1. INTRODUCTION :

Overview :

Agriculture is one of the oldest activities of civilization. Currently, the food production is inadequate and doesn't generate more income to farmers due to wrong crop cultivation according to farming factors like soil, climate, rainfall. The main objective of this project is to Assist farmers using machine learning techniques to recommend the good crops which in turn will provide better yeilds from the given and also predict the yeild of particular crop by analysing past data sets.

2. LITERATURE SURVEY :

Existing Problem :

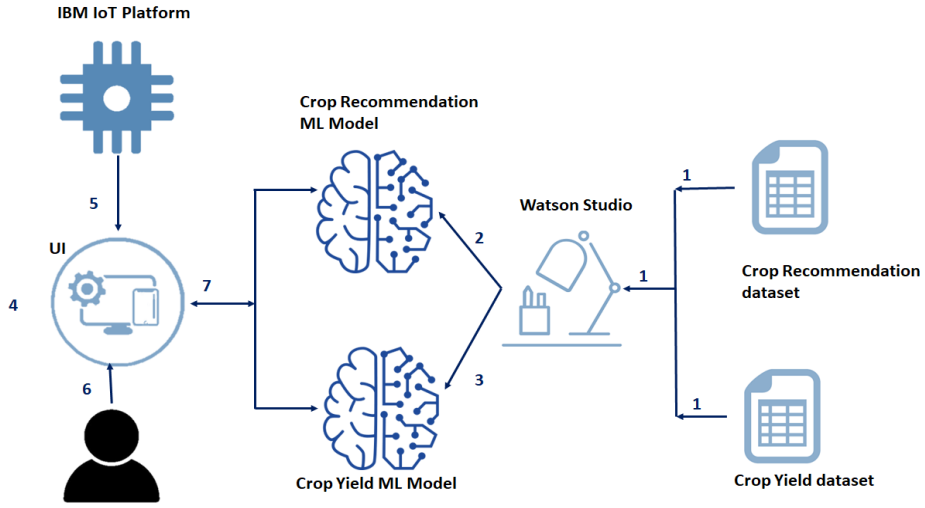
Lack of efficent or productive assistance machine learning models which helps in getting efficent production

Proposed Solution :

1. Cognos Analysis of Data using IBM Cognos Analytics.
2. Development Of Machine Learning Model using IBM WATSON STUDIO using AutoAI TOOL.
3. Development of Watson Assistant and integration in the webpage.

3. THEORITICAL ANALYSIS :

BLOCK DIAGRAM :



3.2.Hardware / Software Used :

IBM Watson Studio

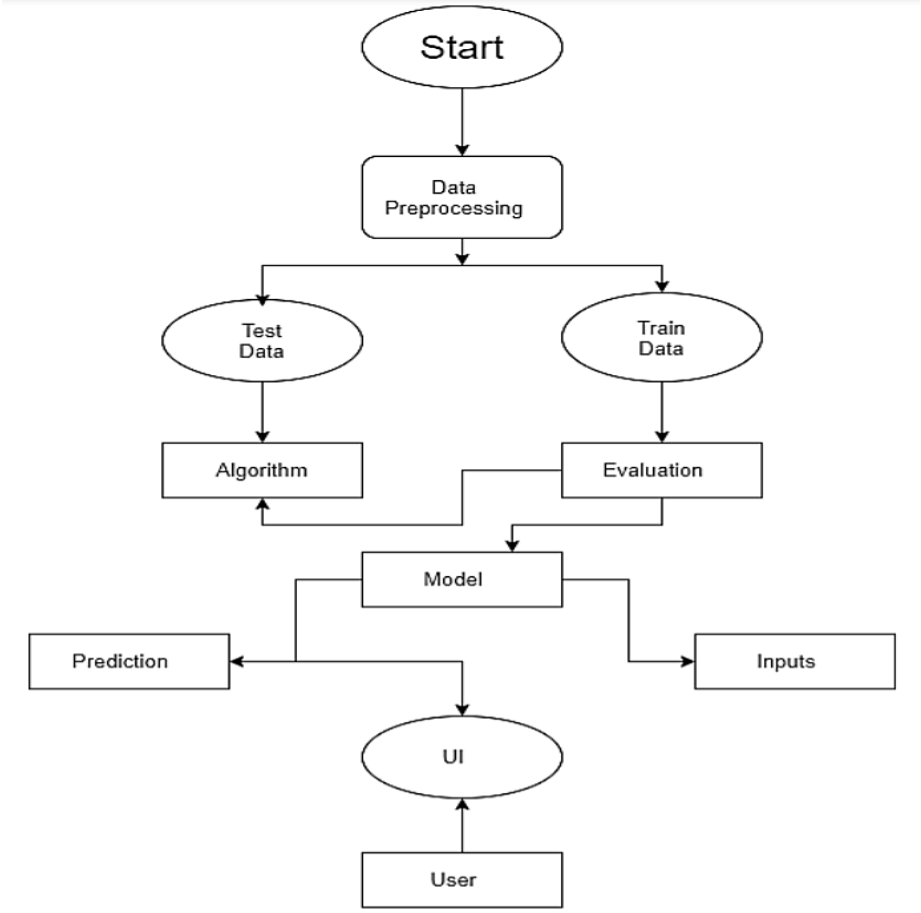
IBM Watson Assistant

IBM Cognos Analytics

4 .EXPERIMENTAL INVESTIGATIONS :

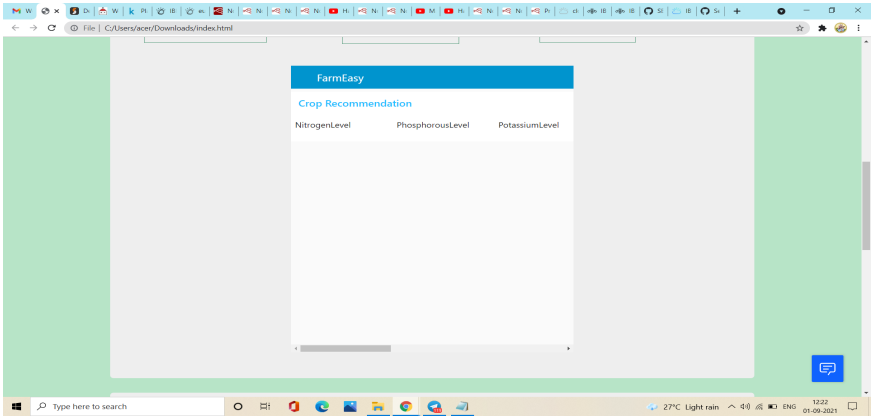
90% of data was used for training the algorithm and the rest 10% for testing purpose. In case of crop production data, regression prediction type. XGB Regressor algorithm generated RMSE 15920016.982, Snap Decision Tree Regressor generated RMSE 168680035.189, 20708122.413, 21207842.478 and the fastest 8969848.870 with HPO-1, HPO-2, FE enhacement with 8 second of build time

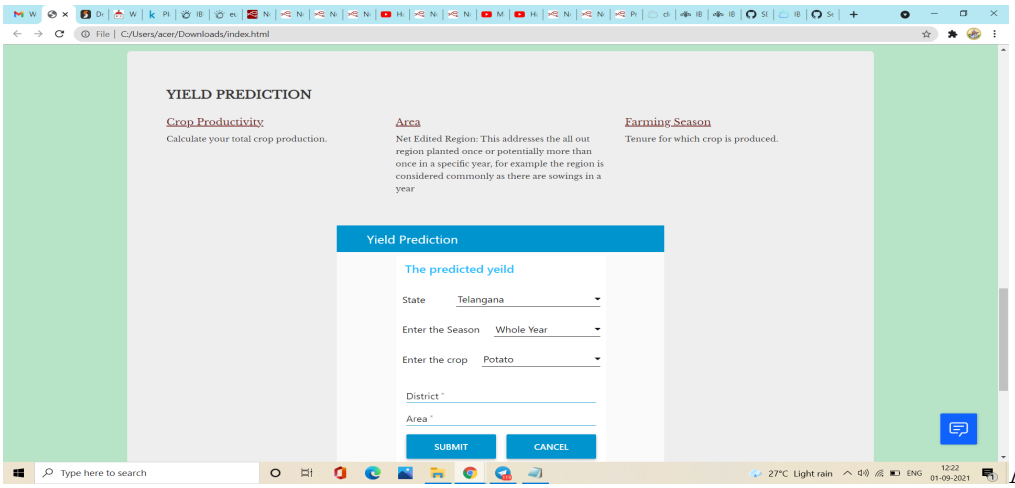
5.Flow Chart:



Results :

Developed Webapplication using nodered output snapshots





Advantage :

- Information was dissected utilizing relapse and multiclass characterization strategies which brought about exact forecasts.
- Incorporation of web application in a solitary website page which is created utilizing portable first methodology prompts utilization from any gadget.
- Watson Assistant gives visit answers for client questions.
- Harvest is anticipated utilizing AI Model which is exceptionally precise, correspondingly the complete creation forecast.

Disadvantages :

- Conflicting Information additionally results in wrong expectation
- Restricted Information prompts expectation shortcoming
- Missing Qualities, Spelling Deviations all through the information are to be either eliminated or standardized to single worth to work on model precision CUH LIMIT prompts restricted use.

Applications :

- This arrangement can be applied in the advanced cultivating area.
- Precise Yield and its creation can be anticipated.
- Computer based intelligence applications in horticulture have created applications and instruments which help ranchers incorrect and controlled cultivating by giving them legitimate direction to ranchers about water the executives, crop turn, opportune gathering, kind of harvest to be developed, ideal planting and so on

Conclusion :

- AI recognizes patterns a lot in information inspecting enormous pieces of information and gives yield right away.
- The ability to convey significantly more in the Horticulture area is moved by by AI.
- Mechanization and constant improvement are distinct advantages in

the rural area as we have learned in IBM courses.

Feature Scope :
Application in Current Cultivating Strategy like plant species reproducing what's more, the executives, soil and water the board, yield creation and crop quality, calamity discovery a weed recognition.

Wedpage Creation:

```
<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>FarmEasy</title>
    <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.5.1/jquery.min.js"></script>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.16.0/umd/popper.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
    <link rel="shortcut icon" type="image/x-icon" href="leaf.png" />
</head>
<style>
    @import url('https://fonts.googleapis.com/css2?family=Libre+Baskerville&display=swap');
    @import url('https://fonts.googleapis.com/css2?family=Allison&display=swap');
    body {
        font-family: 'Libre Baskerville', serif;
        background: #b7e4c7;
    }
    .container h1 {
        font-family: 'Allison', cursive;
        font-size: 75px;
        text-align: center;
        color: #7f4f24;
    }
    .container p {
        font-size: 13px;
        line-height: 23px;
    }
    .particular {
        margin-left: 85px;
```

```
    }
    .jumbotron h2 {
        font-size: 20px;
        text-transform: uppercase;
        font-weight: bold;
    }
    .card-body h3 {
        font-size: 16px;
        color: #6f1d1b;
        text-decoration: underline;
    }
    .primary {
        border: 1px solid #40916c;
        padding: 15px;
        color: #40916c;
    }
    .row a {
        text-decoration: none;
    }
    .primary:hover {
        background: #40916c;
        transition: .3s ease;
        color: white;
    }
</style>

<body>
    <!-- Navbar -->
    <nav class="navbar navbar-inverse">
        <div class="container-fluid">
            <div class="navbar-header">
                <button type="button" class="navbar-toggle" data-toggle="collapse"
data-target="#myNavbar">
                    <span class="icon-bar"></span>
                    <span class="icon-bar"></span>
                    <span class="icon-bar"></span>
                </button>
                <a href="index.html" class="navbar-brand">
                    <img src="leaf.png" width="30" height="28" alt="Logo">
                </a>
                <a class="navbar-brand" href="index.html">FarmEasy</a>
```

```
        </div>
        <div class="collapse navbar-collapse" id="myNavbar">
          <ul class="nav navbar-nav">
            <li><a href="#about">About</a></li>
            <li><a href="#cropRecommendation">Crop Recommendation</a></li>
            <li><a href="#cropProduction">Yield Prediction</a></li>
            <li><a href="#contact">Contact</a></li>
          </ul>
        </div>
      </div>
    </nav>
    <!-- Navbar Ends-->

    <!-- Jumbotron -->
    <div class="container">
      <div class="jumbotron">
        <h1>FarmEasy</h1>
        <p class="particular">Anticipate your harvest and all out creation as indicated by your dirt,
environment and district utilizing Machine Learning.</p>
      </div>
    </div>
    <!-- Jumbotron Ends -->

    <!-- Carousel -->
    <div class="container">
      <div id="myCarousel" class="carousel slide" data-ride="carousel">
        <!-- Indicators -->
        <ol class="carousel-indicators">
          <li data-target="#myCarousel" data-slide-to="0" class="active"></li>
          <li data-target="#myCarousel" data-slide-to="1"></li>
          <li data-target="#myCarousel" data-slide-to="2"></li>
        </ol>

        <!-- Wrapper for slides -->
        <div class="carousel-inner">
          <div class="item active">
            <img src="./pexels-lisa-109260.jpg" alt="Carousel 1" style="width:100%;">
          </div>

          <div class="item">
            <img src="./pexels-pixabay-207247.jpg" alt="Carousel 2" style="width:100%;">
```

```
            </div>

            <div class="item">
               <img src="./pexels-toan-pham-2681673.jpg" alt="Carousel 3" style="width:100%;">
            </div>
         </div>

         <!-- Left and right controls -->
         <a class="left carousel-control" href="#myCarousel" data-slide="prev">
            <span class="glyphicon glyphicon-chevron-left"></span>
            <span class="sr-only">Previous</span>
         </a>
         <a class="right carousel-control" href="#myCarousel" data-slide="next">
            <span class="glyphicon glyphicon-chevron-right"></span>
            <span class="sr-only">Next</span>
         </a>
      </div>
   </div>
   <!-- Carousel Ends -->
   <br>

   <!-- About -->
   <div class="container" id="about">
      <div class="jumbotron">
         <h2>About</h2>
         <br>
         <p>
            Today, practically the whole economy is being supported by farming, which is the backbone of the towns. It contributes 16% of the general GDP and records for work of roughly 52% of the Indian populace. Fast development in farming is fundamental for confidence
            as well as to procure significant unfamiliar trade. Indian ranchers are top-notch underway and efficiency notwithstanding of the way that millions are peripheral and little ranchers. They take on further developed agribusiness innovation
            as effectively as ranchers in created nations. Ranchers become acquainted with the best harvest which gives more benefit to them utilizing Machine Learning. </p>
      </div>
   </div>
   <!-- About Ends -->

   <!-- Crop Recommendation -->
   <div id="cropRecommendation" class="container">
```

```
<div class="jumbotron">
  <h2>Crop Recommendation</h2>

  <div class="row">
    <div class="col-sm-4">
      <div class="card">
        <div class="card-body">
          <h3 class="card-title">Essential Nutrients</h3>
          <p class="card-text">Nitrogen (N), phosphorous (P), and potassium (K) are the three main nutrients that are conventionally supplied by inorganic fertilizers</p>

          <!-- The Modal -->
          <div class="modal" id="myModal1">
            <div class="modal-dialog">
              <div class="modal-content">

                <!-- Modal Header -->
                <div class="modal-header">
                  <h2 class="modal-title">SOIL TEST PARAMETERS / NUTRIENTS</h2>
                  <button type="button" class="close" data-dismiss="modal">×</button>
                </div>

                <!-- Modal body -->
                <div class="modal-body">
                  1.Ratio of soil to extractant <br> 2.Shaking time, action and speed <br> 3.Overall techniques used in the lab <br> 4.Cut-off" levels for high test results <br> 5.Nitrogen ,Phosphorus,Sulphur <br> 6.FERTILIZER
                  PLACEMENT <br>
                </div>

                <!-- Modal footer -->
                <div class="modal-footer">
                  <button type="button" class="btn btn-danger" data-dismiss="modal">Close</button>
                </div>

              </div>
            </div>
          </div>
          <br>
          <br>
```

```
                    <a href="https://soilhealth.dac.gov.in/NewHomePage/StateWiseNPKChart"
class="primary" target="_blank">Get Your Soil Health Card</a>
                </div>
              </div>
            </div>

            <div class="col-sm-4">
              <div class="card">
                <div class="card-body">
                  <h3 class="card-title">Temperature</h3>
                  <p class="card-text">Temperature increase reduces global yields of major crops in four
independent estimates 1.Significance,2.Abstract,3.Results and Discussion</p>



                  <!-- The Modal -->
                  <div class="modal" id="myModal2">
                    <div class="modal-dialog">
                      <div class="modal-content">

                        <!-- Modal Header -->
                        <div class="modal-header">
                          <button type="button" class="close" data-dismiss="modal">×</button>
                        </div>

                        <!-- Modal body -->
                        <div class="modal-body">
                          <p>
                            Notwithstanding how good light and dampness conditions might be, plant
development stops when the air and leaf temperature dips under a specific least or surpasses a specific
greatest worth. <br> Between
                            these limits, there is an ideal temperature at which development continues
with most prominent velocity. <br> These three temperature focuses are the cardinal temperatures for a
given plant; the cardinal
                            temperatures are known for most plant species, around. <br> Cool-season
crops (oats, rye, wheat, and grain) have low cardinal temperatures: least 32° to 41° F (0° to 5° C), ideal
77° to 88° F (25° το 31°
                            C), and most extreme 88° το 99° F (31° to 37° C). <br> For hot-season
crops, like melons and sorghum, the range of cardinal temperatures is a lot higher. <br> The cardinal
temperatures might change with
                            stage of advancement. <br> For instance, chilly treatment close to 32° F (0°
C) of sprouted seeds prior to planting can change winter rye into the spring type; such treatment, called
```

vernalization, has commonsense
application in cool environment plants.

Know
Your
Temperature

<h3 class="card-title">Rainfall</h3>
An individual rancher thinks that powerful precipitation is that amount that is valuable in raising harvests planted on his dirt.

Know Your Rainfall

<embed type="text/html" src="https://node-red-qjcdd-2021-07-18.eu-gb.mybluemix.net/ui/#!/0?socketid=Sg4zP2PerIvvGdIVAAAs" width="500" height="600">

```
<!-- Crop Recommendation Ends-->

<!-- Crop Production  -->
<div id="cropProduction" class="container">
  <div class="jumbotron">
    <h2>Yield Prediction</h2>

    <div class="row">
      <div class="col-sm-4">
        <div class="card">
          <div class="card-body">
            <h3 class="card-title">Crop Productivity</h3>
            <p class="card-text">Calculate your total crop production.</p>
          </div>
        </div>
      </div>

      <div class="col-sm-4">
        <div class="card">
          <div class="card-body">
            <h3 class="card-title">Area</h3>
            <p class="card-text">Net Edited Region: This addresses the all out region planted once or potentially more than once in a specific year, for example the region is considered commonly as there are sowings in a year</p>
          </div>
        </div>
      </div>

      <div class="col-sm-4">
        <div class="card">
          <div class="card-body">
            <h3 class="card-title">Farming Season</h3>
            <p class="card-text">Tenure for which crop is produced.</p>

            <div class="modal" id="myModal4">
              <div class="modal-dialog">
                <div class="modal-content">

                  <!-- Modal Header -->
                  <div class="modal-header">
                    <h2>Farming Season</h2>
```

```
                        <button type="button" class="close" data-dismiss="modal">×</button>
                    </div>

                    <div class="modal-footer">
                        <button type="button" class="btn btn-danger"
data-dismiss="modal">Close</button>
                    </div>

                </div>
            </div>
        </div>
    </div>
    </div>
    <br>
    <br>
    <center>
        <embed type="text/html"
src="https://node-red-jllth-2021-07-21.eu-gb.mybluemix.net/ui/#!/0?socketid=YkCQPBmELjVnai4rAAAa" width="500" height="500">
    </center>

  </div>
</div>
<!-- Crop Production -->

<!-- Contact -->
<div id="contact" class="container">
  <div class="jumbotron">
    <h2>Contact : </h2>
    <h3>
      <a
href="https://mail.google.com/mail/u/0/#inbox?compose=CllgCJqbzgZFkXtFdWZkplvnsCtMjldRwnCjGjGvgHkcRLgNnZwLQvQhVHMLVkmxFnGJXHntsFL" target="_blank">
        <p>Email Us At : hustlers369@gmail.com</p>
      </a>
    </h3>
    </a>
  </div>
</div>
```

```
    <!-- Contact -->

    <!-- footer -->
    <nav class="navbar navbar-inverse fixed-bottom">
        <ul class="nav navbar-nav">

        </ul>
        <p class="navbar-text">© Team Hustlers : Hack Challenge-IBM 2021 SmartInternz</p>
    </nav>

    <!-- Watson Assistant -->
    <script>
        window.watsonAssistantChatOptions = {
            integrationID: "ad38c544-b690-458b-819c-867cf379dc14", // The ID of this integration.
            region: "eu-gb", // The region your integration is hosted in.
            serviceInstanceID: "d425d0df-88c0-46ff-a754-4972b19efe5b", // The ID of your service instance.
            onLoad: function(instance) {
                instance.render();
            }
        };
        setTimeout(function() {
            const t = document.createElement('script');
            t.src = "#";
            document.head.appendChild(t);
        });
    </script>
</body>

</html>
```