PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

ESTIMATE THE CROP YIELD USING DATA ANALYTICS

DOMAIN: DATA ANALYTICS

PROJECT REPORT

Submitted by

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1. INTRODUCTION

1.1. PROJECT OVERVIEW:

Humanity is confronted with the grand challenge of how to increase agricultural production to achieve food security during the 21st century and feed a population that is expected to grow to 10 billion people. This needs to be done while maintaining sustainable agricultural systems and simultaneously facing challenges such as a changing climate, depletion of water resources, and the potential for increased erosion and loss of productivity due to the occurrence of extreme weather events. Crop yield prediction is becoming more important because of these growing concerns. Utilizing data to help navigate shifts in environmental conditions can help farmers prepare for challenges and maximize on opportunities, all without wasting resources. Data analytics can help farmers monitor the health of crops in real-time, create predictive analytics related to future yields and make resource management decisions based on proven trends.

Crop yield is influenced by various parameters, and it is difficult to build a reliable prediction model with traditional methods. However, with advancements in computational technology, the development and training of a novel approach for crop yield prediction have become feasible. Our project aims to build a model that provides an optimal solution in finding the best crop suitable for specific climate.

1.2. PURPOSE:

Early crop yield prediction plays an important role in reducing famine by estimating the food availability for the growing world population. Hunger is one of the most devastating issues in the world and increasing crop yield production is a feasible solution to overcome this problem. The World Health Organization estimated that there is still an inadequate food supply for 820 million people around the world. The target for the Sustainable Development Goals of the United Nations is to eliminate hunger, accomplish food security, and encourage sustainable agriculture by 2030. The Food and Agriculture Organization (FAO) estimated that there will be a 60 per cent demand for food to supply the world population of 9.3 billion by 2050. Therefore, crop yield prediction can offer crucial information required for developing a reasonable solution to achieve the target and end hunger.

This project analyzes the data to produce some important visualization, to create a dashboard and gain insights of crop production.

2.LITERATURE SURVEY

2.1. EXISTING PROBLEM :

Increase in climate change serves as major bottleneck in agricultural production. Extreme weather events have resulted in reduced crop yield. Crop plants, which are frequently chosen for high yield rather than stress tolerance are typically delicate and brittle. Production of these crops are affected by several variables including soil fertility, water availability, climate, and diseases or pests. Without the aid of technology, it is quite challenging to comprehend or estimate the patterns with such a wide range of factors. Therefore, a technological solution that can adapt to the changes and offer the anticipated solution in a way that end users can easily understand is crucial.

2.2. REFERENCES:

I. Shreya Bhosale, Ruchita Thombare, Anagha Chaudhari and Prasanna G. Dhemey. "Agriculture yield prediction using predictive analytic techniques." 2016 2nd International Conference on Contemporary Computing and Informatics (IC3I). IEEE, 2016.

II. Sagar, B. M., and N. K. Cauvery. "Agriculture data analytics in crop yield estimation: a critical review." Indonesian Journal of Electrical Engineering and Computer Science 12.3 (2018): 087-1093.

III. D. Ramesh, B. Vishnu Vardhan. “Analysis of crop yield prediction using data mining techniques.” International Journal of Research in Engineering and Technology eISSN: 319-1163

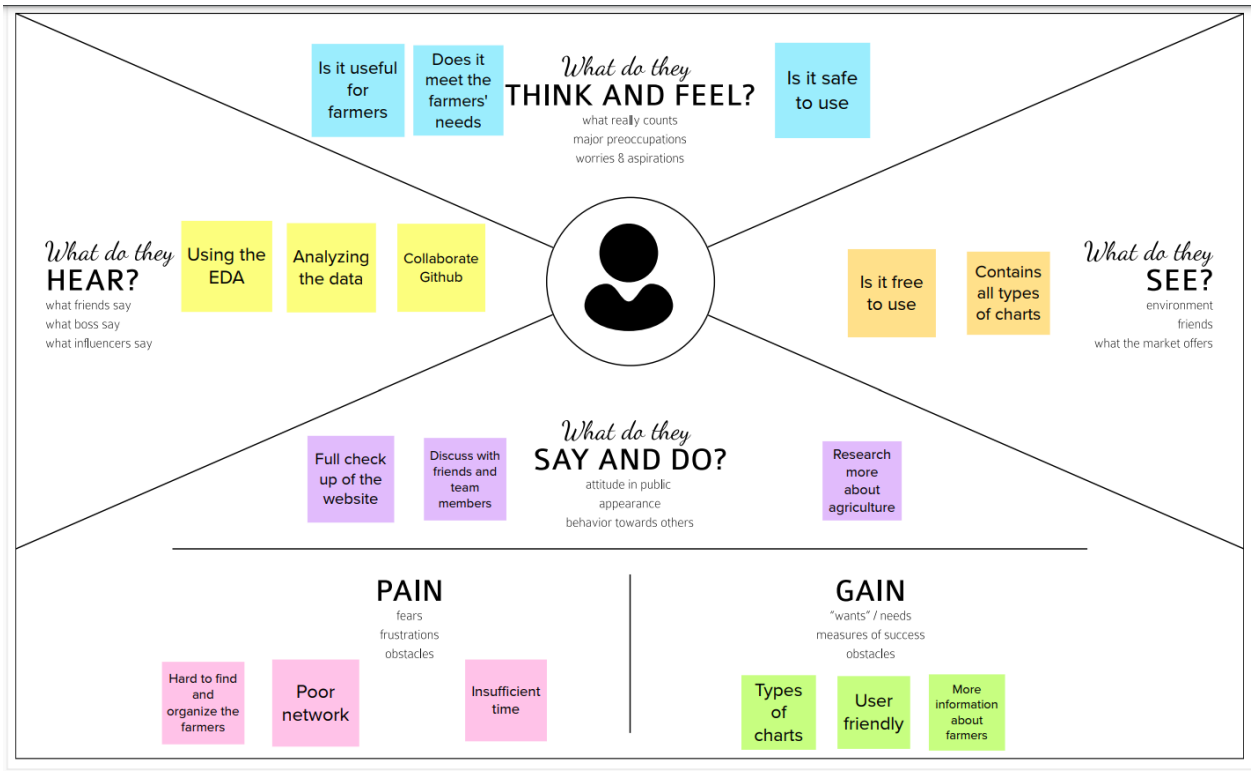
IV. Sharma, Shivi, Geetanjali Rathee, and Hemraj Saini. "Big data analytics for crop prediction mode using optimization technique." 2018 Fifth International Conference on Parallel, Distributed and Grid Computing (PDGC). IEEE, 2018.

2.3. PROBLEM STATEMENT DEFINITION:

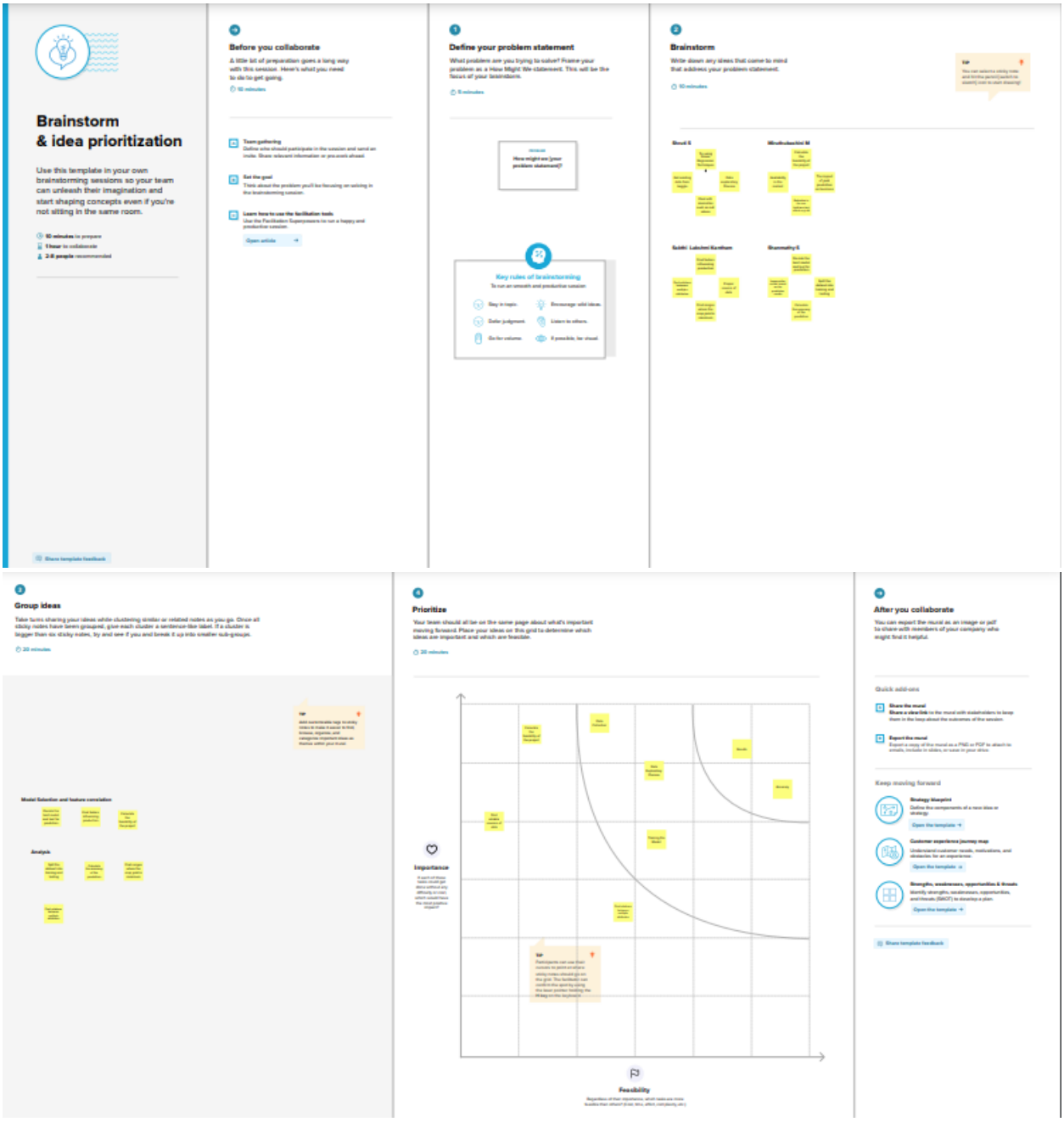
Crop production in India is one of the most important sources of income and India is one of the top countries to produce crops. As per this project, we will be analyzing some important visualization, and creating a dashboard and by going through these we will get most of the insights into Crop production in India. Our project uses data analytics to analyze and estimate the crop yield in a particular region and in a particular climatic condition.

3. IDEATION & PROPOSED SOLUTION

3.1. EMPATHY MAP CANVAS:



3.2. IDEATION & BRAINSTORMING:

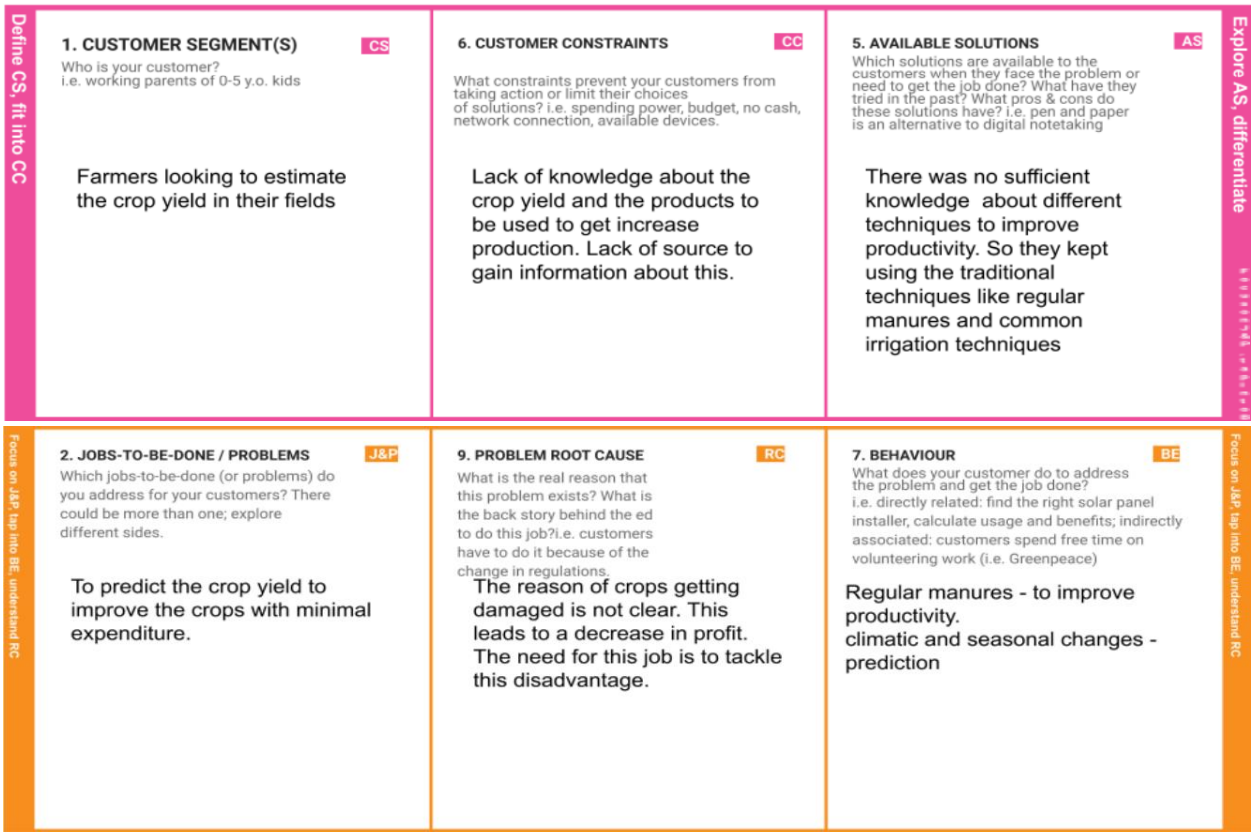


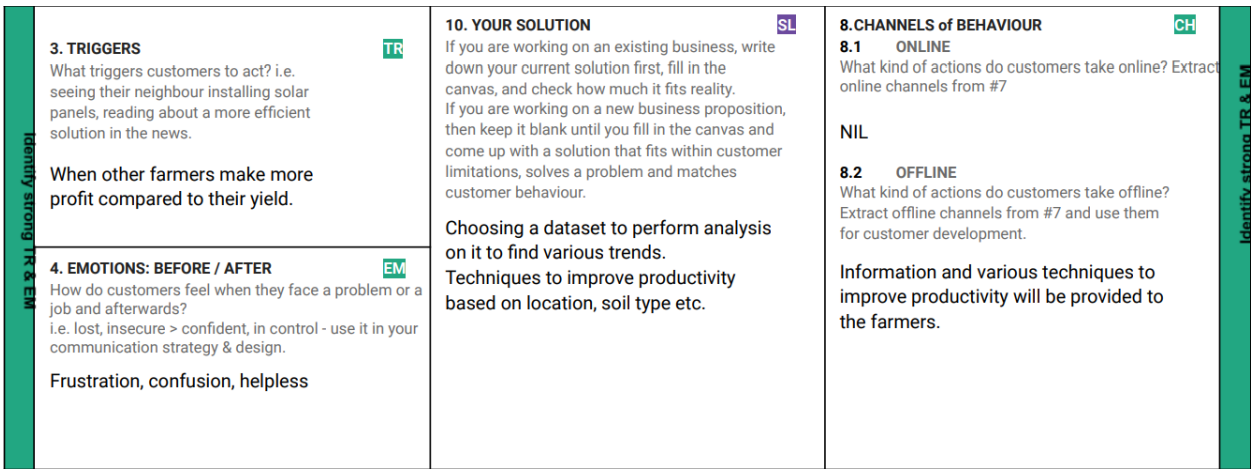
3.3. PROPOSED SOLUTION:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To estimate the crop yield using data analytics techniques to help farmers increase the profit by good harvesting practices
2.	Idea / Solution description	To create a system that gives an estimation of the crop types to be planted in a given season and location
3.	Novelty / Uniqueness	Understanding the nature of crops and their growth process
4.	Social Impact / Customer Satisfaction	Help farmers continue their job without worrying about loss in their investment
5.	Business Model (Revenue Model)	A model that gives farmers information about different crops so that they can invest in a crop that maximizes the profit in that season and soil condition.

6.	Scalability of the Solution	To perform analysis on all kinds of soil, weather and crop types

3.4 PROBLEM SOLUTION FIT:





4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS:

Functional requirement	Description
Registration	A new user can be created using the registration form
Google authentication	Add new user with a pre-existing google account
Login	Easy login for already existing users
Take in the required data	Take input data from the user for which prediction is to be performed

Estimation / Prediction	A prediction of crop yield is done based on the user input
Analysis	An analysis is done on the given data to gain useful insights on the crop yield

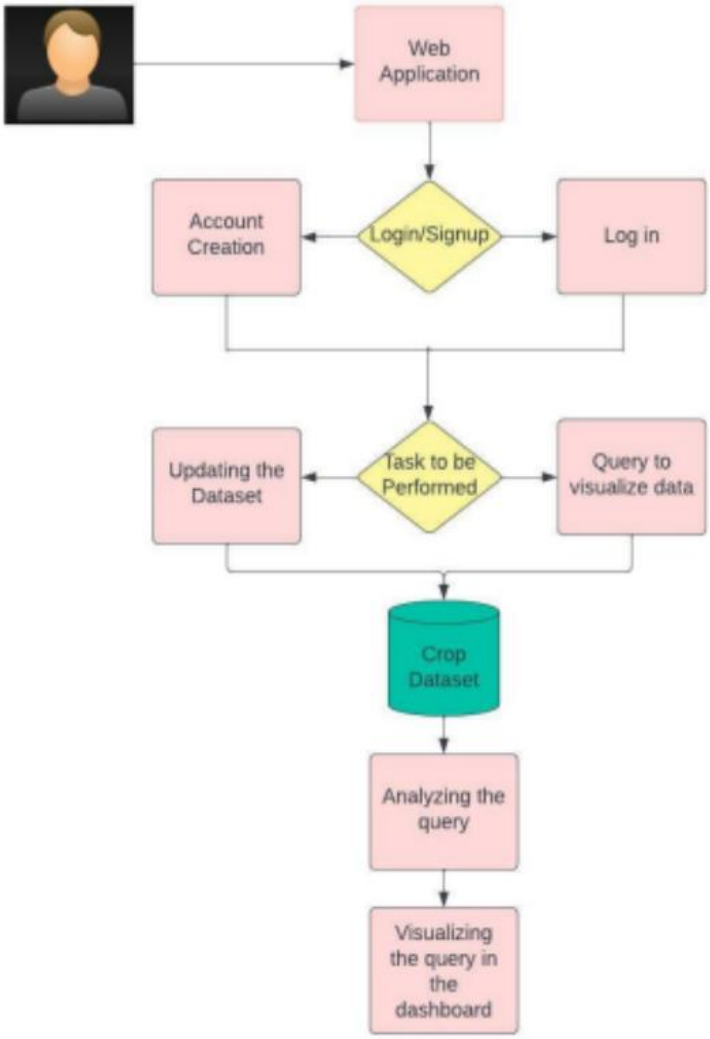
4.2 NON - FUNCTIONAL REQUIREMENTS:

Non-functional requirement	**Description**
Performance	The software should provide us good performance
Reliability	The UI should be user friendly and easily understandable
Availability	It should be available for access at any time from anywhere

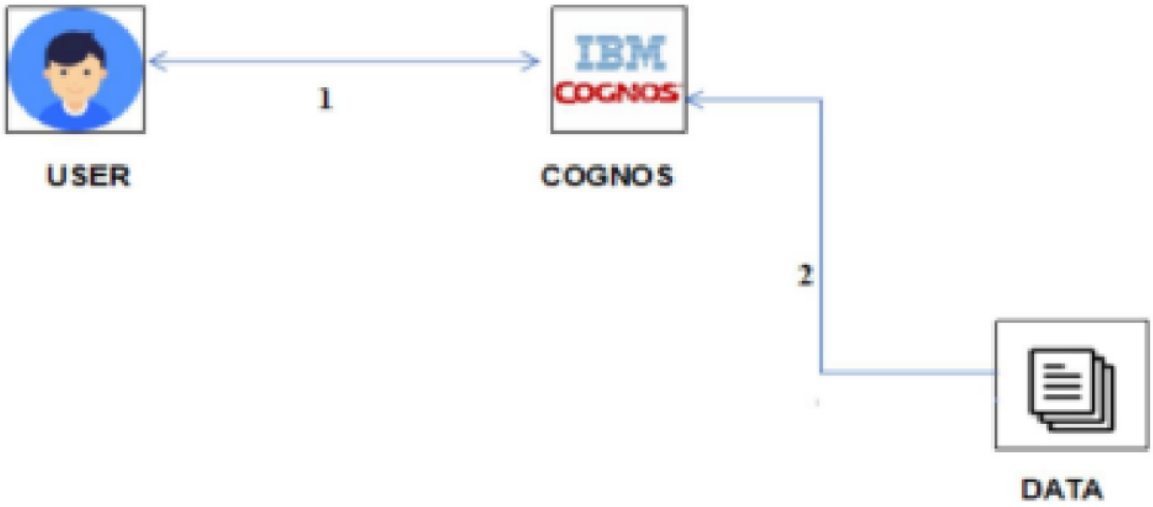
Scalability	The software should be scalable for larger datasets
Security	The user login and registration should be secure end to end

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS:


Web Application
Account Creation
Login/Signup
Log in
Updating the Dataset
Task to be Performed
Query to visualize data
Crop Dataset
Analyzing the query
Visualizing the query in the dashboard

5.2 SOLUTION & TECHNICAL ARCHITECTURE:



5.3 USER STORIES:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Acceptance criteria	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2

		USN-4	As a user, I can register for the application through Gmail	I can register and login with my email	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can use my mail id if I forget my password to reset it.	High	Sprint-1
	Dashboard	USN-6	As a user I can access the dashboard to view the required information	I can edit my profile	High	Sprint-2
Customer (Web user)		USN-7	As a user I can Register/login the application and access it	I can access my account and dashboard	Medium	Sprint-1
Customer Care Executive		USN-8	Provide support system for the application owner and able to communicate with the users	Authentication is provided to access the account so no one can access without permission	High	Sprint-2
Administrator		USN-9	As a user I can take decision to improve the company	I am able to modify the dataset.	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

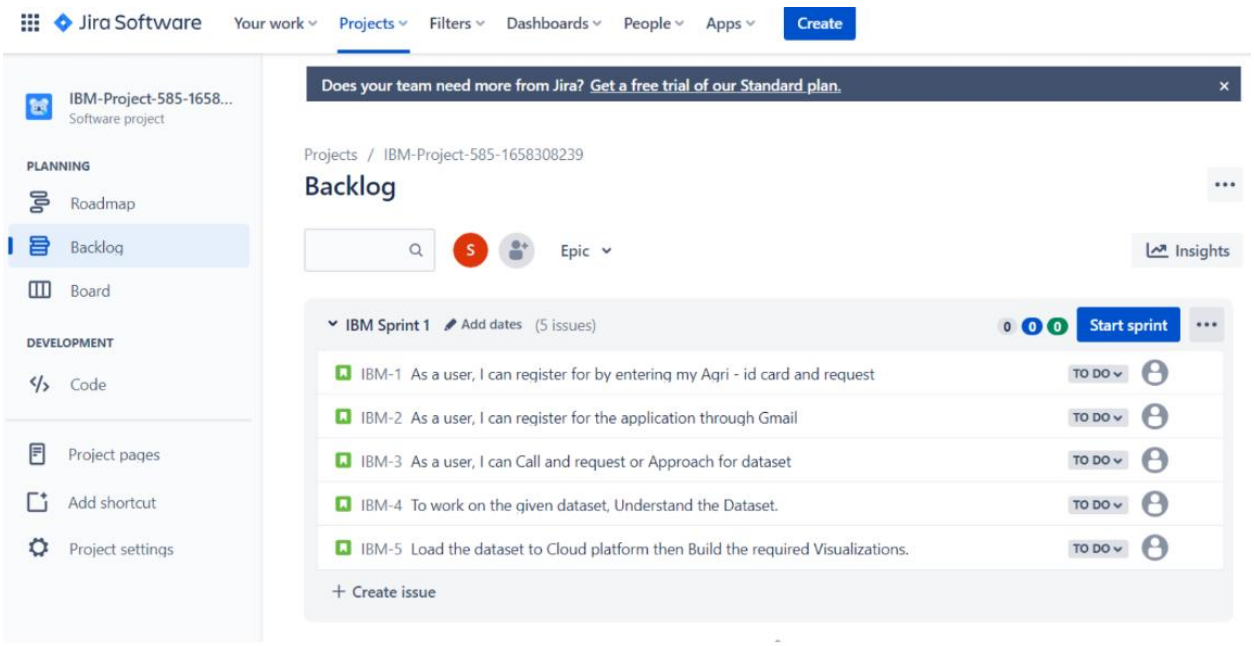
6.1 SPRINT PLANNING & ESTIMATION:

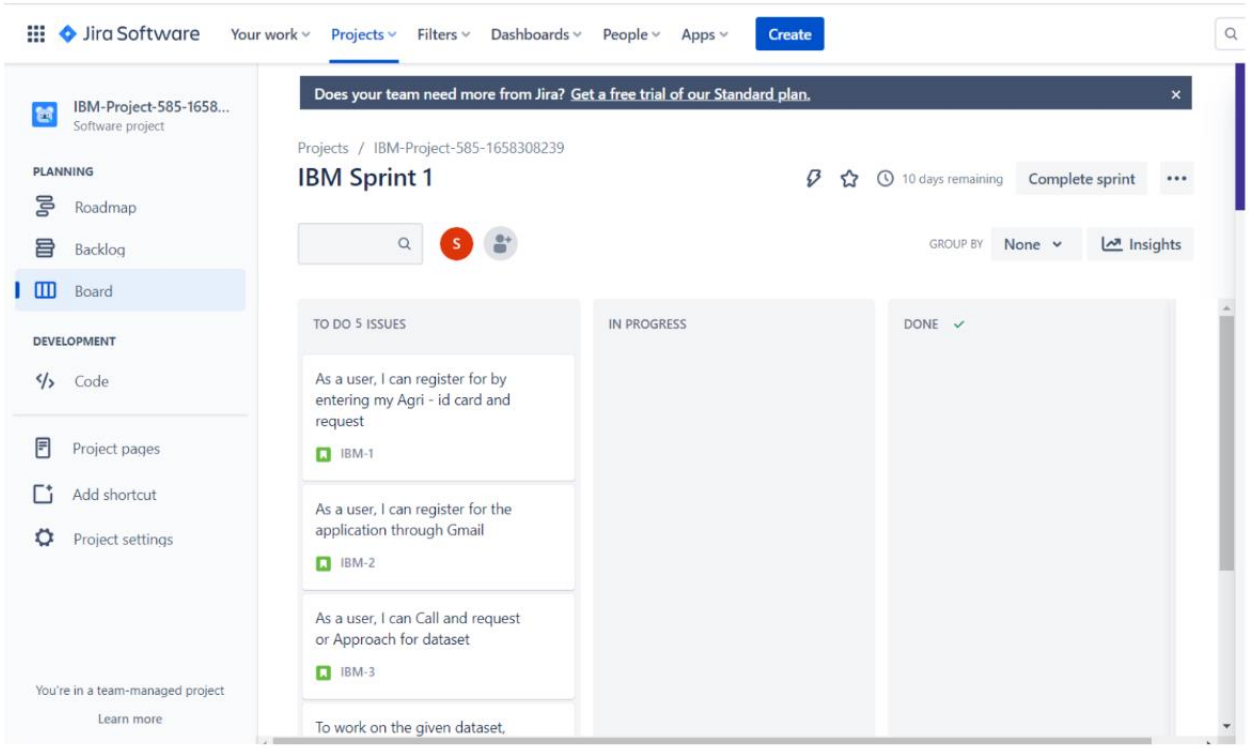
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Selva Saranya Varshine
		USN-2	As a user, I can register through Google.	2	Medium	Mythily Sheela
	Login	USN-3	The user can login through their login credentials.	2	High	Selva Saranya Varshine
	Working with Dataset	USN-4	Understanding the dataset.	2	High	Sheela Mythily
		USN-5	Loading the dataset into IBM Cognos	10	High	Mythily Sheela

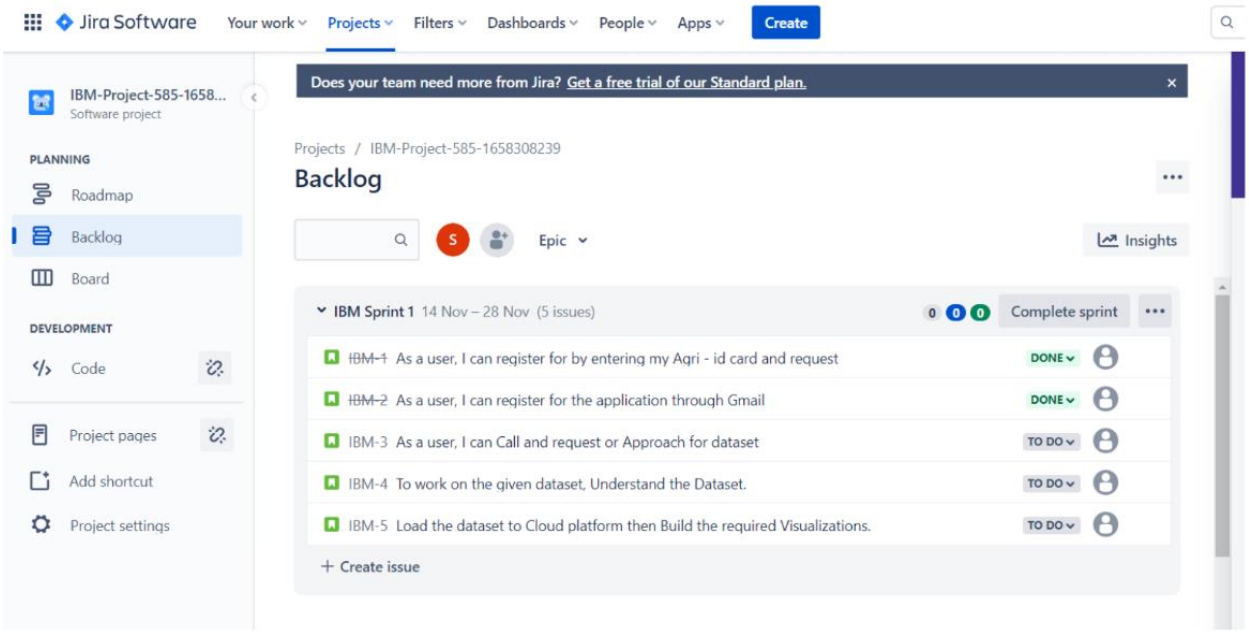
6.2 SPRINT DELIVERY SCHEDULE:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3 REPORT FROM JIRA:



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Apps
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Software project
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Roadmap
Backlog
Board
DEVELOPMENT
Code
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Project settings
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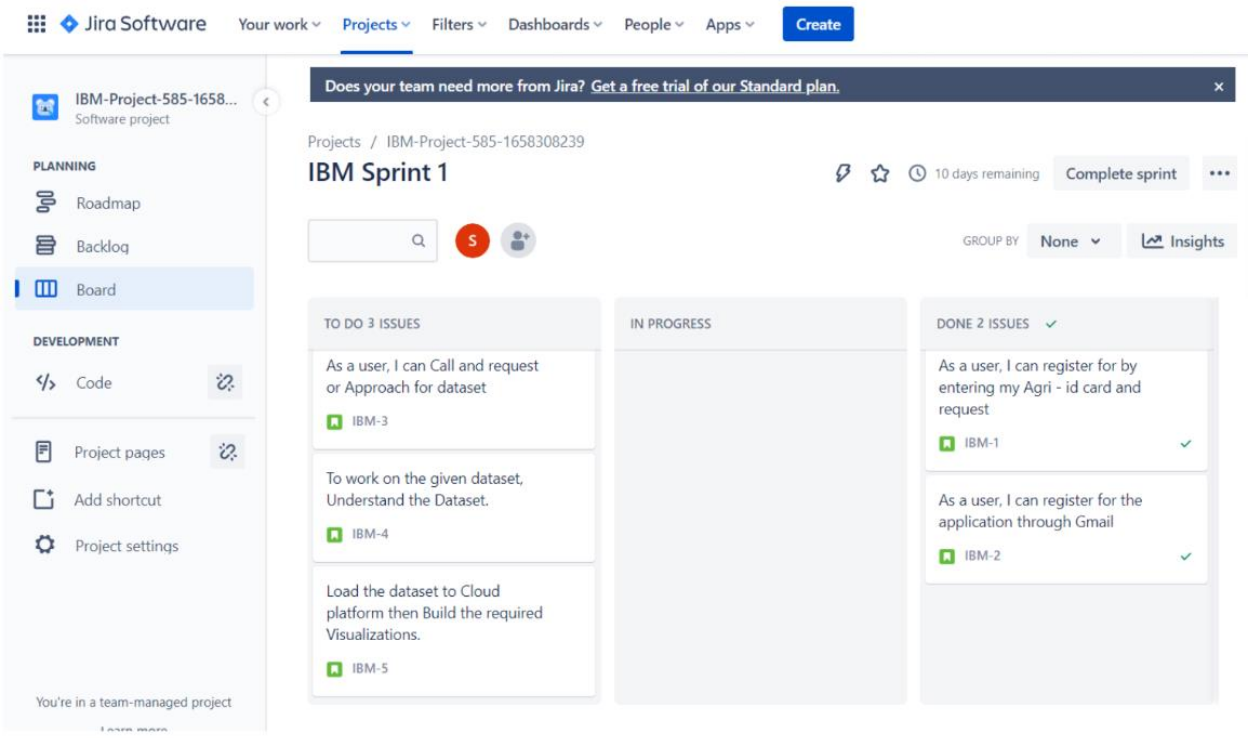
Projects / IBM-Project-585-1658308239
Backlog
Epic
Insights
IBM Sprint 1 14 Nov – 28 Nov (5 issues)
Complete sprint
IBM-1 As a user, I can register for by entering my Agri - id card and request
DONE
IBM-2 As a user, I can register for the application through Gmail
DONE
IBM-3 As a user, I can Call and request or Approach for dataset
TO DO
IBM-4 To work on the given dataset, Understand the Dataset.
TO DO
IBM-5 Load the dataset to Cloud platform then Build the required Visualizations.
TO DO
Create issue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Software project
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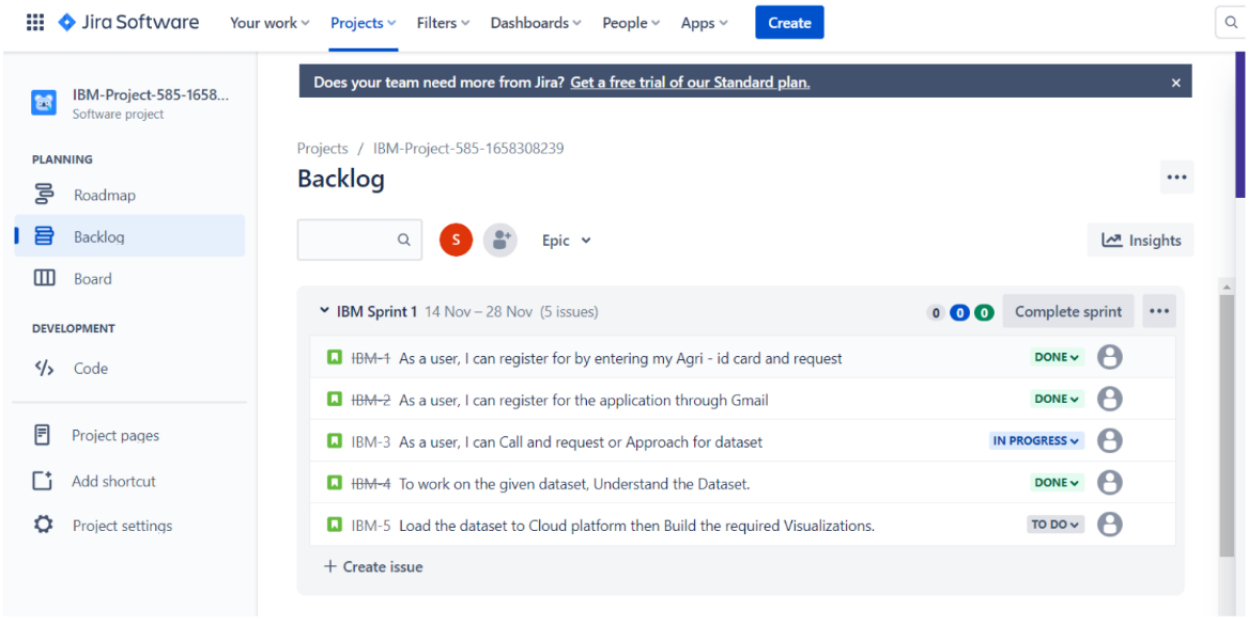
Projects / IBM-Project-585-1658308239
IBM Sprint 1
10 days remaining
Complete sprint
GROUP BY
None
Insights
TO DO 3 ISSUES
As a user, I can Call and request or Approach for dataset
IBM-3
To work on the given dataset, Understand the Dataset.
IBM-4
Load the dataset to Cloud platform then Build the required Visualizations.
IBM-5
IN PROGRESS
DONE 2 ISSUES
As a user, I can register for by entering my Agri - id card and request
IBM-1
As a user, I can register for the application through Gmail
IBM-2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IBM-Project-585-1658...
Software project
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Roadmap
Backlog
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DEVELOPMENT
Code
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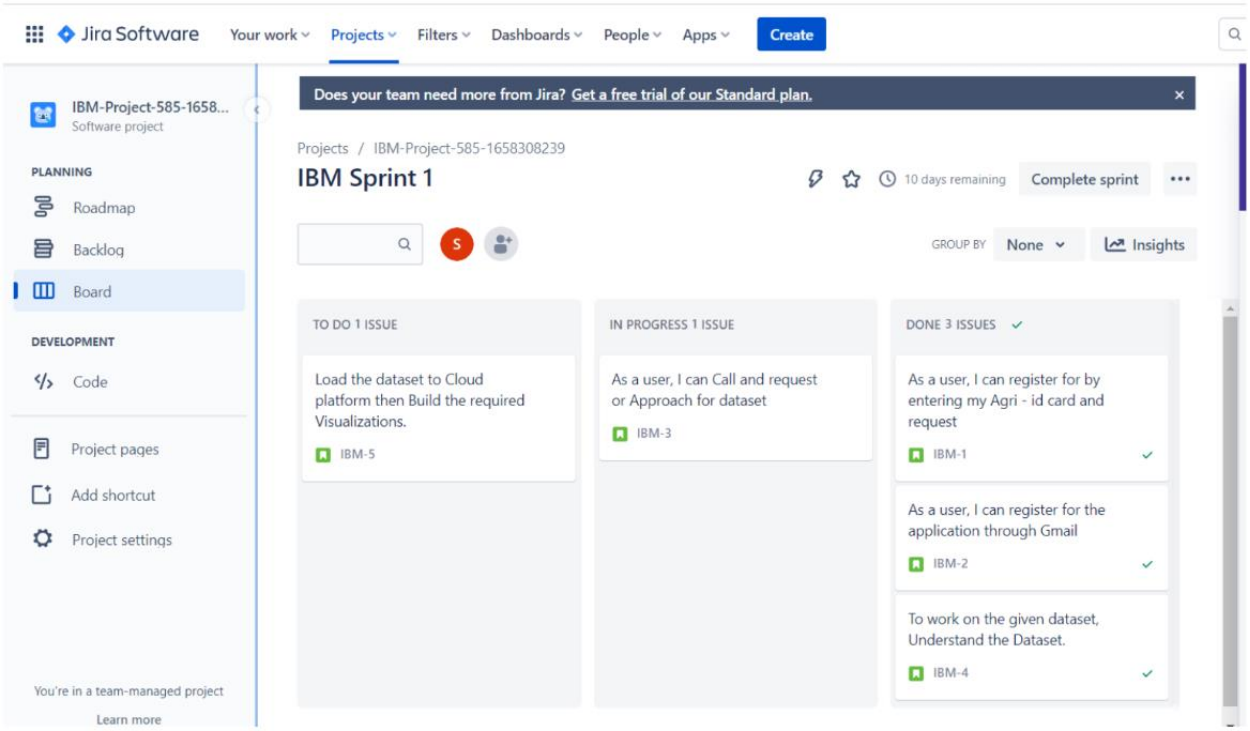
IBM-2 As a user, I can register for the application through Gmail
DONE
IBM-3 As a user, I can Call and request or Approach for dataset
IN PROGRESS
IBM-4 To work on the given dataset, Understand the Dataset.
DONE
IBM-5 Load the dataset to Cloud platform then Build the required Visualizations.
TO DO
Create issue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Projects
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Dashboards
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IBM-Project-585-1658...
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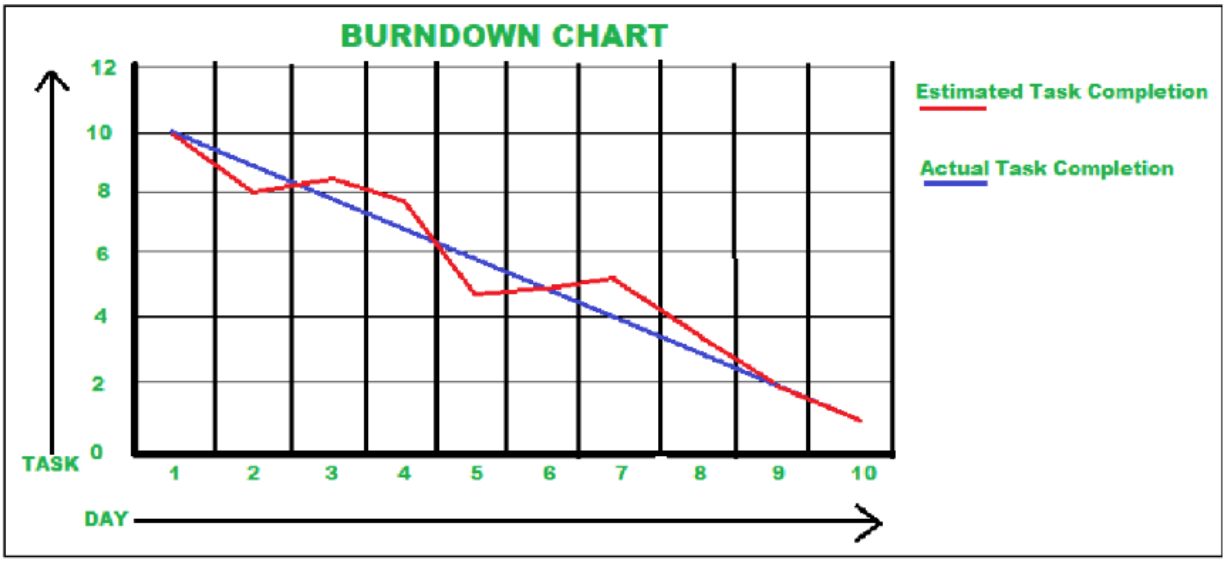
Projects / IBM-Project-585-1658308239
IBM Sprint 1
10 days remaining
Complete sprint
GROUP BY
None
Insights
TO DO 1 ISSUE
Load the dataset to Cloud platform then Build the required Visualizations.
IBM-5
IN PROGRESS 1 ISSUE
As a user, I can Call and request or Approach for dataset
IBM-3
DONE 3 ISSUES
As a user, I can register for by entering my Agri - id card and request
IBM-1
As a user, I can register for the application through Gmail
IBM-2
To work on the given dataset, Understand the Dataset.
IBM-4

BURN DOWN CHART:



7. CODING & SOLUTION

7.1 CODING:

Login.html

HTML:

```
<!DOCTYPE html>
<html>
<head>
<meta charset="ISO-8859-1">
<meta name="viewpoint" content="width=device-width, initial-scale=1.0">
<title>Login and Registration form example</title>
<link rel="stylesheet" type="text/css" href="login.css">
</head>
<body>
<div id="container">
<form action="login" method="post" id="flogin">
<div class="border-box">
<h2>Login Form</h2>
<label for="uname" id="un">Username:</label>
<input type="text" name="user" placeholder="Enter username" id="uname"><br/>
<label for="upass" id="ps">Password:</label>
<input type="password" name="pass" placeholder="Enter Password" id="upass"><br/>
<button type="submit" value="Login" id="submit" onclick="alert('Login
Successful')">Login</button>
<a href="register.html">New Member</a>
</div>
</form>
</div>
</body>
```

CSS:

```
body{
margin: 0px;
padding: 0px;
text-align: center;
width: 100%;
background-color: #e6e6fae8;
}
input[type=text], input[type=password]{
width:20%;
padding:7px 10px;
margin: 10px 0;
display:inline-block;
border: 1px solid #ccc;
box-sizing: border-box;
}
button{
background-color:#4CAF50;
width: 10%;
padding: 9px 5px;
margin:10px 0px 0px 35px;
cursor:pointer;
border:none;
color:#ffffff;
font-size: 15px;
font-weight: bold;
}
```

```
button:hover{
opacity:0.8;
}
#un,#ps{
font-family:'Lato', sans-serif;
color: gray;
}
#container{
position: absolute;
top:0;
bottom: 0;
left: 0;
right: 0;
margin: auto;
width:600;
height: 300px;
text-align: center;

}
```

Registration.html

```
<!DOCTYPE html>

<html>

<head>

<meta charset="ISO-8859-1">

<title>Login and Registration form example</title>

<link rel="stylesheet" type="text/css" href="register.css">

</head>
```

```
<body bgcolor="#E6E6FA">

<form name="regi" action="register1.jsp" method="post">
<h2>Registration Form</h2>

<label for="r1" id="fn">First Name :</label>
<input type="text" name="fname" id="r1"><br/>

<label  for="r2" id="ln">Last Name :</label>
<input type="text" name="lname" id="r2"><br/>

<label  for="r3" id="un">Username :</label>
<input type="text" name="uname" id="r3"><br/>

<label  for="r4" id="pwd">Password :</label>
<input type="password" name="pass" id="r4"><br/>

<label  for="r5" id="em">Email :</label>
<input type="text" name="email" id="r5"><br/>

<label  for="r6" id="mn">Mobile No :</label>
<input type="text" name="mno" id="r6"><br/>
```

```
<label for="r7" id="pi">Pincode :</label>

<input type="text" name="pincode" id="r7"><br/>


<label for="r8" id="ad">Address :</label>

<input type="text" name="Address" placeholder="Follow with pincode"
id="r8"></textarea><br/>


<label for="r9" id="cy">City:</label >

<input type="text" name="city" id="r9"><br/>


<label for="r10" id="st">State:</label>

<input type="text" name="state" id="r10"><br/>


<label for="r11" id="dob">Date Of Birth:</label>

<input type="date" name="date_of_birth" id="r11" required autocomplete="off"><br/>


<button type="submit" value="Submit" id="button">Register</button>


</form>


<script type="text/javascript">

function save(){

var user = document.getElementById("user").value;
```

```
var pwd = document.getElementById("pwd").value;
alert("username"+user+"password"+pwd);
}
</script>

</body>
</html>
```

CSS:

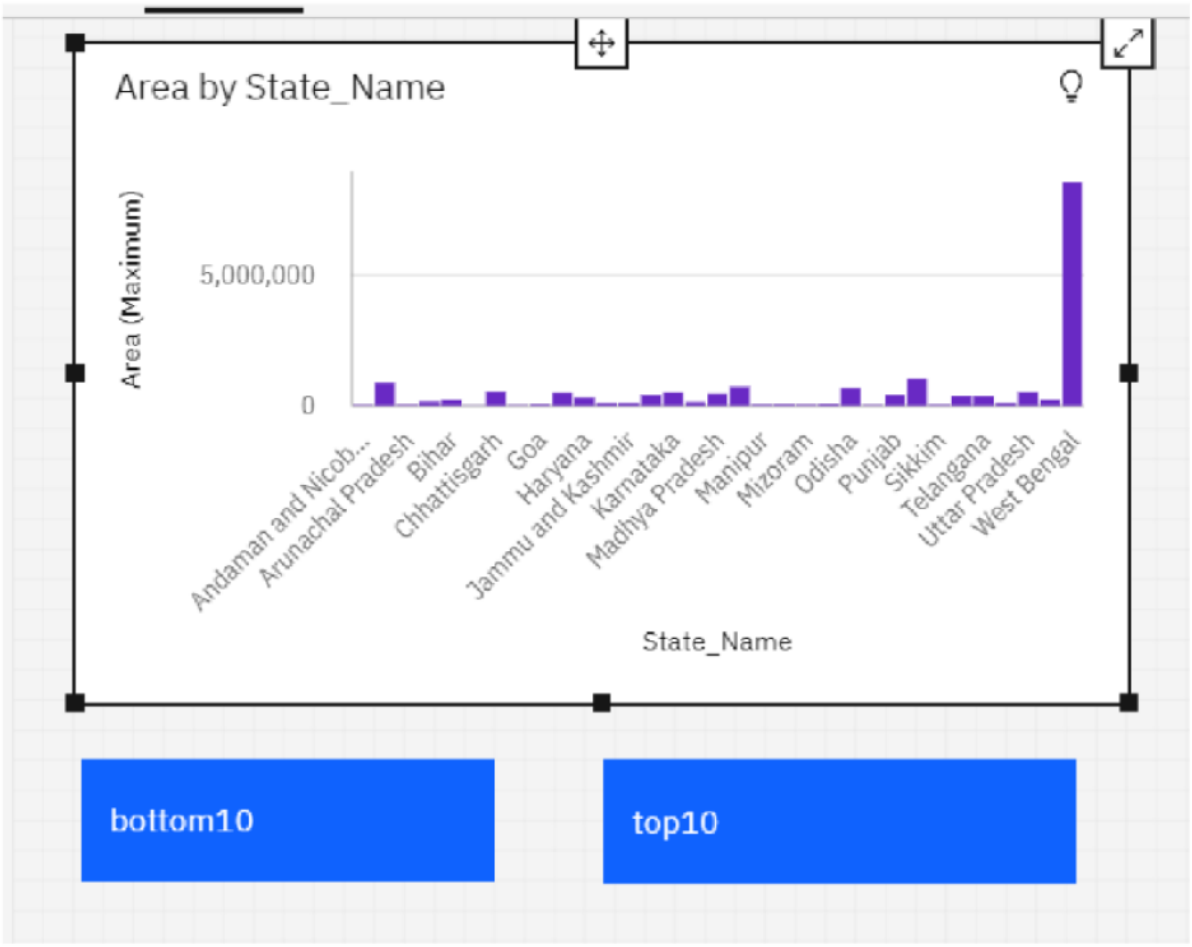
```
body{
    margin: 100px;
    text-align: center;
    box-align: center;
    }

    input[type=text],[type=password],[type=number]{
    width: 20%;
    margin: 8px 0;
    padding: 7px 10px;
    display: inline-block;
    border:1px solid #ccc;
    box-sizing: border-box;
    }
```

```
button{
background-color:#4CAF50;
width: 10%;
padding: 9px 5px;
margin:5px 0;
cursor:pointer;
border:none;
color:#ffffff;
margin-left: 80px;
}

button:hover{
opacity:0.8;
}

#fn,#ln,#un,#pwd,#em,#mn,#fm,#cy,#ad,#st,#pi,#dob{
font-family:'Lato', sans-serif;
color: gray;
}

#em,#st{
margin-left:30px;
}
```

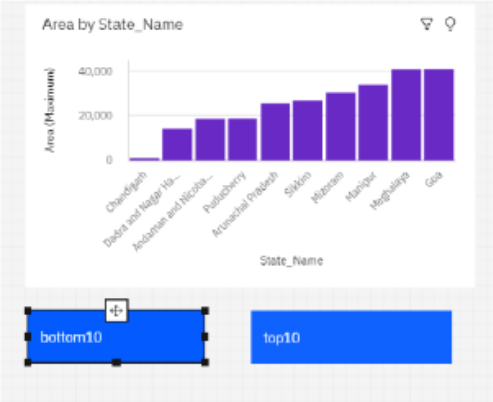
```
#ad,#pi{
    margin-left: 20px;
}

#cy{
    margin-left: 40px;
}
```

7.2 DASHBOARD CREATION:

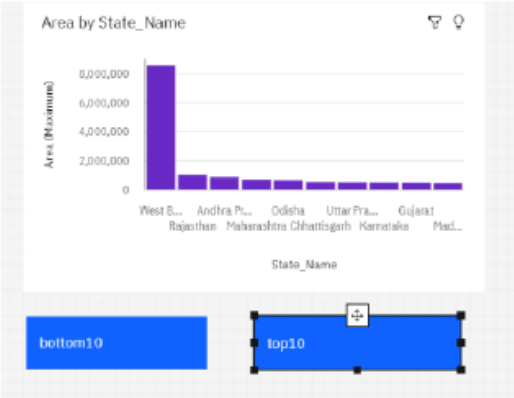
Action Buttons:

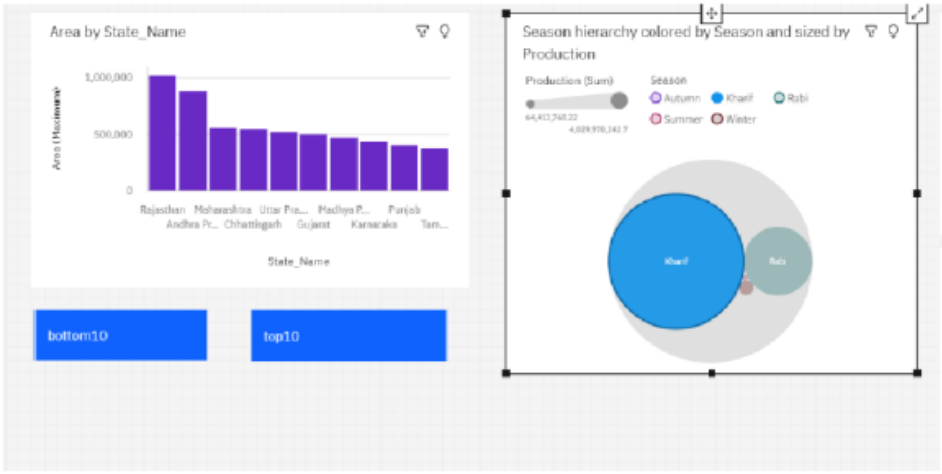


After pressing bottom 10:

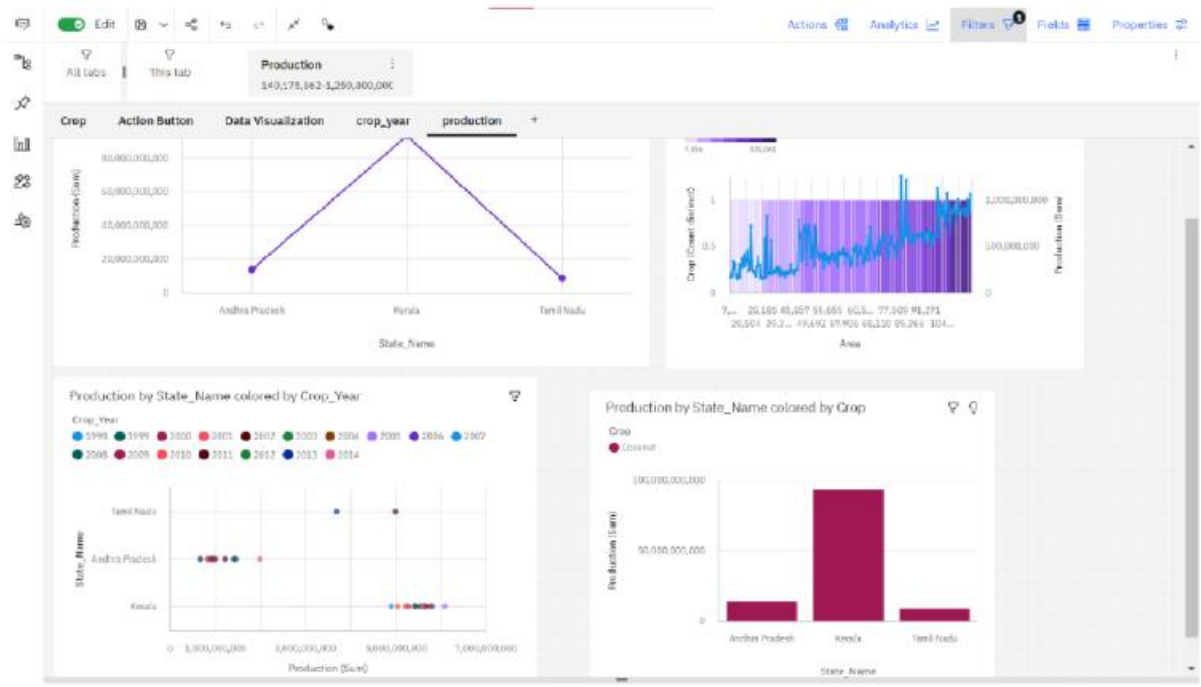


After pressing top 10:



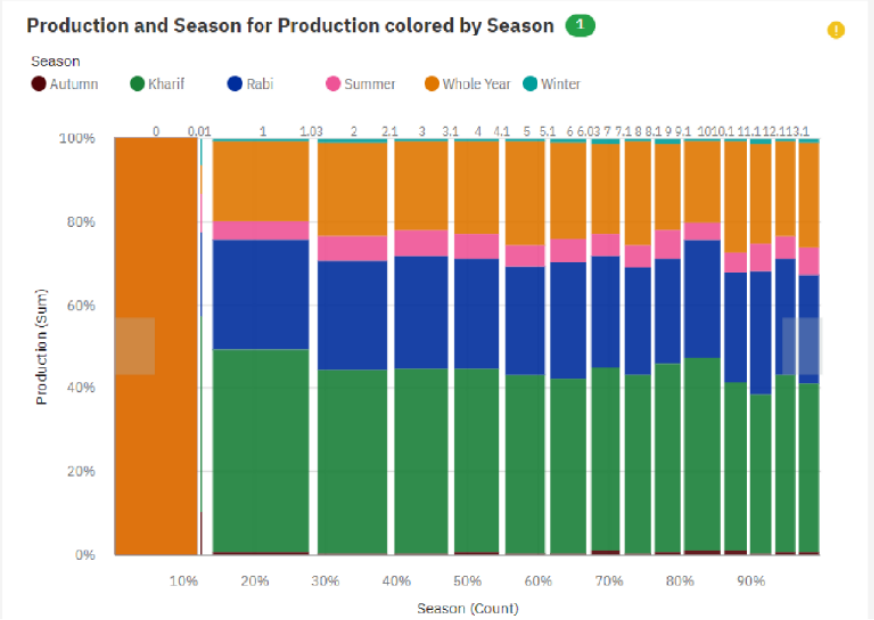


Dashboard with respect to production:

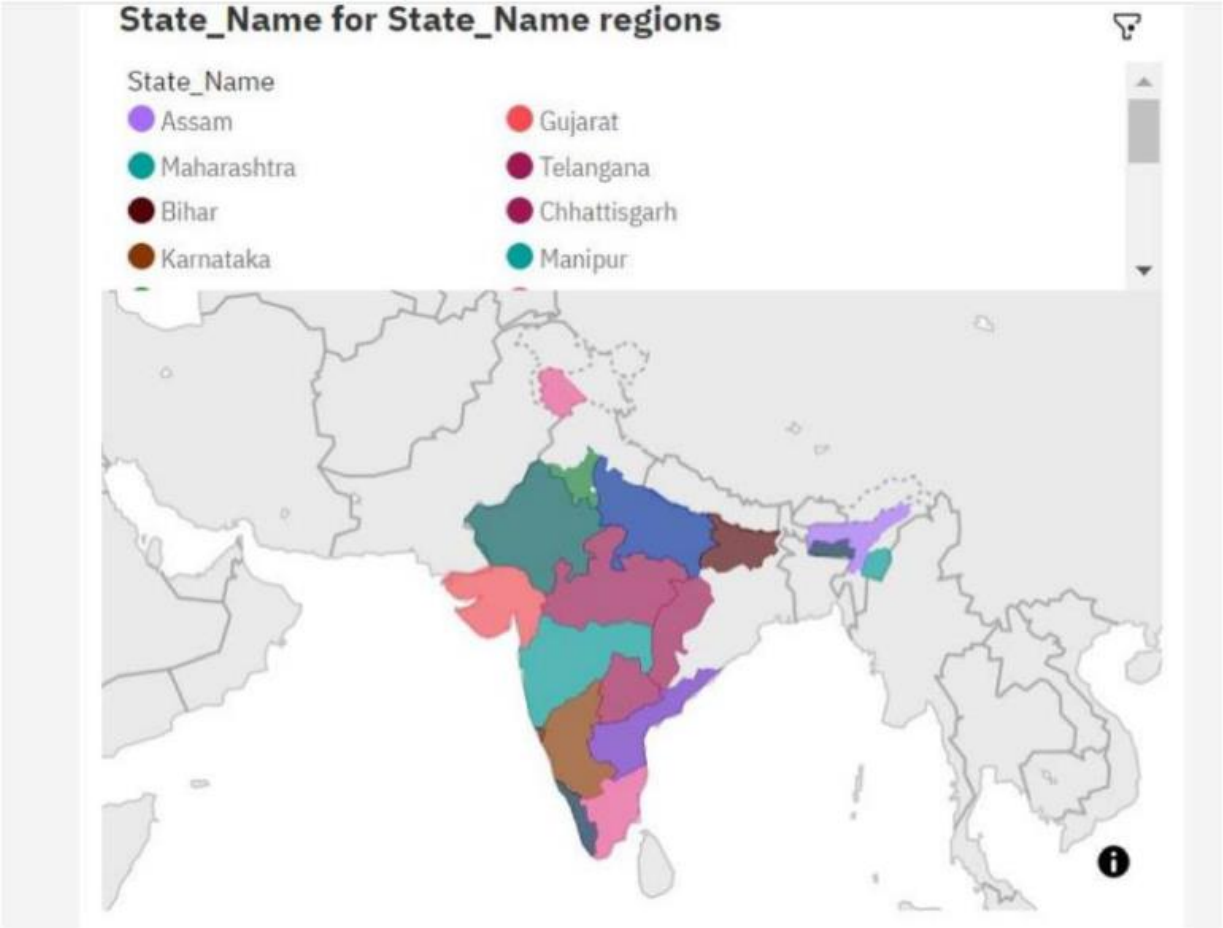


7.3 REPORT CREATION:

SEASONS WITH AVERAGE PRODUCTION



STATE WITH CROP PRODUCTION

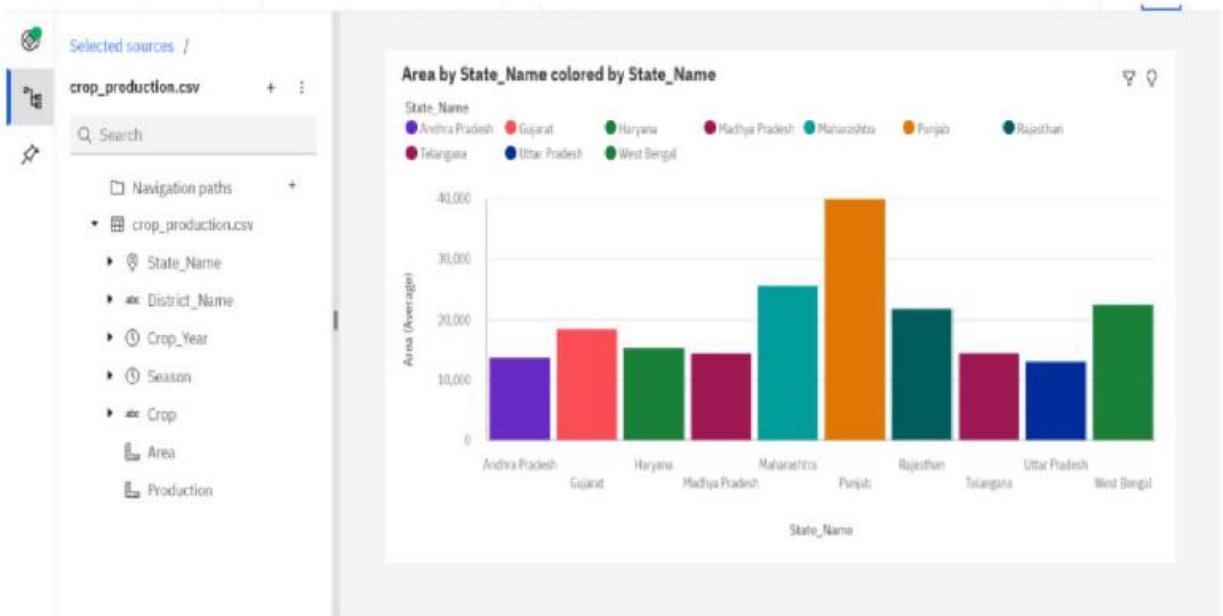


STATE WITH CROP PRODUCTION ALONG WITH SEASON

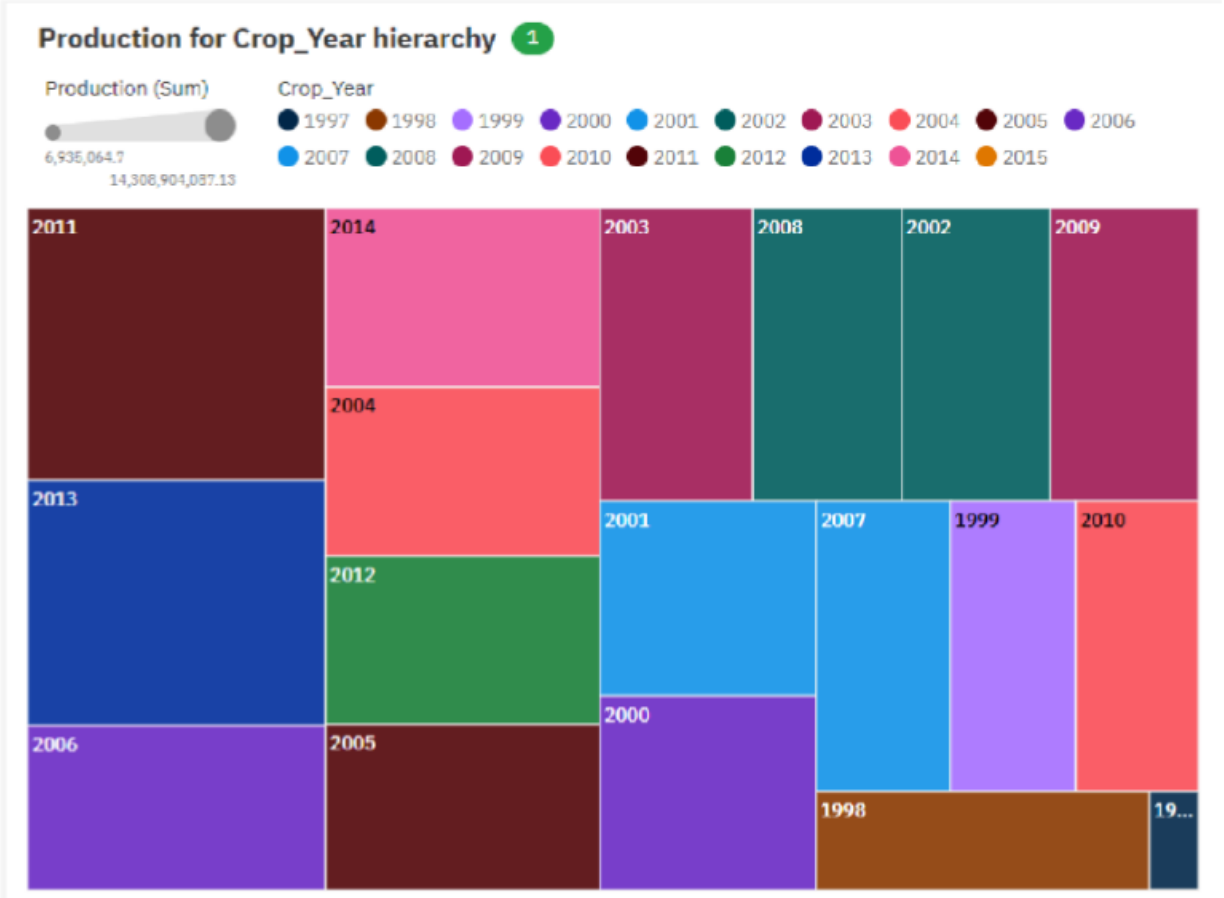
State_Name	Crop
Kerala	Banana
Madhya Pradesh	Banana
Maharashtra	Banana
Manipur	Banana
Meghalaya	Banana
Puducherry	Banana
Rajasthan	Banana
Tamil Nadu	Apple
	Banana
Telangana	Banana
Uttar Pradesh	Banana

Crop	Season
Apple	Whole Year
Banana	Autumn
	Kharif
	Rabi
	Summer
	Whole Year
	Winter

TOP 10 STATES WITH MOST AREA

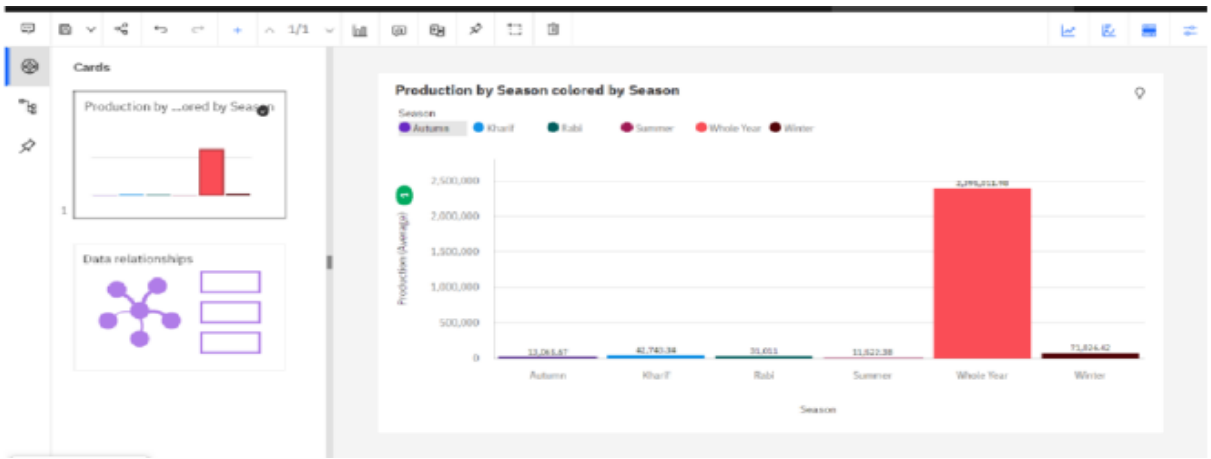


WITH YEARS USAGE OF AREA AND PRODUCTION

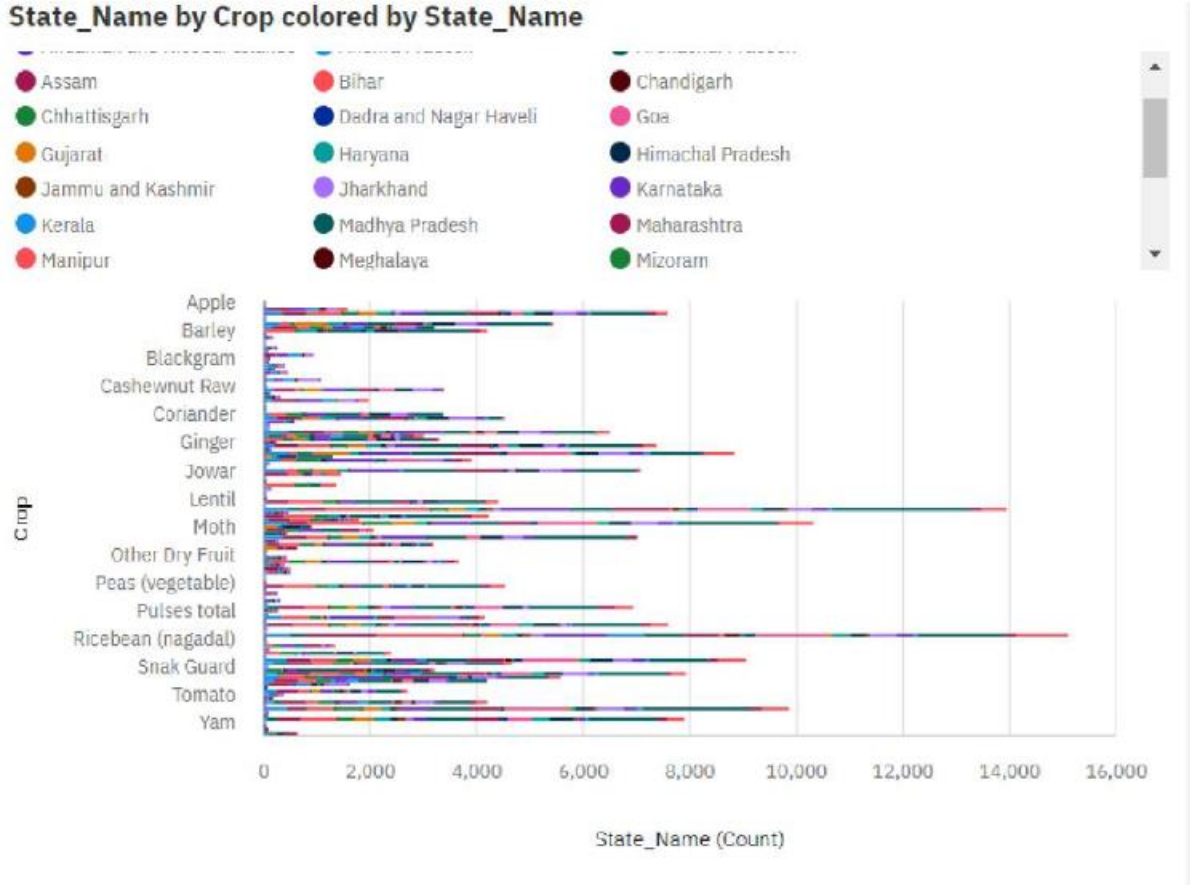


7.4 STORY CREATION:

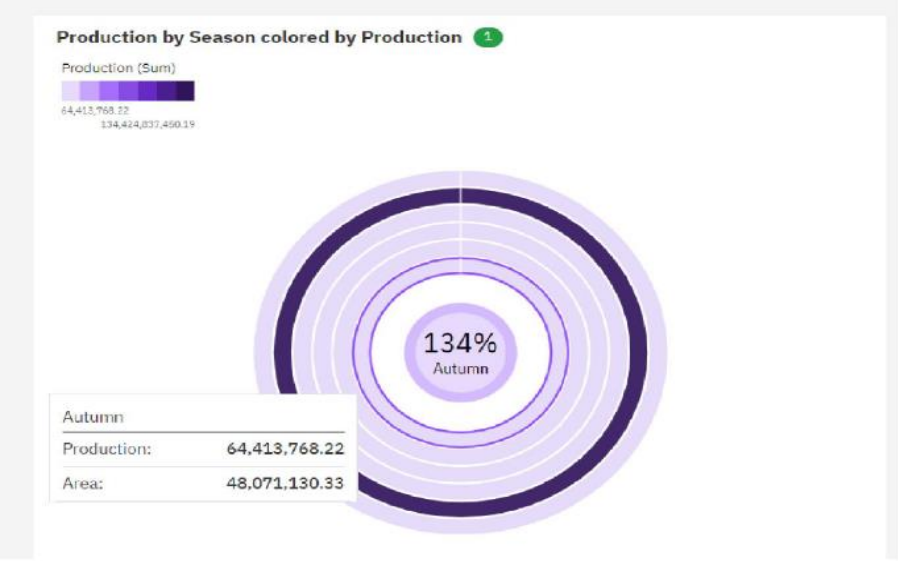
SEASONS WITH AVERAGE PRODUCTION



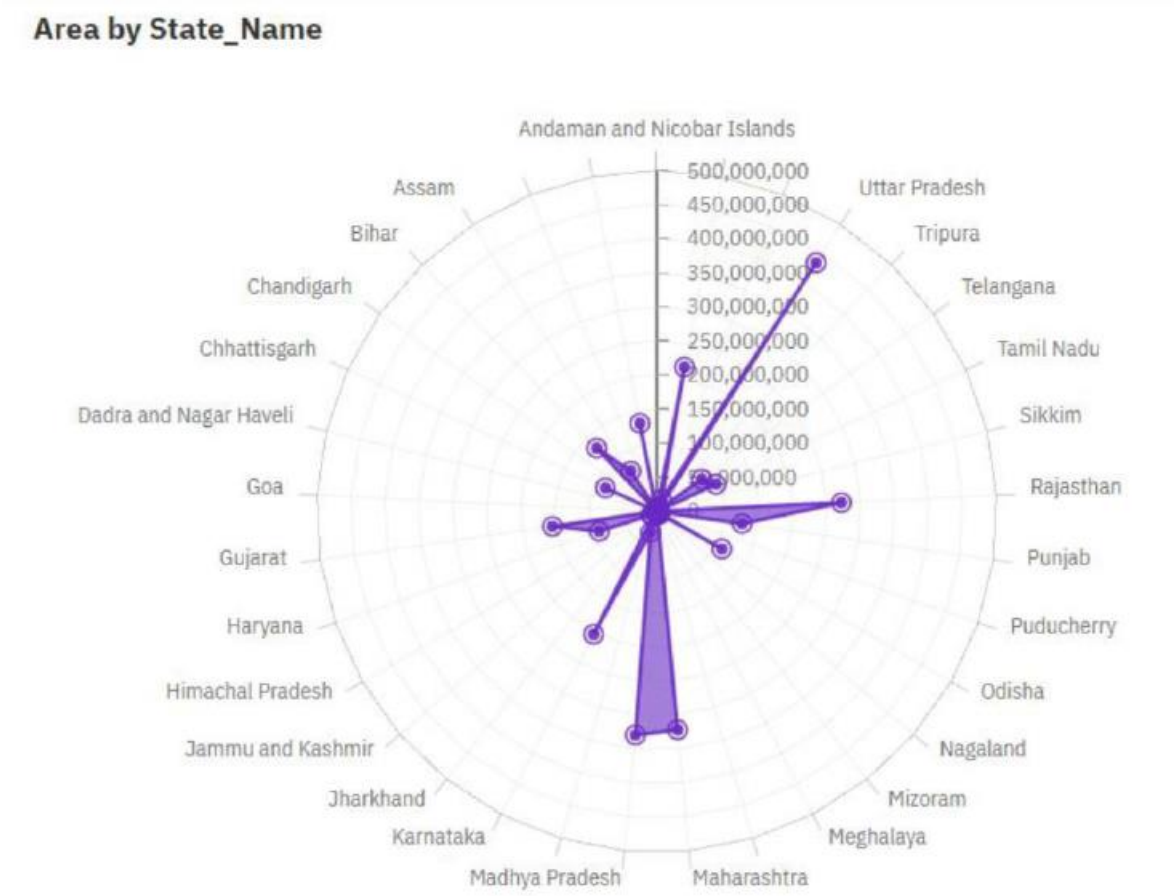
STATE WITH CROP PRODUCTION



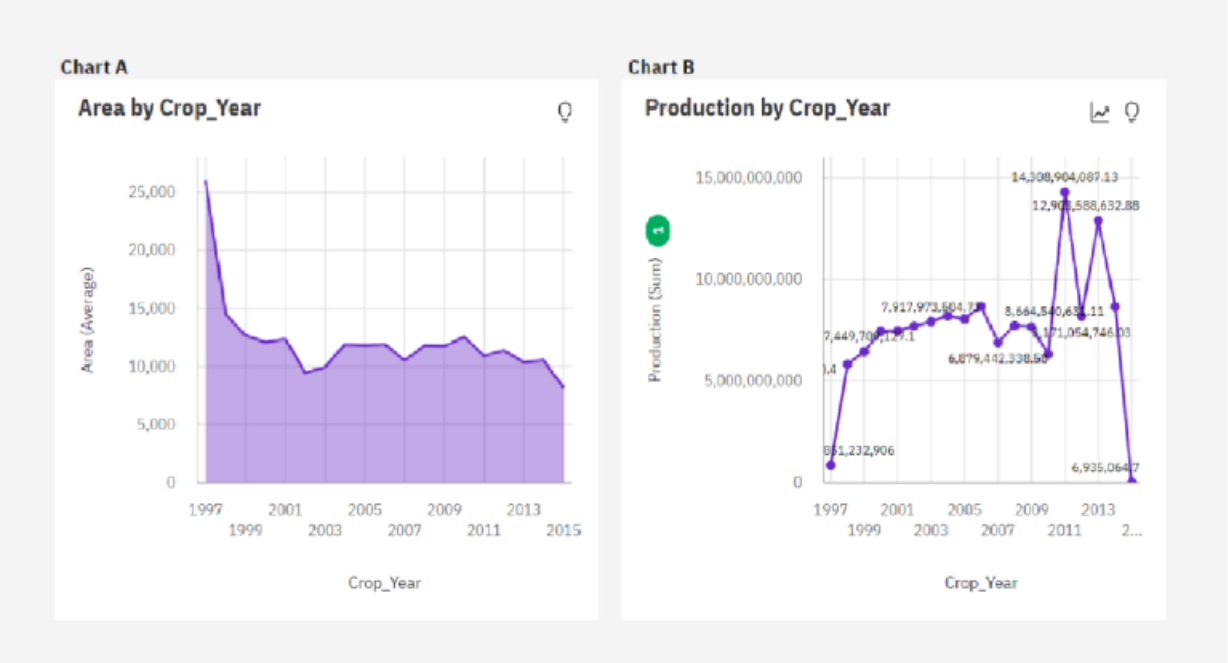
STATE WITH CROP PRODUCTION ALONG WITH SEASON



TOP 10 STATES WITH MOST AREA



WITH YEARS USAGE OF AREA AND PRODUCTION



8. TESTING

8.1 TEST CASES:

Test case	Feature Type	Component	Test Scenario	Steps to Execute	Result	Status
Home Page_TC_001	Functinal	Home Page	Verify user is able to see the login/signup	1. Enter URL and click go	Login page should pop up as the login button is clicked	Pass
Login page	UI	Login Page	Verrify the elements in the Login/Signup popup	1. Click on the login button . 2.Verify	Application should show UI elements	Pass

				the login / signup		

8.2 USER ACCEPTANCE TESTING:

PURPOSE OF TESTING:

The purpose of this document is to briefly explain the test coverage and open issues of the [Estimate The Crop Yield Using Data Analytics] project at the time of the release to User Acceptance Testing (UAT).

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	3	0	0	3

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

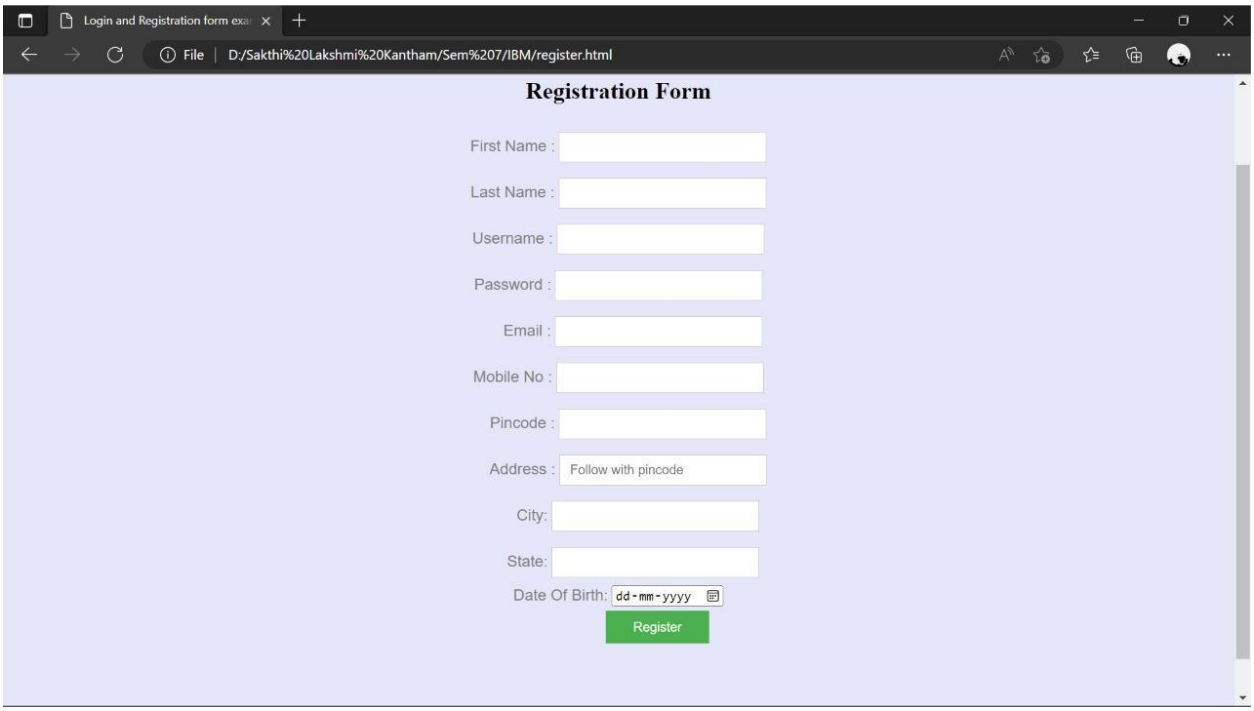
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	19
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	18	35
Not Reproduced	1	0	0	0	1
Skipped	0	0	1	1	2
Won't Fix	0	0	2	1	3
Totals	25	9	12	24	70

(II) TEST CASE ANALYSIS:

This report shows the number of test cases that have passed, failed, and untested

Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	5	0	0	4
Version Control	2	0	0	2

9. RESULTS


Login and Registration form exa
File | D:/Sakthi%20Lakshmi%20Kantham/Sem%207/IBM/register.html
Registration Form
First Name :
Last Name :
Username :
Password :
Email :
Mobile No :
Pincode :
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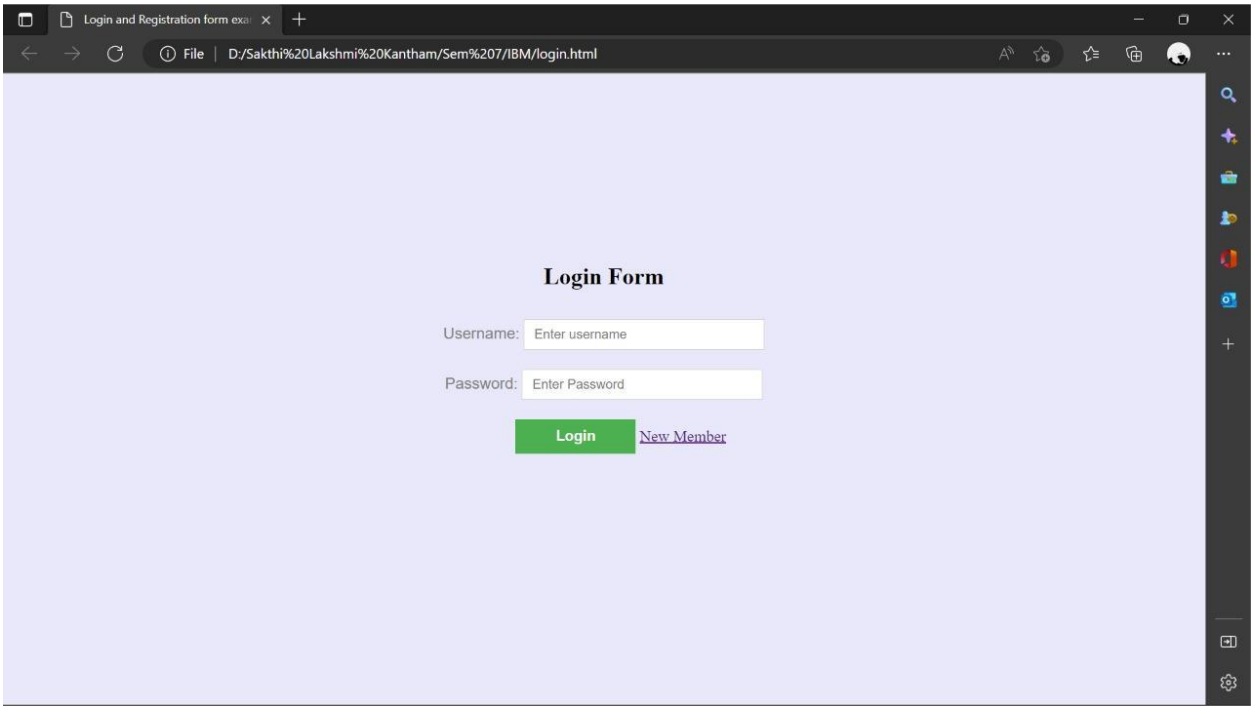
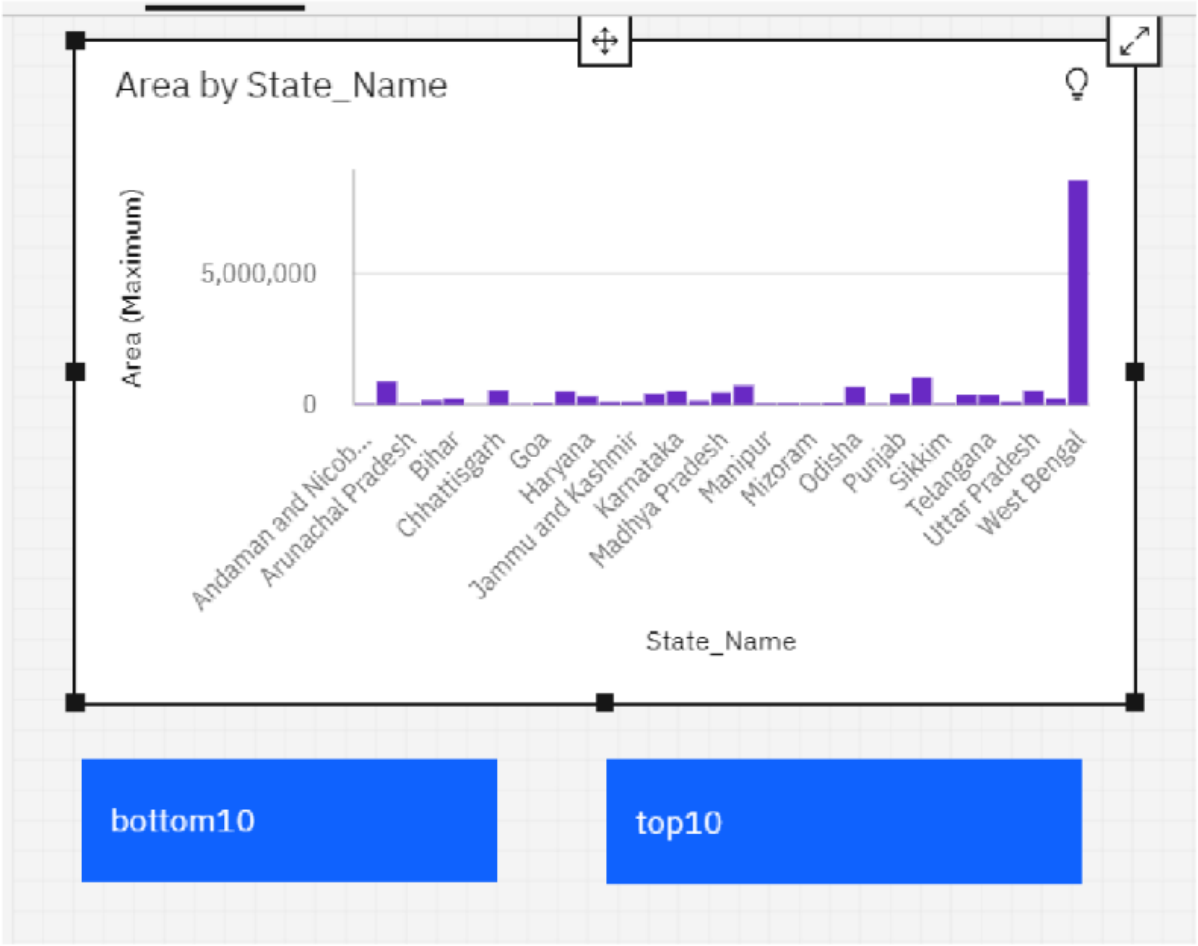
State:
Date Of Birth:
dd-mm-yyyy
Register


Login and Registration form exa
File | D:/Sakthi%20Lakshmi%20Kantham/Sem%207/IBM/login.html
Login Form
Username:
Enter username
Password:
Enter Password
Login
New Member

Action Buttons:



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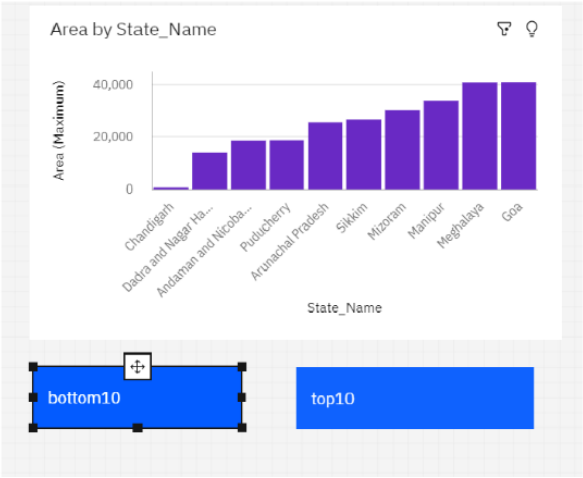

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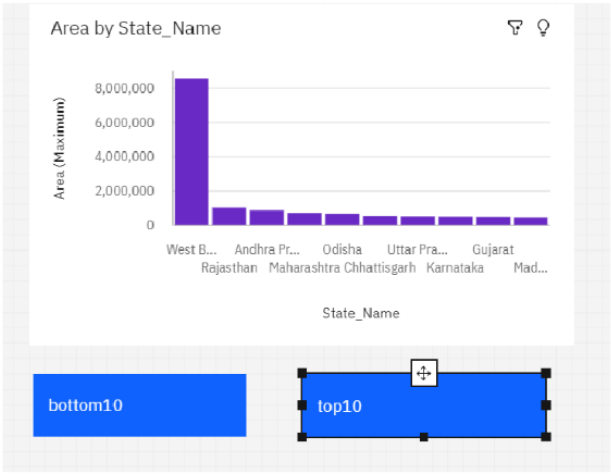
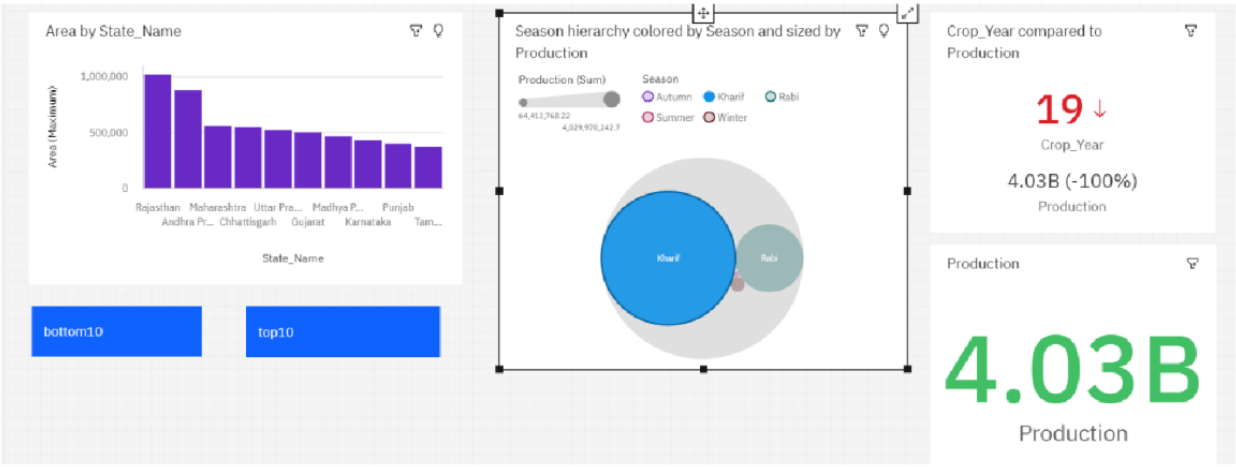
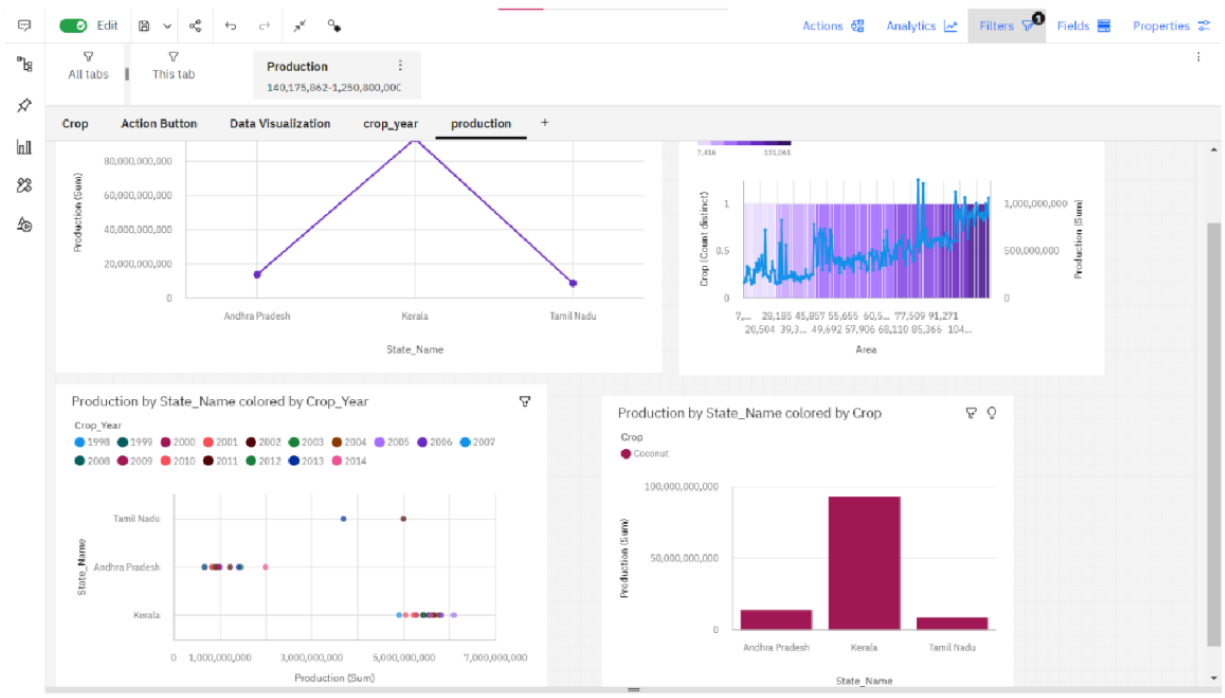




Dashboard with respect to production:



10. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

• Technology increases productivity. Technology has significantly increased productivity in agriculture, allowing farmers to complete more tasks quickly and with less effort.

• Technology reduces costs. The use of modern agricultural technologies can aid in cost savings for farmers. Farmers may labour more effectively, with less effort, and in less time with the aid of contemporary technologies.

• Work that previously needed a large number of people and a long amount of time can now be completed quickly thanks to current technology.

DISADVANTAGES:

• High maintenance costs. The high maintenance expenses of farm technology are one of its drawbacks. For farmers and small businesses, the technology's high maintenance costs are a challenge.

• Farmers struggle to stay current with technology because they cannot afford the high maintenance costs of modern technological equipment. Farmers with low levels of education are illiterate, and it is difficult for them to understand how to use modern farming technologies.

11. CONCLUSION

Through the application of data visualisation techniques, agricultural yield data is utilised to analyse and increase crop productivity.

The data users can dive down and concentrate on more in-depth views of these data displays thanks to the interactive charts that are included in the visualisation techniques that are offered.

12. FUTURE SCOPE

We anticipate expanding the same in the future as an even more user-friendly mobile application with other user experience improvements planned.

13. APPENDIX

Link to the GitHub Repository: https://github.com/IBM-EPBL/IBM-Project-585-1658308239

Project Demo Video Link: https://drive.google.com/uc?id=1XrsI1kneDRXJcrqw6oATnLl7z-2Vj9_U&export=download