PROJECT REPORT

ESTIMATION OF CROP PRODUCTION USING DATA ANALYTICS

TEAM MEMBERS:
- **SNEHA M (TEAM LEAD)**
- **SIVAPRIYAA S M**
- **SAI SRAVANI K**
- **NARMATHA K**

1. Introduction:

1.1 Overview:

The demand for food is found increasing with increase in population. With a rapid demand for cultivation of food, it is highly essential to analyze the growth of their production with respect to seasons, production, area, demands across cities etc. Hence we bring in an exemplary analytical dashboard for the farmers to understand all possible enhancements that has to be done to upscale their production. We have given all possible insights that will help the users to get quick overview.

1.2 Purpose:

Our Analytical Dashboard is completely user friendly and it is designed in a way that grabs the famer's attention as the representation is made appetizing and interesting. . The main problem to be solved is predicting the crop yield using Data Analytics which helps farmers to analyse the Crop Production. To assist him in planning and harvesting.The ultimate purpose for analytics is to build a strong marketing strategy which can be achieved through our project.

2. LITERATURE SURVEY:

2.1 Existing Problem:

Crop production in India is one of the most important sources of income and India is one of the top countries to produce crops. It might be a tough task for a business man to analyze each column skimming through the datasets. And of course, mind calculation for about 40,000 rows is impossible. Also it is highly important to represent the visualization graphs with suitable data that can be read by the users.

2.2 References:

Agrawal et al discuss about various Data Mining tools such as Dashboards, TextMining tools. They provide an overview about these tools and the various scenarios in which they can be deployed [2].

The proposed architecture mainly focuses on open source tools for the development of the application. The user can select location from map for which the details are available at one click [3].

 K. Sabarina and N. Priya, [2] has presented an efficient strategy for crops Big data for the benefit of precision agricultural lowering data dimensionality. Predictive analytics can be used to make the smartest decision in farming by collection realtime data analysis with streaming data.

2.3 Problem Statement Definition:

It's high time we take a call and analyze the famer needs and increase or decrease the production based on seasons. Hence with the help of Cognos Analytics, we have built a dashboard where there are 5 tabs, each representing a unique relationship that needs to be solved. We have used Data Player to highlight the top values which would be more appetizing for the users. This tool predicts the crop yield based on the parameters like Rainfall, temperature, pesticides, etc. This helps in predicting the yield and increasing production.

3.IDEATION AND PROPOSED SOLUTION:
3.1 Empathy Map Canvas:
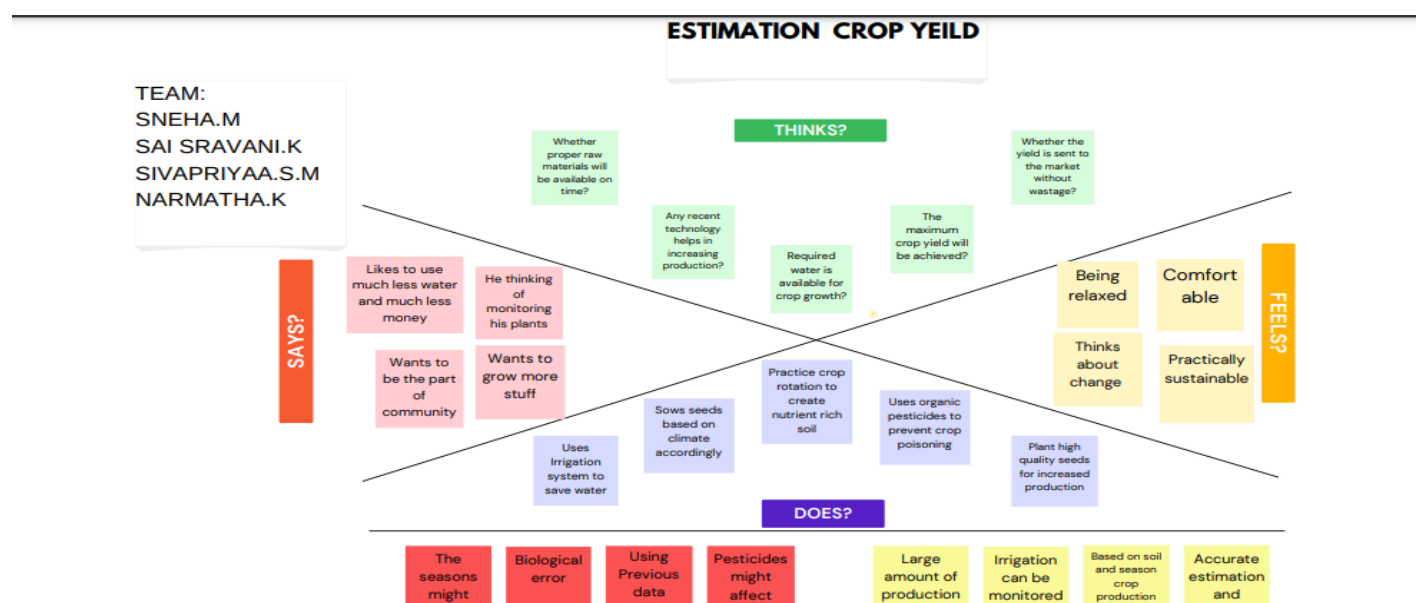
3.2 Ideation and Brainstorming:

Team Members and their Ideas:

SNEHA M:

Idea 1:Increased production

Idea 2:Usage of water limitedly

Idea 3:Determining soil type

Idea 4:Estimation of seasonal seeds

SAI SRAVANI K:

Idea 1:Sowing seeds based of climate

Idea 2Analyse the data and process

Idea 3:Providing proper visualizations

Idea 4:Increasing accuracy

SIVAPRIYAA S M :

Idea 1:Collecting data from different sectors

Idea 2Cleaning the data to avoid inaccuracy

Idea 3Visualizing fields based on the requirements

Idea 4:Interactive dashboard

NARMATHA K:

Idea 1:Introducing innovative idea
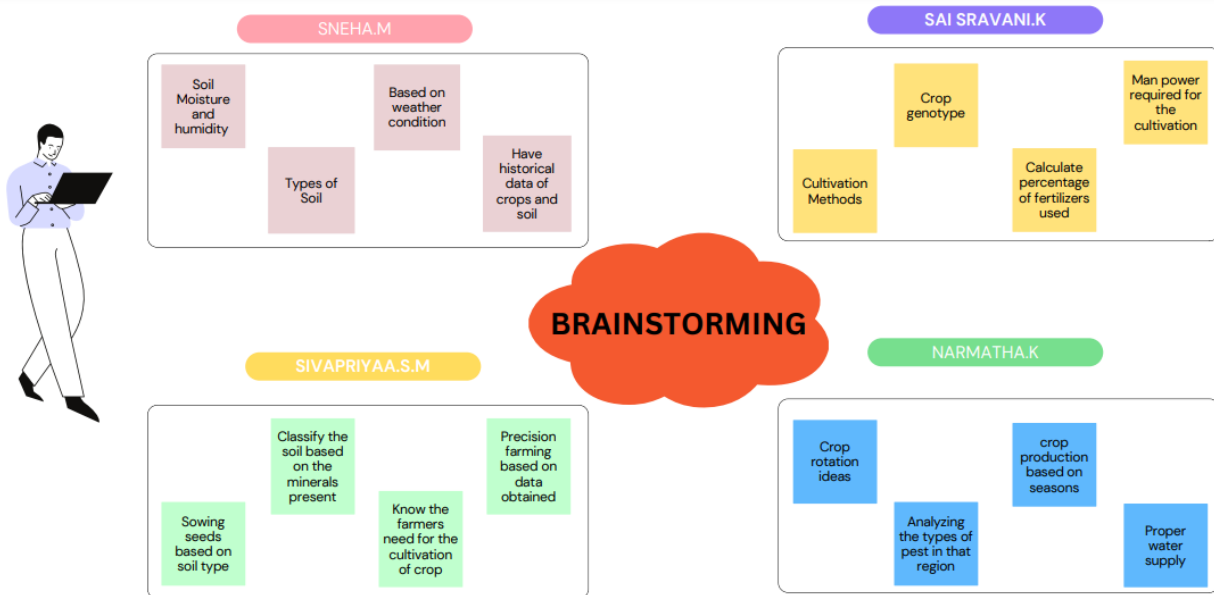
Idea 2:Using chatbot as an add on to the dashboard

Idea 3:Displaying charts for easy understanding

Idea 4:Increasing the productivity

TOP 3 IDEAS:

1.Estimation of seeds based on seasonal variation.

2. Visualizing fields based on the requirements.

3. Using chatbot as an add on to the dashboard.

BRAINSTORMING:

3.3 PROPOSED SOLUTION:

1.Problem Statement (Problem to be solved):

The main problem to be solved is predicting the crop yield using Data Analytics which helps farmers to analyse the Crop Production. To assist him in planning and harvesting.

2.Idea / Solution description:

This tool predicts the crop yield based on the parameters like Rainfall, temperature, pesticides, etc. This helps in predicting the yield and increasing production.

3.Novelty / Uniqueness:

We are planning of integrating a Chatbot with our Dashboard so as to make it Interactive. Also, additional forecasting is planned to be done.

4.Social Impact / Customer Satisfaction:

Crop production in India is one of the most important sources of income. So, this tool helps farmers for predicting crop yield which in turn benefits the Indian economy and social beings

5.Business Model (Revenue Model):

This model helps farmer to monitor the crop yield and make decisions based on the output. This will help them to increase their productivity.

6.Scalability of the Solution:

This model performs well with large datasets and gives accurate predictions.

3.4 PROBLEM SOLUTION FIT:

The Problem Solution Fit canvas is based on the principles of Lean Startup , LUM(LazyUserModel) and User Experience design . It helps entrepreneurs , marketers and corporate innovators identify behavioral patterns and recognize what would work and why . It is a template to help identify solutions with higher chances of solution adoption , reduce time spent on testing and get a better overview of the current situation. My goal was to create a tool that translates a problem into a solution, taking into account customer behavior and the context around it. None of the existing canvases or frameworks were giving mean overview and in sight into the real customer situation during his/her decision-making process . With this template you will be able to take important information into consideration at an earlier stage and look at problem solving in depth. It increases your chances offinding problem solution and product-market fit. It helps you to:
1.Solve complex problems in away that fits the state of your customers.
2.Succeed faster and increase your solution adoption by tapping into existing medium sand channels of behavior.
3.Sharpen your communication and marketing strategy with the right triggers and messaging.

4. REQUIREMENT ANALYSIS:

4.1 Functional Requirement:

• User sign up: The user needs to sign up through the website to estimate the crop production.
• Profile: The user must set up the profile and login to the webpage.
• Provide the necessary data: Based on the data provided the dashboard will be launched.
• Analysis: Analysing is an important part where the fields of the dataset are analysed.
• Estimation: The crop production will be estimated based on the data collected.
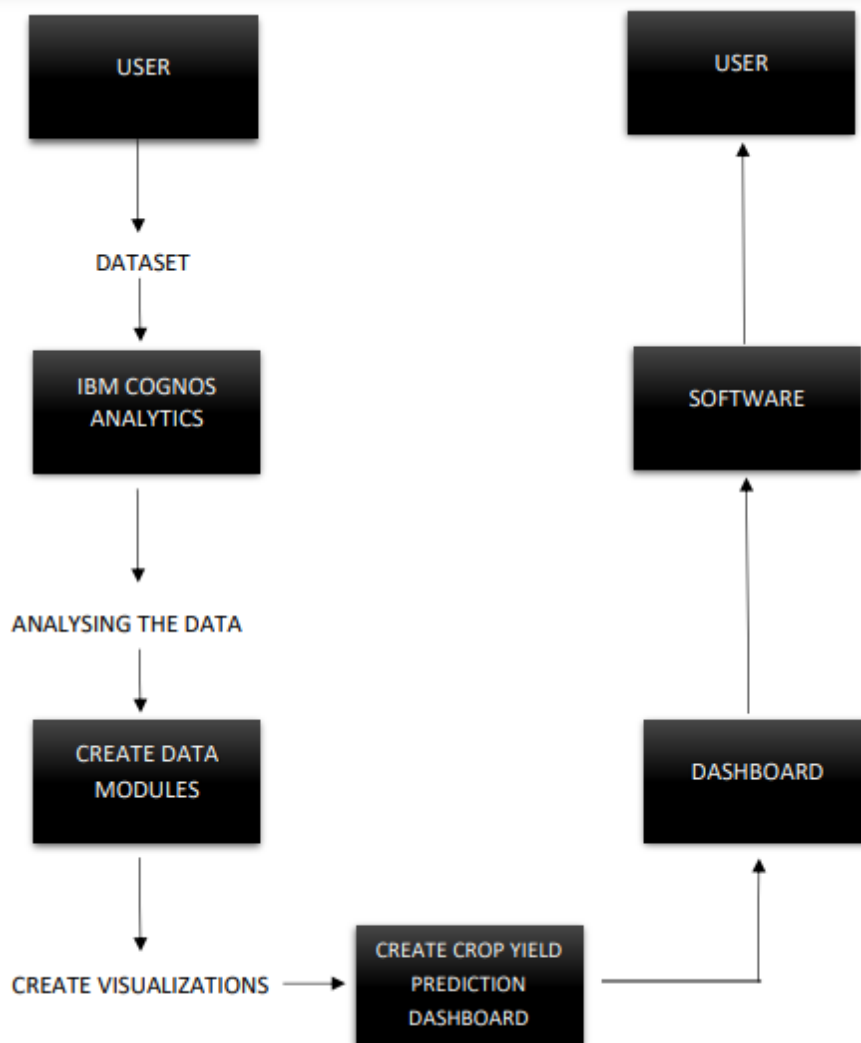
4.2 Non Functional Requirement:

• Security: The user authentication and the data is secured.
• Productivity: The estimation is highly productive and reliable.
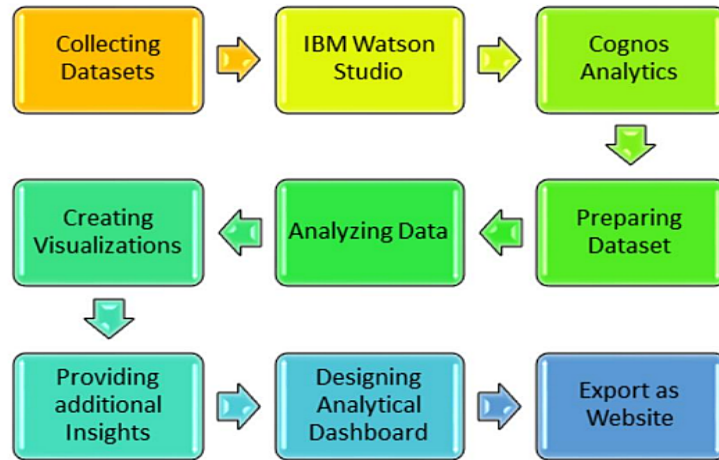• Performance: The analytics dashboard is quick and responsive.

5. PROJECT DESIGN:

5.1 Data Flow Diagrams:

✓ A Data Flow Diagram (DFD) is a traditional visual representation of the information flows 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.

5.2 Solution and Technical Architecture:

```
Collecting          IBM Watson          Cognos
Datasets      →     Studio        →     Analytics
                                          ↓
Creating            Analyzing     ←     Preparing
Visualizations ←    Data                Dataset
    ↓
Providing           Designing           Export as
additional    →     Analytical    →     Website
Insights            Dashboard
```

Technical Architecture:

```
Login to Cognos     Additional          Comparsio
Analytics           Insights        →   -n and
                    are given           growth
    ↓                   ↑               are shown
                                            ↓
Upload              Visulizatio         Forcasting
Cleaned             -ns are             future          Logout
Dataset             made                sales
    ↓                   ↑                   ↓               ↑
Choose              Analyze             Theme           Dashboar-
the            →    the data            and        →    d is
Suitable                                Designs          exported
Template                                are              to
                                        changed          Website
```

5.3 USER STORIES:

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	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 the access the dashboard using Gmail Login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	If I forgot my password, I can reset using Reset password option	High	Sprint-1
	Dashboard	USN-6	As a user, I can login to the application and view dashboard	I can look into the insights	High	Sprint-1
Customer (Web user)	Registration	USN-7	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

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
		USN-8	As a user, I can register for the application by entering my email, password, and confirming my password	I can add my profile photo and edit my account information	High	Sprint-1
Customer Care Executive	Communication	USN-9	As a user, I can give customer support and communicate with customers related to their queries	I can maintain good relationship with clients	High	Sprint-1
Administrator	Chief Executive	USN-10	As a user , I can take business-driven decisions to improve the growth of the company	Add or remove products	High	Sprint-1
Estimator	Estimation	USN-11	As a user, I can go through all the items and will try to estimate this session	I have a feel for the size of the various items in the product based	Medium	Sprint-1

6. Project Planning:

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.	5	High	Sivapriyaa S M Sai Sravani K
		USN-2	As a user, I will receive confirmation email once I have registered for the application	4	Medium	Narmatha K
		USN -3	Creating a website for the login application	2	Medium	Sneha M
		USN – 4	Upload the dataset into the cognos analytics	4	Low	Narmatha K
		USN – 5	Create a new dashboard	5	Medium	Sivapriyaa S M
Sprint-2	Data Visualization Chart	USN-6	Build a Visualization to showcase Average Crop Production by Seasons.	4	Medium	Sai Sravani K Narmatha K
			Showcase the Yearly usage of Area in Crop Production	4	Medium	Sneha M Sivapriyaa S M
			Top 10 States in Crop Yield Production by Area.	4	Medium	Narmatha K
			Crop Production by State.	4	Medium	Sai Sravani K

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			Sates with Seasonal Crop Production using a Text representation.	4	Medium	Sivapriyaa S M Narmatha K
Sprint-3	Creating The dashboard	USN-7	Create the Dashboard by using the created visualizations.	20	High	Sneha M Sivapriyaa S M Sai Sravani K Narmatha K
Sprint-4	Export The Analytics	USN-8	Finally export the created dashboard	20	High	Sai Sravani K Sneha M

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

8.TESTING

8.1 TEST CASES

Date	3-Nov-22
Team ID	PNT2022TMIB03372
Project Name	Project - Estimation of Crop Prod
Maximum Marks	4 marks

Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	
Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	Web page to Login, Verified User	1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup displayed or not	https://us3.ca.analytics.ib m.com/bi/?perspective=da shboard&pathRef=.public_f olders%2FEstimate%2Bthe %2Bcrop%2Byield%2Busing %2BData%2BAnalytics%2FC rop%2Bproduction&action= view&mode=dashboard&s ubView=model000001847c0 58011_00000000	Login/Signup popup should display	W e
			Webpage of Estimate The	1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup with below UI elements:	https://us3.ca.analytics.ib m.com/bi/?perspective=da shboard&pathRef=.public_f olders%2FEstimate%2Bthe	Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour	

Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	
Functional	Home page	Verify user is able to log into application with Valid credentials	Webpage(Login Page) of Estimate The Crop Yield Using Data Analytics	1.Enter URL(https://us3.ca.analytics.ib m.com/bi/?perspective=dashboard&p athRef=.public_folders%2FEstimat e%2Bthe%2Bcrop%2Byield%2Busi ng%2BData%2BAnalytics%2FCrop %2Bproduction&action=view&mo de=dashboard&subView=model00 0001847c058011_00000000) and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter valid password in	Username: sneha@gmail.com password: Testing123	User should navigate to user account homepage	

Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	
Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	Web page to Login, Verified User	1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup displayed or not	https://us3.ca.analytics.ib m.com/bi/?perspective=da shboard&pathRef=.public_f olders%2FEstimate%2Bthe %2Bcrop%2Byield%2Busing %2BData%2BAnalytics%2FC rop%2Bproduction&action= view&mode=dashboard&s ubView=model000001847c0 58011_00000000	Login/Signup popup should display	
			Webpage of Estimate The	1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login/Singup popup with below UI elements:	https://us3.ca.analytics.ib m.com/bi/?perspective=da shboard&pathRef=.public_f olders%2FEstimate%2Bthe	Application should show below UI elements: a.email text box b.password text box c.Login button with orange colour	

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the **Estimation of Crop Production using Data Analytics** project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

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	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9.RESULTS

The final dashboard created with 5 tabs are attached below:
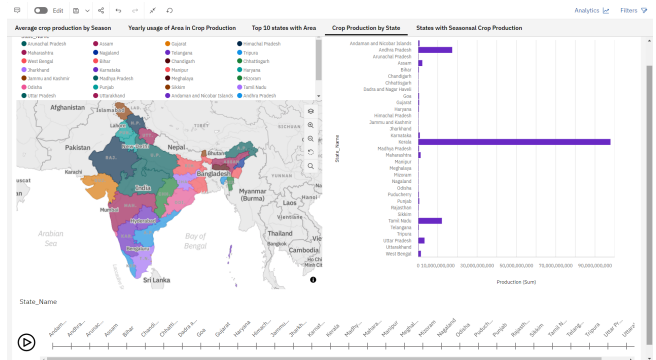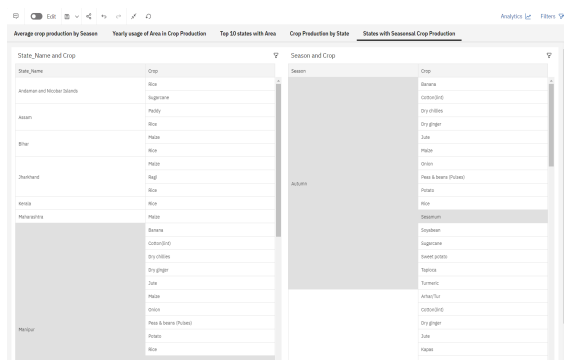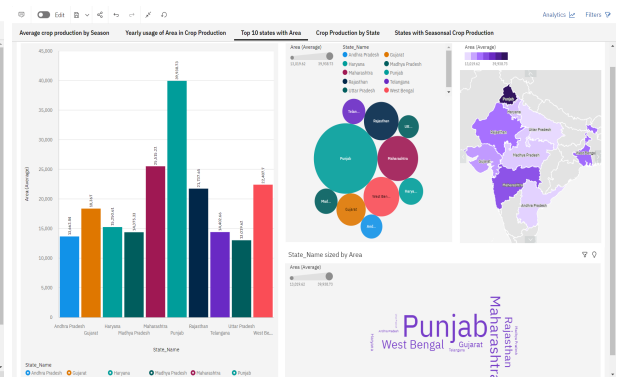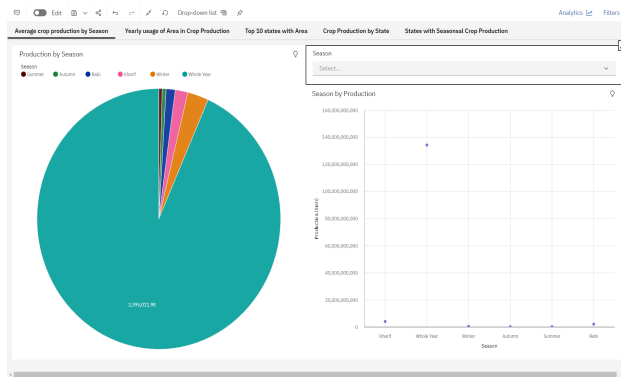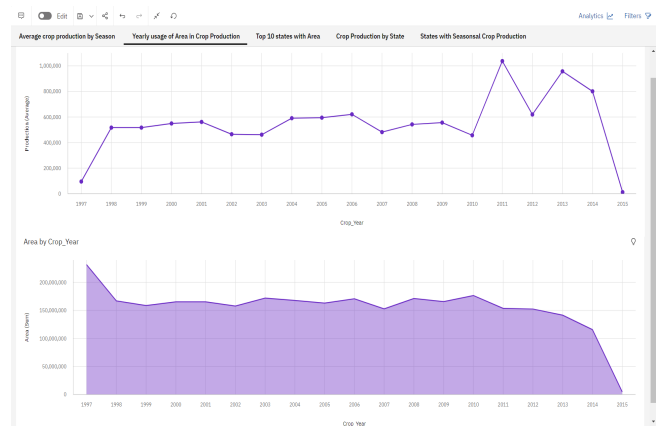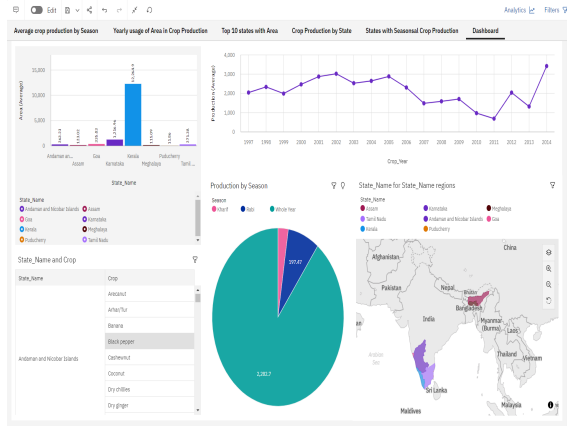
10. ADVANTAGES AND DISADVANTAGES:
ADVANTAGES:

- ✓ Data analytics is a critical part of improving business operations in every industry.
- ✓ An organization can utilize data analytics to improve decision-making, analyze customer trends, track customer satisfaction and identify opportunities for new products and services to meet growing market needs.
- ✓ Data analytics can help farmers monitor the health of crops in real-time, create predictive analytics related to future yields and help farmers make resource management decisions based on proven trends.

DISADVANTAGES:

- ✓ There might be data redundancy and the results might not be accurate
- ✓ The seasons might mislead and the prediction goes wrong.

11. 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 soils,hidden patterns discovery using data set related to climatic conditions and crop yields data.The activities of agriculture field are numerous like weather forecasting, soil quality assessment, seeds selection, crop yield prediction etc. In this survey, the specific activity, crop yield prediction has been surveyed and the major trends have been identified.

It can be concluded that the research in the field of agriculture with reference to using IT trends like data analytics is in its infancy. As the food is the basic need of humans, the requirement of getting the maximum yields using optimal resource will become the necessity in near future as a result of growing population. The survey outcomes indicate the need for improved techniques in crop yield analytics.There exists a lot of research scope in this research area.
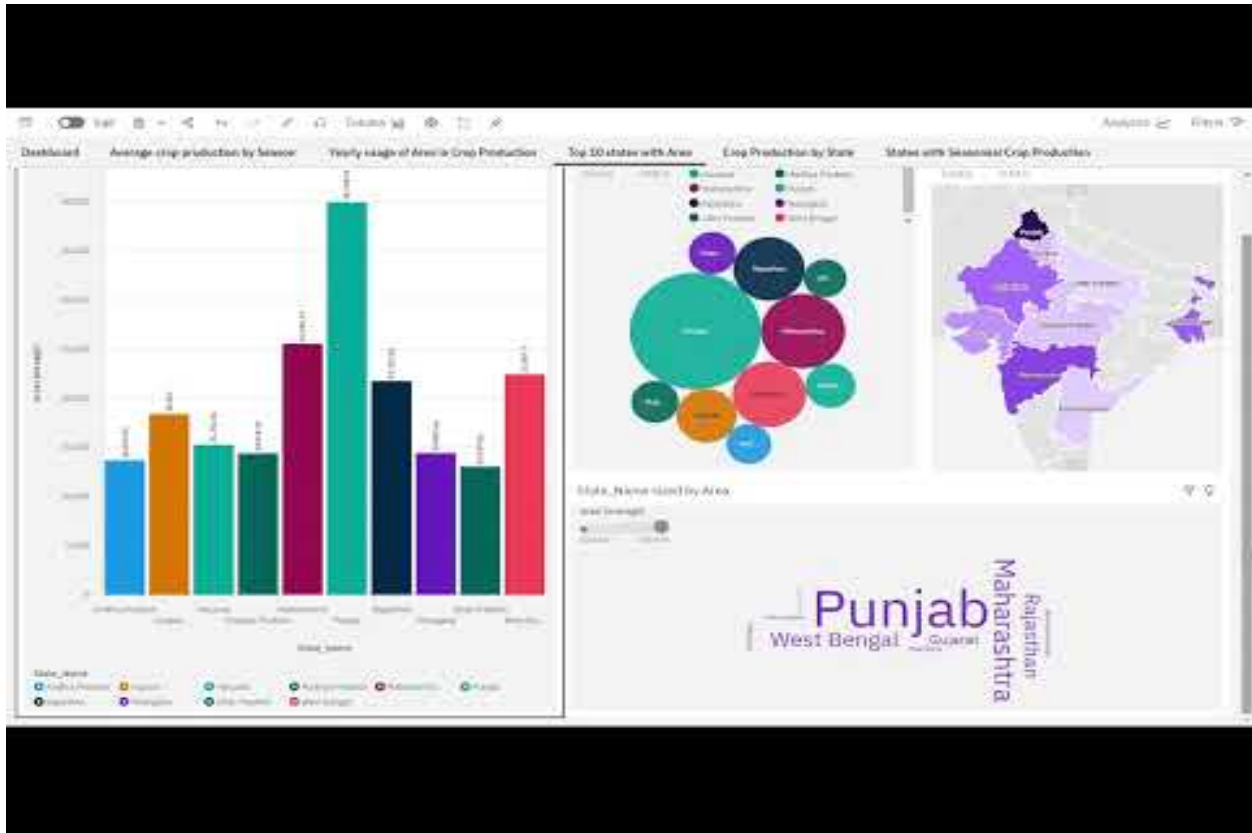
12.FUTURE SCOPE:

Crop production in India is one of the most important sources of income and India is one of the top countries to produce crops.Our project mainly focuses on getting dominant insights from the data that helps the farmers to choose which crop to use wisely. The operating sector such as Collecting datasets, Analyzing the data, and Providing relationships and Insights. This process makes to he farmers to predict in which season what crop to use and helps to forecast future sales strategically. The accurate prediction of crop yield certainly benefits the farmers in choosing the right method to reduce the crop damage and gets best prices for their crops.

In coming decades, two most significant and important factors found to influence crop yield is, increase in the global population and economy, which greatly demands the higher and sustainable agricultural based crop yields. The capacities of food production at global level is going to be very limited due to the less availability of cultivable land, water resources, difficulties in maintaining the sustainable crop production levels, effects of changes in the global climatic conditions and also by various biophysical parameters which influence the crop yield. The farmers need to be educated on the application of scientifically proven methods to quantify the crop yield capacities and same need to be informed to higher authorities to maintain transparency in sharing the actual information, intern helps in making the policy based, research oriented, development and investment related decisions that aim to influence future crop yield.

13. APPENDIX

DEMO LINK:

GITHUB:

https://github.com/IBM-EPBL/IBM-Project-20090-1659712360