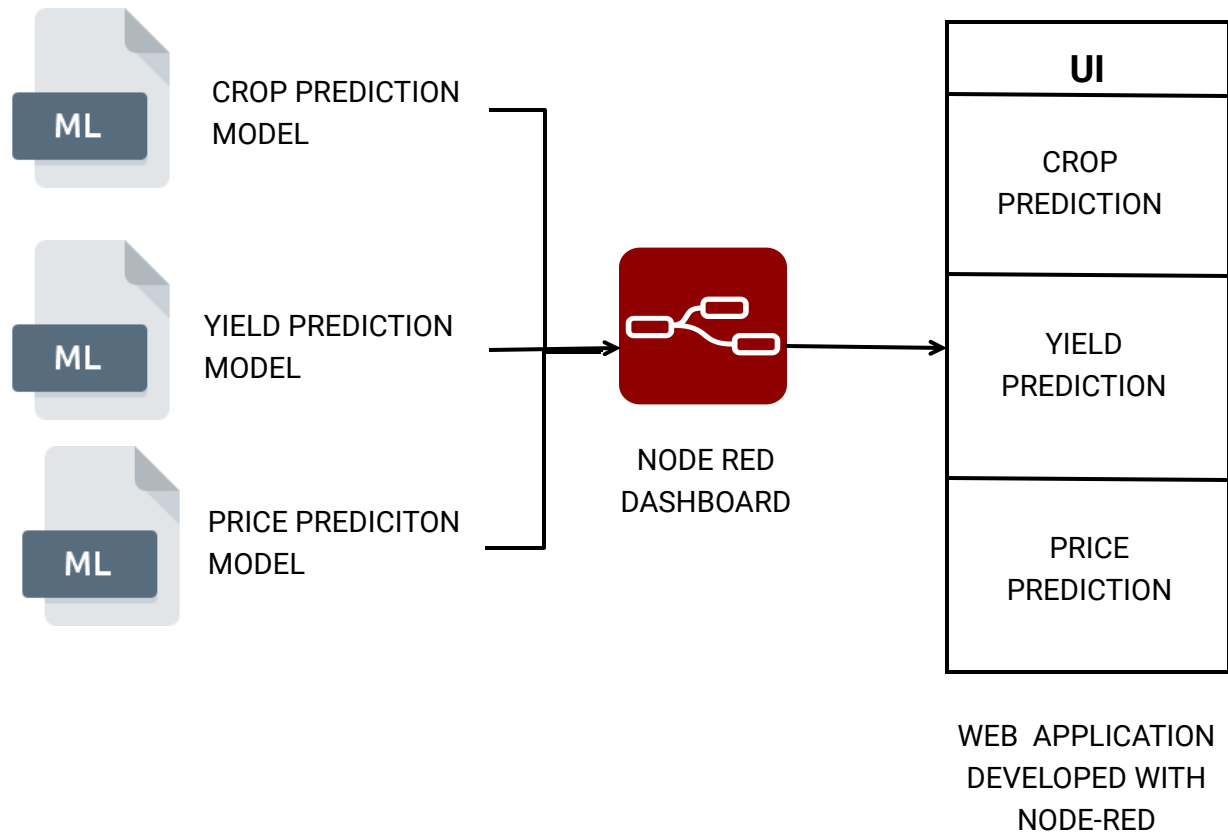
3. Theoritical Analysis

3.1 Block Diagram

Module 1:

DATASET   Auto AI   DEVELOPED ML MODEL

Module 2:

CROP PREDICTION MODEL

YIELD PREDICTION MODEL

PRICE PREDICITON MODEL

NODE RED DASHBOARD

UI

CROP PREDICTION

YIELD PREDICTION

PRICE PREDICTION

WEB APPLICATION DEVELOPED WITH NODE-RED

3.2 Hardware/Software Designing

Hardware Requirements:

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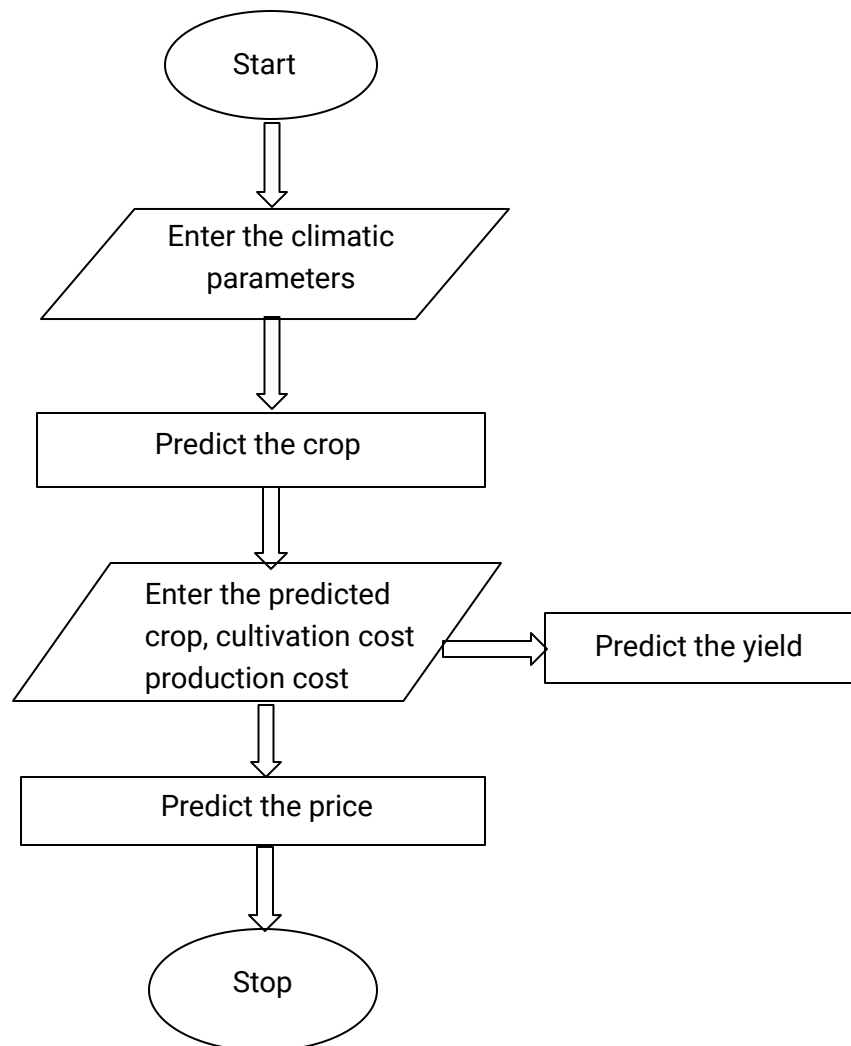- Free disk space: 18.3 GB

Software Requirements:

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

4. Experimental Investigations

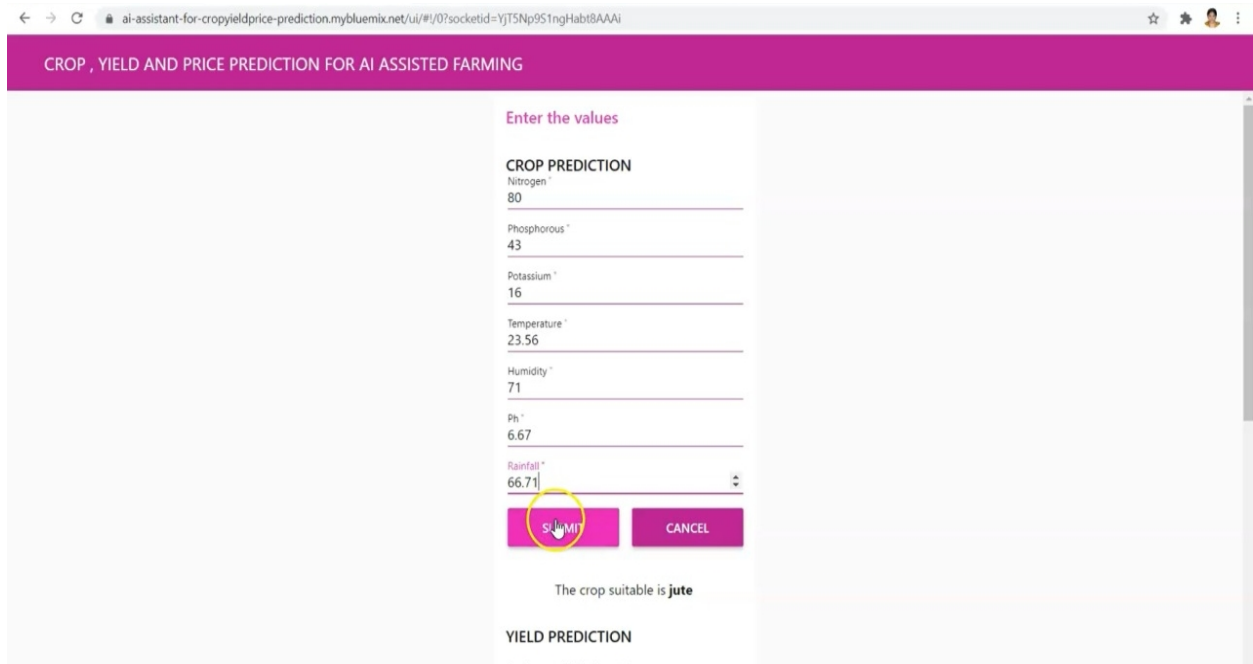The following is the analysis made while working on the solution

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

```
                    ┌─────────────┐
                    │    Start    │
                    └──────┬──────┘
                           │
                    ╱─────────────╲
                   ╱ Enter the climatic ╲
                   ╲    parameters    ╱
                    ╲─────────────╱
                           │
                    ┌─────────────┐
                    │ Predict the crop │
                    └──────┬──────┘
                           │
              ╱──────────────────╲
             ╱ Enter the predicted  ╲        ┌──────────────────┐
             ╲ crop, cultivation cost ├──────▶│ Predict the yield │
             ╲  production cost     ╱        └──────────────────┘
              ╲──────────────────╱
                           │
                    ┌─────────────┐
                    │ Predict the price │
                    └──────┬──────┘
                           │
                    ┌─────────────┐
                    │    Stop     │
                    └─────────────┘
```

6. Result

- The required climatic parameters are entered.
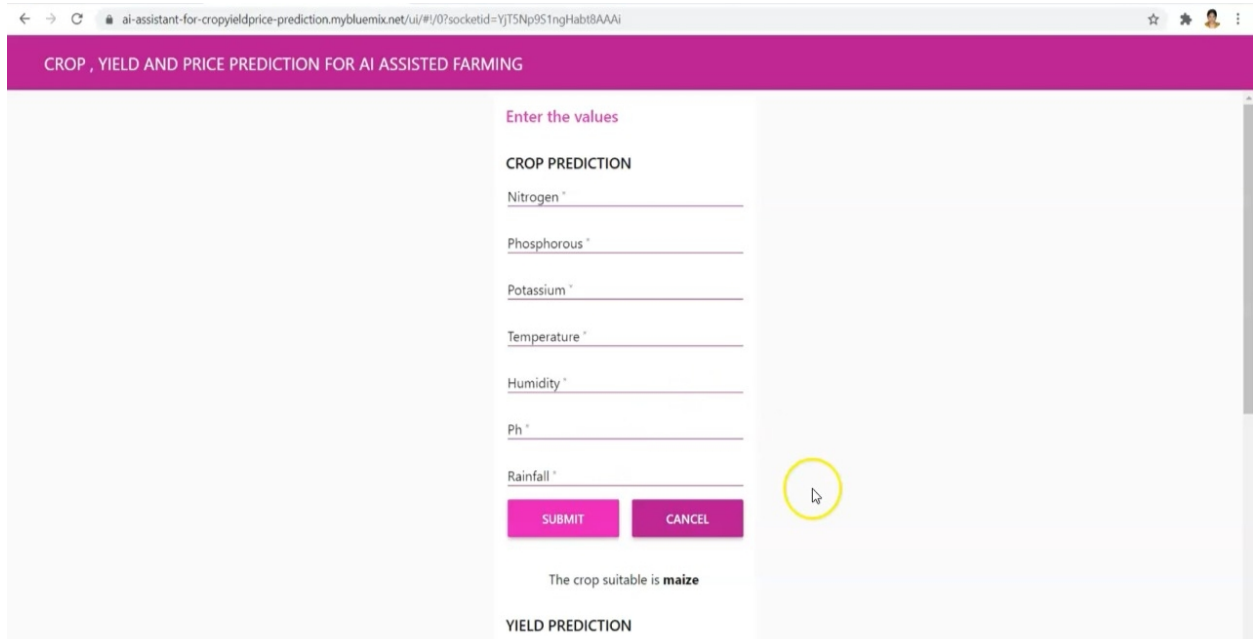
- On clicking submit, the crop is predicted. In this example, the crop predicted is maize.

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

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

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

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

- Remi Schmaltz, "What is Precision Agriculture", April 2017. [Online]. Available: https://agfundernews.com/what-is-precisionagriculture.html [Accessed Feb.23, 2020].

- A. de Carbon, "PRECISION AGRICULTURE: ITS BENEFITS AND LIMITATIONS", carrhure, 2019 [Online]. Available: https://www.carrhure.com/precisionagriculture-benefits-limitations/ [Accessed: Feb.25, 2020].

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