Estimate The Crop Yield Using Data Analytics

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INTRODUCTION

1.1Project overview:

Analytics is the interpretation of data pattern that assist decision- making and performance improvement. Agriculture Data analytics in crop yield helps in analysing some important visualization, creating a dashboard and by going through these we will get most of the insights of Crop production in India. IBM Cognos Analytics integrates reporting, modelling, analysis, exploration, dashboards, stories, and event management so we can understand our organization\'s data, and make effective decisions. A dashboard helps us to monitor events or activities at a glance by providing key insights and analysis about our data on one or more pages or screens. In this project, we visualize, analyse and gain most of the insights by creating a dashboard.

1.2Purpose:

Agriculture is the backbone of Indian Economy. In India, majority of the farmers are not getting the expected crop yield due to several reasons. The agricultural yield is primarily depends on weather conditions. Rainfall conditions also influences the rice cultivation. In this context, the farmers necessarily requires a timely advice to predict the future crop productivity and an analysis is to be made in order to help the farmers to maximize the crop production in their crops. Yield prediction is an important agricultural problem. Every farmer is interested in knowing, how much yield he is about expect. In the past, yield prediction was performed by considering farmer's previous experience on a particular crop. The volume of data is enormous in Indian agriculture. The data when become information is highly useful for many purposes. IBM Cognos Business Intelligence is a web-based integrated business intelligence suite by IBM. It provides a toolset for reporting, analytics, score carding, and monitoring of events and metrics. The software consists of several components designed to meet the different information requirements in a company. IBM Cognos has components such as IBM Cognos Framework Manager, IBM Cognos Cube Designer, IBM Cognos Transformer. Cognos Analysis Studio helps business users get fast answers

to business-related queries. Reporting studio allows you to create pixel-perfect reports for your organization.

LITERATURE SURVEY

Reference:

M. A. Jayaram and Netra Marad, "Fuzzy interference Systems for Crop Prediction", Journal of Intelligent Systems, 2012, 21(4), pp.363-372[1]. Prediction of crop yield is significant in order to accurately meet market requirements and proper administration of agricultural activities directed towards enhancement in yield. Several parameters such as weather, pests, biophysical and morphological features merit their consideration while determining the yield. However, these parameters are uncertain in their nature, thus making the determined amount of yield to be approximate. It is exactly here that the fuzzy logic comes into play. This paper elaborates an attempt to develop fuzzy inference systems for crop yield prediction. Physio morphological features of Sorghum were considered. A huge database (around 1000 records) of physio morphological features such as days of 50 percent lowering, dead heart percentage, plant height, panicle length, panicle weight and number of primaries and the corresponding yield were considered for the development of the model. In order to find out the sensitivity of parameters, one-to-one, two-to-one and three-to-one combinations of input and output were considered. The results have clearly shown that panicle length contributes forth yield as the lone parameter with almost one-to-one matching between predicted yield and actual value while panicle length and panicle weight in combination seemed to play a decisive role in contributing for the yield with the prediction accuracy rejected by very low RMS value

Problem statement definition:

Crop Yield Prediction Using Data Analytics A research group investigated the utilization of various information mining methods which will foresee rice crop yield for the data collected from the state of Maharashtra, India. A total of 27 regions of Maharashtra were selected for the assessment and the data was collected related to the principle rice crop yield influencing parameters such as different atmospheric conditions and various harvest parameters i.e Precipitation rate, minimum, average, maximum and most extreme temperature, reference trim cultivable area, evapotranspiration, and yield for the season between June to November referred as Kharif, for the years 1998 to 2002 from the open source, Indian Administration records. WEKA a Java based dialect programming for less challenging assistance with information data sets, assigning design outcomes

tool was applied for dataset processing and the overall methodology of the study includes, (1) pre-processing of dataset (2) Building the prediction model utilizing WEKA and (3) Analyzing the outcomes. Cross validation study is carried out to scrutinize how a predictable information mining method will execute on an ambiguous dataset. Study applied 10-fold higher cross validation study design to assess the data subsets for screening and testing. Identified and collected information was randomly distributed into 10 sections where in one data section was used for testing while all other data sections were utilized for the preparation information. Study reported that the method applied was supportive in the precise estimation of rice crop yield for the state of Maharashtra, India. The precise quantification of the rice productivity in various climatic conditions can help farmer to understand the optimum condition for the higher rice crop yield .

IDEATION & PROPOSED SOLUTION

Empathy map canvas

An empathy map canvas is a more in-depth version of the original empathy map, which helps identify and describe the user's needs and pain points. And this is valuable information for improving the user experience. Teams rely on use insights to map out what is important to their target audience, what influences them, and how they present themselves. This information is then used to create personas that help teams visualize users and empathize with them as individuals, rather than just as a vague marketing demographic or account number.Agile teams in a variety of departments use empathy map canvases to better understand how to meet their customers' needs.Design teams use them to help understand the various reasons why a user might interact with the product so they can design a user-friendly experience.Sales teams use them to learn who customers are at an individual level so they can help them invest in a product that suits their needs, rather than leading with a sales pitch that might be off-putting or not appropriately tailored to customers.An empathy map canvas helps brands provide a better experience for users by helping teams understand the perspectives and mindset of their customers. Using a template to create an empathy map canvas reduces the preparation time and standardizes the process so you create empathy map canvases of similar quality.

Ideation and brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity. Brainstorming is usually conducted by getting a group of people together to come up with either general new ideas or ideas for solving a specific problem or dealing with a specific situation.Participants in a brainstorming session are encouraged to freely toss out whatever ideas may occur to them. The thinking is that by generating a large number of ideas, the brainstorming group is likely to come up with a suitable solution for whatever issue they are addressing.

Proposed solution

 Our proposed system system is a mobile application which predicts name of the crop as well as calculate its corresponding yield. Name of the crop is determined by several features like temperature, humidity, wind-speed, rainfall etc. and yield is determined by the area and production. In this paper, Random Forest classifier is used for prediction.The system has some other specification like displaying approximated yield .

Problem fit solution

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem.

Requirement Analysis

Functional requirement

The Functional Requirements Definition reports and tracks the basic information expected to effectively portray business and handy necessities. The Functional Requirements Definition report is made in the midst of the Planning Phase of the endeavor. Its objective gathering is the endeavor boss, errand gathering, wander bolster, client/customer, and any accomplice whose information/respect into the necessities definitions

Non Functional Requirements
A non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.
Non functional requirements specifies the quality attribute of a software system.

Project Design
Data Flow Diagram

A Data Flow Diagram(DFD) is a traditional visual representation of the information flowa within a system.A neat and clear DFD can depict the right amount of the system requirement graphically.It shows how data enters and leaves the system, what changes the information ,and where data is stored .
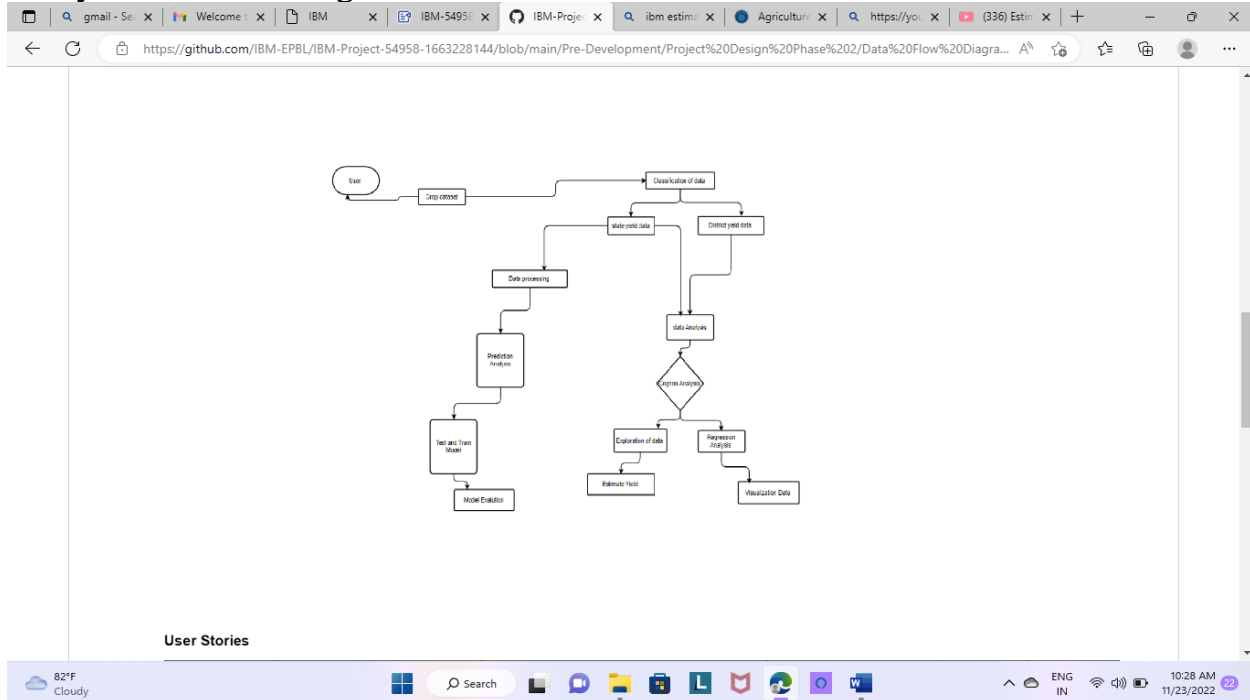
Solution & Technical Architecture

Fig. 1 Architecture Diagram

Project planning & Scheduling

Sprint planning and Estimation

The objective of sprint planning is to work out the key details regarding the team's planned work during the next sprint. With that in mind, the sprint team should plan to address at least the following issues during this meeting.

In fact, you can use the following items as the foundation of your team's meeting agenda:
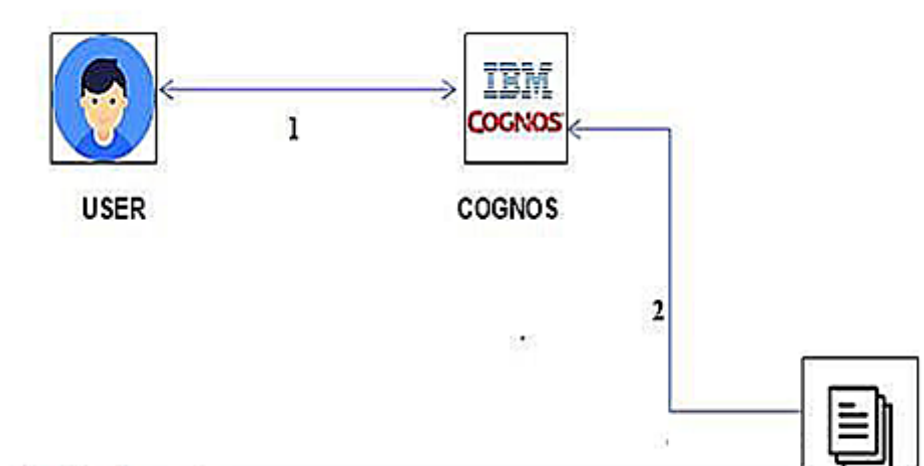
1. Decide on the team's overall strategic objective for the next sprint. (This will be represented as the one- or two-sentence sprint goal.)
2. Review the product backlog and discuss which items belong on the next sprint backlog and why.
3. Call for a team consensus on the proposed sprint goal and backlog items (led by the scrum master).
4. Discuss team capacity.
5. Discuss known issues that could disrupt or slow progress on the sprint backlog.
6. Assign the new sprint backlog's tasks, according to skill sets, capacity, and other relevant criteria.
7. Estimate the timeframes for each of the tasks assigned and agree on what "done" will look like for each item.
8. Confirm the timeframe of the upcoming sprint.
9. Open the meeting to sprint-related questions. (The product owner should be responsible for coordinating this step, to ensure the discussion stays on track.)

sprint delivery

Date	22 October 2022
Team ID	PNT2022TMID36904
Project Name	Project - ESTIMATION OF CROP YIELD USING DATA ANALYTICS
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Analysis and Estimation(Working and Loading the dataset)	USN-1	As a user, I can view the resource i.e., dataset that is being uploaded or loaded in a platform called IBM Cognos Analytics with Watson Services to view and analyze the data.	20	High	Ananthi,Oviya, Rabina,Ramya
Sprint-2	Analysis and Estimation(Data Visualization Charts)	USN-2	As a user, I can visualise the data of crop production to know the insights Where Average Crop Production by Seasons, the Yearly usage of Area in Crop Production, top 10 States in Crop Yield Production by Area, the Crop Production by State and the Sates with Seasonal Crop Production can be known.	20	High	Ananthi,Oviya, Rabina,Ramya

Testing

Test cases

A test case is a document, which has a set of test data, preconditions, expected results and postconditions, developed for a particular test scenario in order to verify compliance against a specific requirement.

Test Case acts as the starting point for the test execution, and after applying a set of input values, the application has a definitive outcome and leaves the system at some end point or also known as execution postcondition.

User Acceptance Testing

User acceptance testing is the final testing stage in software development before production. It's used to get feedback from users who test the software and its user interface (UI). UAT is usually done manually, with users creating real-world situations and testing how the software reacts and performs.

Source Code
Login form.html

<!DOCTYPE html>	
	<html>
	<head>
	<meta name="viewport" content="width=device-width, initial-scale=1">
	<title> Login Page </title>
	<style>
	Body {
	font-family: Calibri, Helvetica, sans-serif;
	background-color:white;
	background-image: url('https://2.bp.blogspot.com/-pLLWS1j5PCQ/VqyQUTUqtdI/AAAAAAABE64/QYlUh6421co/s1600/2de5113b6a62d0360130b90442106237_large.jpeg');"
	}
	button {
	background-color:#c3e3dc;
	width: 100%;
	color: purple;
	padding: 15px;
	margin: 10px 0px;
	border: none;
	cursor: pointer;
	}
	form {
	border: 3px solid #f156189;
	}
	input[type=text], input[type=password] {

```
            width: 100%;

            margin: 8px 0;

            padding: 12px 20px;

            display: inline-block;

            border: 2px white;

            box-sizing: border-box;

        }

    button:hover {

        opacity: 0.7;

        }

     .cancelbtn {

        width: auto;

        padding: 10px 18px;

        margin: 10px 5px;

        }


    .container {

        padding: 25px;

<!--        background-color:pink; -->

        }

</style>

</head>

<body>

    <center> <h1>Login Form </h1> </center>

    <form>

        <div class="container">

            <label>Username : </label>

            <input type="text" placeholder="Enter Username" name="username" required>

            <label>Password : </label>

            <input type="password" placeholder="Enter Password" name="password" required>

            <button type="submit">Login</button>

            <input type="checkbox" checked="checked"> Remember me

            <button type="button" class="cancelbtn"> Cancel</button>

            <a href="#"> Forgot password? </a>


        </div>

    </form>

</body>

</html>

Footer
```

Registration form.html

<!DOCTYPE html>	
	<html>
	<head>
	<title></title>
	<meta name="viewport" content="width=device-width, initial-scale=1.0">
	<link rel="stylesheet" type="text/css" href="{{url_for('static',filename='style.css')}}">
	<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/4.7.0/css/font-awesome.min.css">
	<!-- jQuery library -->
	<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.2.1/jquery.min.js"></script>
	<!-- Latest compiled JavaScript -->
	<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"></script>
	<script src="https://www.google.com/recaptcha/api.js" async defer></script>
	<style type="text/css">
	body{
	margin: 10px 10px 10px 100px;
	background-color: aliceblue;
	}
	.error {
	color: red;
	}
	.fm1 {
	text-align: center;
	}
	.lb1 {
	text-align: center;
	padding: 25px;
	}
	.lb2 {
	margin-left: 20px;
	}
	.lb3 {

```
                    margin-right: 35px;
                }

            .container {
                display: block;
            }
            .k{
                border-radius: 15px;
            }
        </style>
    </head>

    <body>

        <?php
include 'header.php';
?>

        <div class="heading fix">
            <label class="lb1">REGISTRATION</label>
        </div>
        <div class="outerbox">
            <div class="fixedbox">
                <span class="content">
                    <h4>Hello, Friend!</h4>
                    <p>Enter your personal details and start journey with us</p>
                </span>
            </div>
            <div class="scrollbox">
                <div class="registerdonor">
                    <form action="process.php" method="POST" id="myform">
                        <div class="login">
                            <h3>Login Details</h3>
                            <table class="fm1">
                                <tr>
                                    <td colspan="2">
                                        <label class="lb1" class="username">User Name:-</label>
                                        <input type="text" name="user_name" required pattern="^[A-Za-z0-9._%+-
@]{5,10}$"
                                        title="Enter a username between 5 to 10 letter" autocomplete="off">
                                    </td>
                                </tr>
                                <tr>
```

	`<td>`
	`<label class="lb1">Full Name:-</label>`
	`<input type="text" name="user_full_name" required pattern="[A-z ]+$"`
	`title="Use only character & whitespace" autocomplete="off">`
	`</td>`
	`</tr>`
	`<tr>`
	`<td>`
	`<label class="lb1">Email Id:-</label>`
	`<input type="email" name="user_email" required`
	`pattern="[A-Za-z0-9._%+-]+@[A-z0-9.-]+\.[a-z]{2,}$"`
	`title="Email id is not Valid" autocomplete="off">`
	`</td>`
	`</tr>`
	`<tr>`
	`<td>`
	`<label class="lb1">Password:-</label>`
	`<input type="password" name="password" required`
	`pattern="(?=.\d)(?=.[a-z])(?=.*[A-Z]).{6,}"`
	`title="Must contain at least one number and one uppercase and lowercase letter, and at least 6 or more characters"`
	`id="password" autocomplete="off">`
	`</td>`
	`</tr>`
	`<tr>`
	`<td>`
	`<label>Confirm Password:-</label>`
	`<input type="text" name="confirm_password" required`
	`pattern="(?=.\d)(?=.[a-z])(?=.*[A-Z]).{6,}"`
	`title="Must contain at least one number and one uppercase and lowercase letter, and at least 6 or more characters"`
	`id="confirm_password" autocomplete="off">`
	`</td>`
	`</tr>`
	`</table>`
	`</div>`
	`<div class="container">`
	`<h3>Contact Details</h3>`
	`<table class="fm1">`
	`<tr>`
	`<td>`
	`<label>Mobile Number:-</label>`
	`<input type="text" name="user_number" required pattern="^[1-9]{1}[0-9]{9}$"`

```
                    title="Number is not valid" autocomplete="off">
                  </td>
                </tr>
                <tr>
                  <td>
                    <label class="lb1">Pincode</label>
                    <input type="text" name="pincode" required pattern="^[0-9]{6}$"
                    title="Pincode is not valid" autocomplete="off">
                  </td>
                </tr>
                <tr>
                  <td rowspan="1">
                    <label class="lb1">Address:-</label>
                    <textarea name="Address" placeholder="follow with pincode"
required></textarea>
                  </td>
                </tr>


                <!-- <tr>
                  <td>
                    <label class="lb1">City:-</label >
                    <input type="text" name="city">
                  </td>
                </tr> -->
                <tr>
                  <td>
                    <label class="lb1">State:-</label>
                    <input type="text" name="state">
                  </td>
                </tr>
              </table>
            </div>
            <div class="personal">
              <h3>Personal Details</h3>
              <table class="fm1">
                <tr>
                  <td>
                    <label>Date Of Birth:-</label>
                    <input type="date" name="date_of_birth" required autocomplete="off">
                  </td>
                </tr>
                <tr>
                  <td>
```

	`<div class="radio">`
	`<label class="lb3">Gender:-</label>`
	`<input type="radio" name="gender" class="radio1" value="Male"><span`
	`class="radioname" required autocomplete="off">Male</span>`
	`<input type="radio" class="radio2" name="gender" value="Female"><span`
	`class="radioname" required autocomplete="off">Female</span>`
	`</div>`
	`</td>`
	`</tr>`
	`<tr>`
	`<td>`
	`<label class="lb1">Blood Group</label>`
	`<input type="text" list="bloodgroup" name="blood_group" placeholder="----`
`Select----"`	
	`required autocomplete="off">`
	`<datalist id="bloodgroup">`
	`<option value="A+"></option>`
	`<option value="A-"></option>`
	`<option value="AB+"></option>`
	`<option value="B+"></option>`
	`<option value="B-"></option>`
	`<option value="O+"></option>`
	`<option value="O-"></option>`
	`</datalist>`
	`</td>`
	`<!-- <tr>`
	`<td>`
	`<label class="lb1">Plasma Type</label >`
	`<input type="text" list="plasmatype" name="plasma_type" placeholder="----`
`Select----"`	
	`required autocomplete="off">`
	`<datalist id="plasmatype">`
	`<option value="Hot"></option>`
	`<option value="Warm"></option>`
	`<option value="Cold"></option>`
	`<option value="Ultra Cold"></option>`
	`</datalist>`
	`</td>`
	`</tr> -->`
	`<tr>`
	`<td>`
	`<label class="lb1">Weight In Kg :-</label>`
	`<input type="number" name="weight" required autocomplete="off">`

	</td>
	</tr>
	</table>
	</div>
	<p class="lb2"><input type="checkbox" name="terms" id="checkbox" required autocomplete="off">
	<!-- I agree to have my contact details broadcasted to the registered donors of PGHS.net -->
	I agree that the above details are true </p>
	<input type="reset" class="lb2 k" name="submit" value="Reset">
	
	<input type="button" class="lb2 k" onclick="href='login.html';" value="Submit">
	</div>
	</form>
	</div>
	</div>
	</div>
	<!-- Responsive table -->
	<div class="rregisterdonor">
	<form action="process.php" method="POST" id="myform">
	</html>
	Footer

Conclusion

As a result of penetration of technology into agriculture field, there is a marginal improvement in the productivity. The innovations have led to new concepts like digital agriculture, smart farming, precision agriculture etc. In the literature, it has been observed that analysis has been done on agriculture productivity, hidden patterns discovery using data set related to seasons and crop yields data. We have noticed and made analysis about different crops cultivated, area and productions in different states and districts using IBM Cognos some of them are 1) Seasons with average productions. In this analytics we come to know in which seasons the average production is more and in which seasons the production is less. 2) Production by crop year. In this analysis we come to know in which years the production is high and low. 3) Production by District. With this analytics we can aware of the districts with the selected crops cultivated and states too.4) Production

by Area. From this we can know how much area should be cultivated and the production will be getting will be estimated. Finally created the dashboard and made analysis that in which state and in which year with crop area and to what extent the production will be are analysed.