ESTIMATE THE CROP YIELD USING DATA ANALYTICS

A PROJECT REPORT

Submitted by

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CHAPTER 1

INTRODUCTION

1.1 Project Overview

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 analysing some important visualization, creating a dashboard and by going through these we will get most of the insights of Crop production in India. Agriculture is important for human survival because it serves the basic need. Due to variations in climatic conditions, there exist bottlenecks for increasing the crop production in India. Crop yield prediction is one of the important factors in agriculture practices. Farmers need information regarding crop yield before sowing seeds in their fields to achieve enhanced crop yield. The use of technology in agriculture has increased in recent year and data analytics is one such trend that has penetrated into the agriculture field. The main challenge in using big data in agriculture is identification of effectiveness of big data analytics. Efforts are going on to understand how big data analytics can agriculture productivity.

1.2 Purpose

The main purpose of the project Estimate the Crop Yield Production is to achieve the maximum crop at minimum yield is the ultimate aim of the project. Early detection of problems and management of that problems using data analytics can help the farmers for better crop yield and also analyzing the usage area along with the seasons also increase the production.

CHAPTER 2

LITERATURE SURVEY

2.1 Existing problem

Niketa et al in 2016 have indicated that the yield of the crop depends on the seasonal climate. In India, climate conditions vary unconditionally. In the time of drought, farmers face serious problems. So this taken into consideration they used help the farmers to suggest the crop for the better yield. They take various data from the previous years to estimate future data. The main factors that take into consideration are minimum temperature, maximum temperature, average temperature, and previous year's crop information and yield information. Using Data Analytics, they are suggested that are high yield and low yield crop productions.

They take various data from the previous years to estimate future data.

2.2 References

van Klompenburg et al. (2020) performed an SLR on crop yield prediction using Machine Learning. They concluded that neural networks, especially CNN, LSTM, and DNN are mostly applied for crop yield prediction. Also, they stated that the number of features depends on the study. There are cases where the yield prediction depends on object counting and detection rather than tabular data. Regarding the usage of Deep Learning in image processing, Hani et al. (2020) compared semisupervised methods with Deep Learning based methods for fruit detection and counting in apple orchards. They showed that for yield mapping the former methods, such as Gaussian Mixture Models, outperform the latter, based on U-Net, Faster RCNN, and CNN. Koirala et al. (2019) reviewed the use of Deep Learning methods for fruit counting and estimating yield.

They revealed the ability of Deep Learning methods to extract important features while recommending approaches such as CNN detectors, deep regression, and LSTM for estimating the fruit load. Lee et al. (2019) conducted experiments using

Deep Learning methods to build a self-predictable crop yield platform based on crop diseases. For the crop disease diagnosis module, they stated that the CNN algorithm outperformed R- CNN and YOLO algorithms. Also, using a ReLU activation function of the artificial neural network showed the highest accuracy for the CYP module.

Zhang et al. (2020) reviewed the Deep Learning applications in dense agriculture scenes, including recognition and classification, detection, counting, and yield estimation. The results of their survey showed that Deep Learning outperforms in dense scenes.

Concerning the use of Deep Learning methods with tabular data, Chlingaryan et al. (2018) performed a review for predicting crop yield and estimating nitrogen status with Machine Learning techniques. They concluded that Machine Learning technological improvements, including the Deep Learning subfield of Machine Learning, will have an impact on providing cost-effective and comprehensive solutions. Moreover, they mentioned that the hybrid systems of Machine Learning techniques will play a role in the near future.

The review of Dharani et al. (2021) on crop yield prediction with the use of Deep Learning, showed that hybrid networks and the RNN-LSTM networks outperform all other networks. The reason for the high performance of RNN and LSTM stands on their storage and feedback loop. They resulted that those networks are more capable of making accurate predictions since they can deal with time-series data of crop yield. The literature appears to contain little on a systematic review analysis on the application of Deep Learning in crop yield prediction. There are not many reviews analyzing and assessing the current work on that topic in an objective way.

Moreover, there are crops and methods that have not been investigated yet for crop yield prediction. That means future research has to be conducted with no knowledge on the features needed and obstacles that need to be overcome. This can be critically revealed with a systematic literature review. Hence, our aim is to help

address these gaps by conducting this SLR and gathering information on the Deep Learning application in crop yield prediction based on the important features and issues.

Study	Review Type	Focus	Inference
(van Klompenburg et al. 2020)	Systematic	Crop yield prediction with Machine Learning	Object counting and detection rather than tabular data
(Hani el al. 2020)	Non-systematic	Fruit detection and counting methods for yield mapping	Semi-supervised method based on U-Net, Faster R-CNN and CNN
(Koirala et al. 2019)	Non-systematic	Fruit detection for yield estimation	Deep regression and LSTM for estimating Fruit Load
(Lee et al. 2019)	Non-systematic	Crop yield prediction using Deep Learning	Crop Disease Diagnosis module to build self-predictable crop yeild platform
(Chlingaryan et al. 2018)	Non-systematic	Crop yield prediction and nitrogen status estimation with Machine Learning	Machine Learning technological improvement impact on cost-effective, comprehensive solutions by use of Hybrid system
(Zhang et al. 2020)	Non-systematic	Employing Deep Learning for dense scenes in agriculture	Deep Learning outperforms in dense agriculture scenes
(Dharani et al. 2021)	Non-systematic	Crop Prediction Using Deep Learning Techniques	Hybrid network and RNN-LSTM networks outperform all other networks with help of time-series data of crop yield

Figure 2.1 References

2.3 Problem Statement Definition

The science of training machines to learn and produce models for future predictions is widely used, and not for nothing. Agriculture plays a critical role in the global economy. With the continuing expansion of the human population understanding worldwide crop yield is central to addressing food security challenges and reducing the impacts of climate change. Crop yield prediction is an important agricultural

problem. The Agricultural yield primarily depends on weather conditions (rain, temperature, etc), pesticides. Accurate information about history of crop yield is important for making decisions related to agricultural risk management and future predictions.

CHAPTER 3

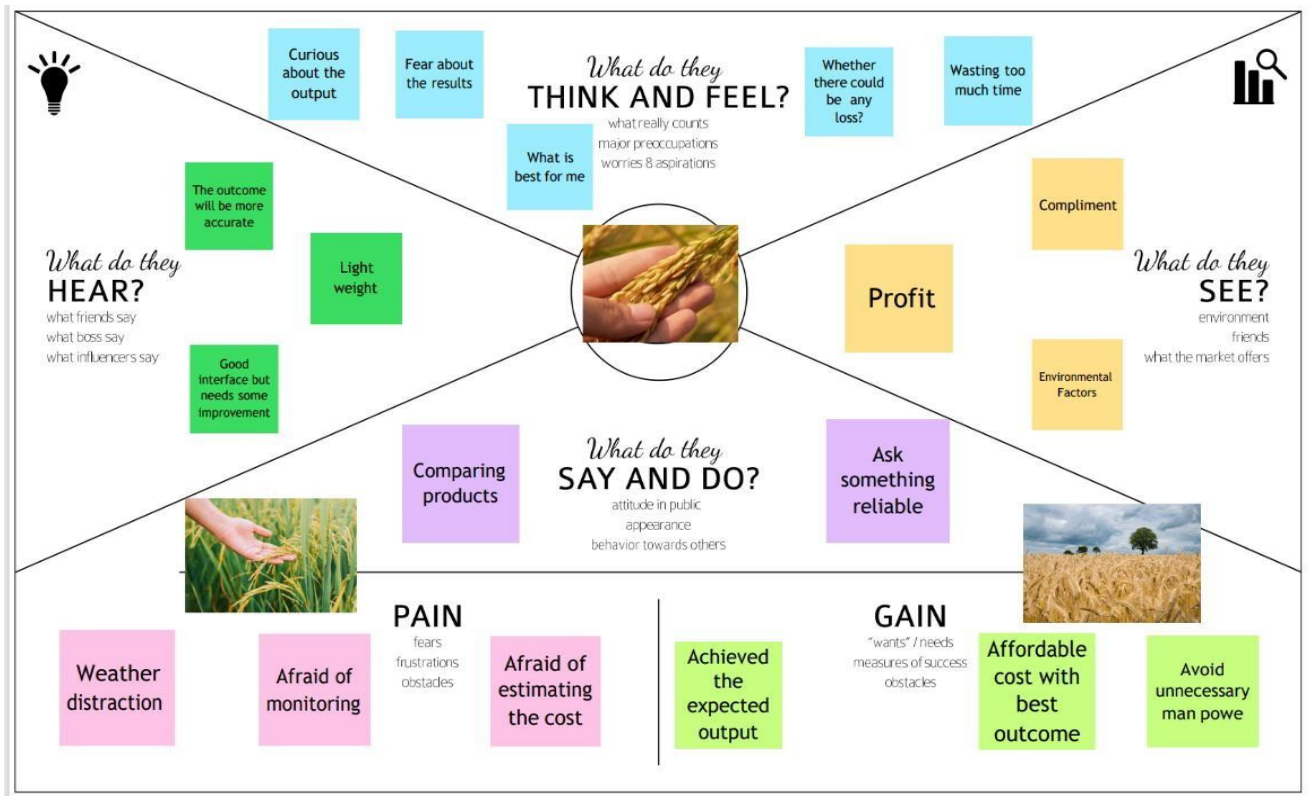# IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

Figure 3.1 Empathy Map Canvas

An empathy map is a widely used visualization tool within the field. In relation to empathetic design, the primary purpose of an empathy map is to bridge the understanding of the end user.

3.2 Ideation & Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement
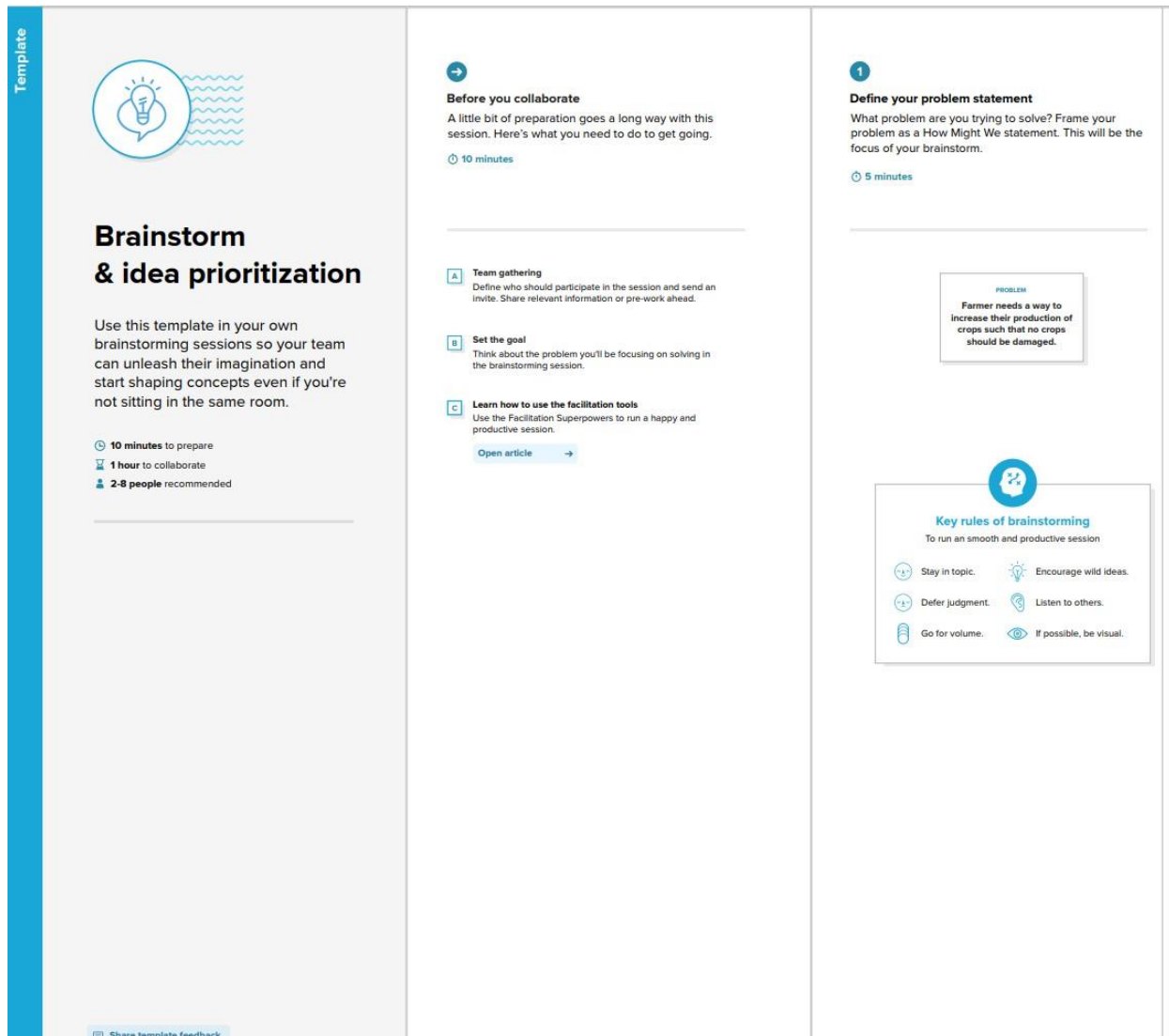
Figure 3.2 Team gathering and select the problem statement

Team Gathering, Collaboration and Select the Problem Statement

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.

Step-2: Brainstorm, Idea Listing and Grouping

②

Brainstorm

Write down any ideas that come to mind that address your problem statement.

🕐 10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!
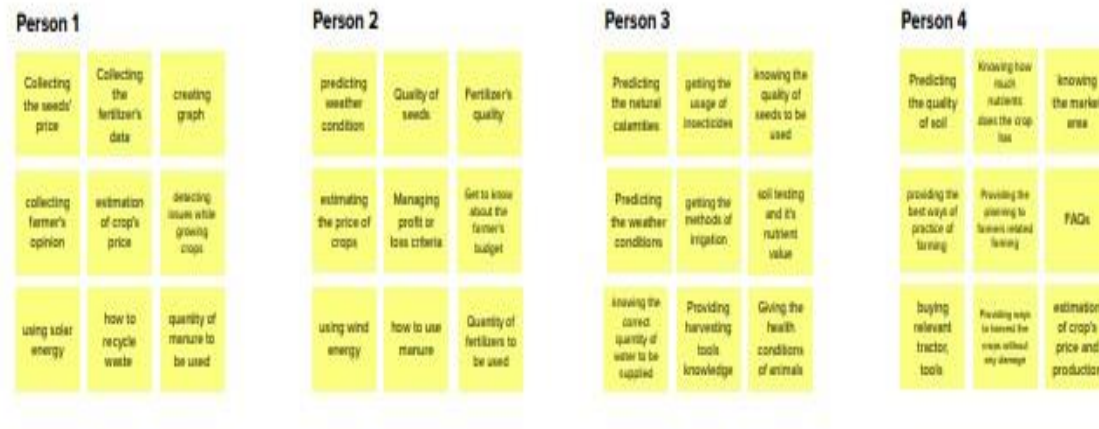

Figure 3.3 Brainstorming

Brainstorming is a group problem-solving method that involves the spontaneous contribution of creative ideas and solutions.

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

⏱ 20 minutes
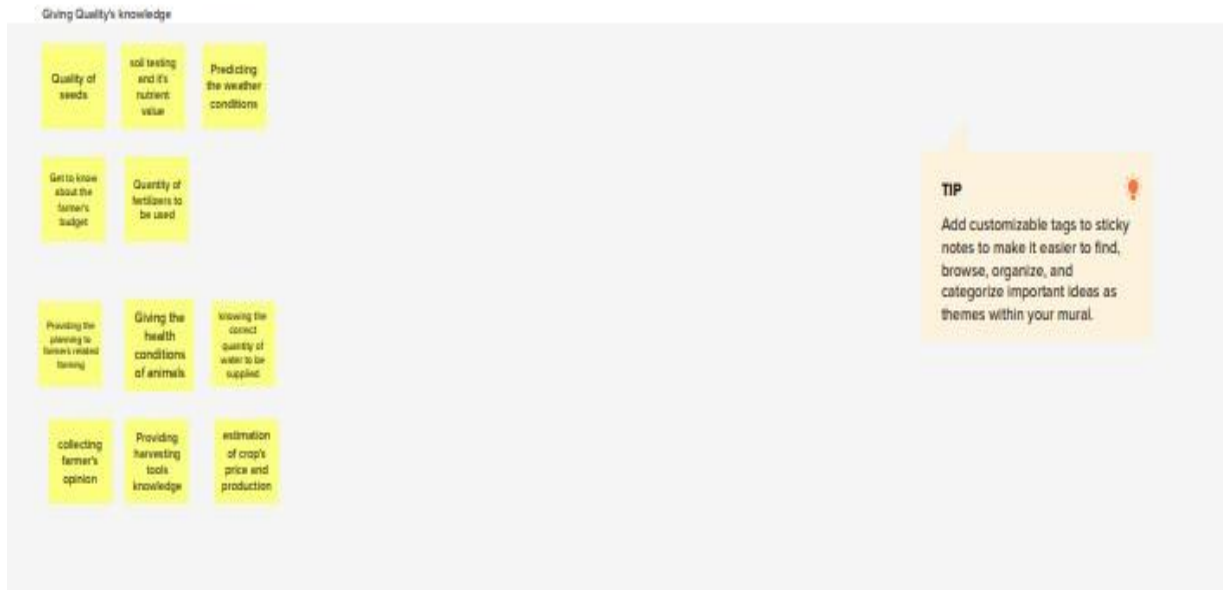
Figure 3.4 Group Ideas

The idea listing and grouping is used to organize and analyses large numbers of ideas by categorizing them. By organizing and reorganizing ideas, students gain a better appreciation of, and dialogue about, their ideas. As students create idea clusters, new contexts and connections among themes emerge.

Step-3: Idea Prioritization

Figure 3.4 Idea Prioritization

Idea prioritization is just a part of the idea management process

3.3 Proposed Solution

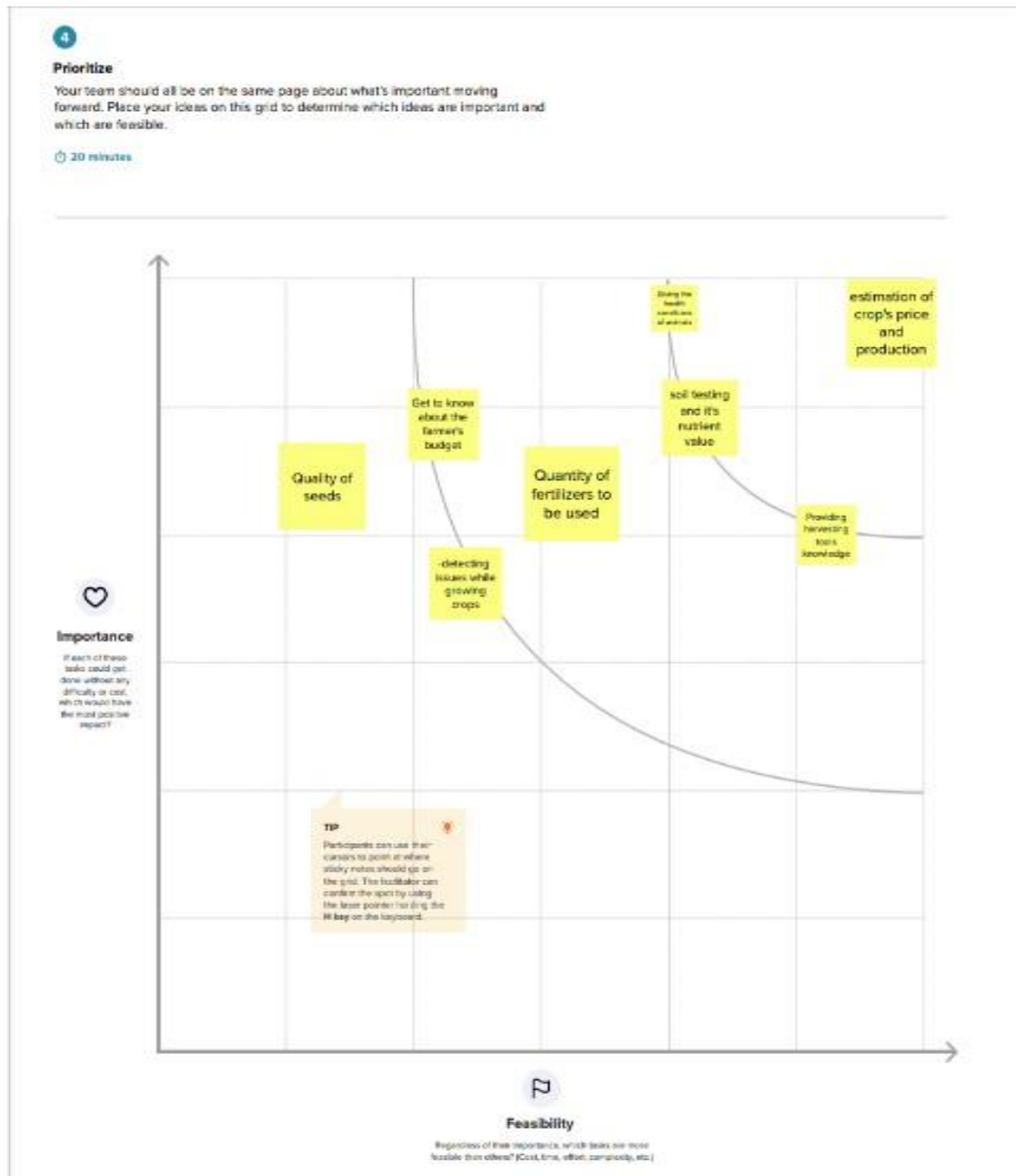| S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Loss in crop yield, Loss of appetite, Increase of Poverty, Decrease depression and Suicide farmer.
2.	Idea / Solution description	Provide perfect data report after deep analyze of past data. Helping them out to overcome loss in farming and business.
3.	Novelty / Uniqueness	According state, district, Climate (Season) and Area and others. We will analytics report and give tips to plant which is comfortable and profitable for them to make profit in the crop yield
4.	Social Impact / Customer Satisfaction	It can solve almost all the problems statement which we analyze. By providing the perfect data visuals it can create a large impact in crop yield and profit of the farmers.
5.	Business Model (Revenue Model)	We can create large number crop production and other raw materials too. We can sale these data report to the industry which need raw materials continuously for their factories. If the outcome is profited According to the Farmer wealth we cost for the model. we can approach government to buy and share the farmer to get wealthy crop yield.
6.	Scalability of the Solution	With the data visual reports we can cultivate crop according to the Crop, State, district, climate , soil can change the estimation of Crop yield

Figure 3.5 Description of Proposed System

3.4 Problem Solution fit

This project is mainly for the farmers who are looking for the best and profitable yield.

The estimation may be wrong at rare cases.

This project will aims at accurate estimation,using natural resourses,GIVING appropriate alerts,etc.,

As there is no high yield for farmers these days, this project will help them in a great way.

Crop production is the important source of income of farmers and india.

Existing solutions will estimate with low accuracy at sometimes but also helpful for farmers.

For yielding good crops and high income, correct estimation of crop is needful.

Estimating the crop yield in a field for farmers to increase their yield and revenue.

Farmers are the customers.

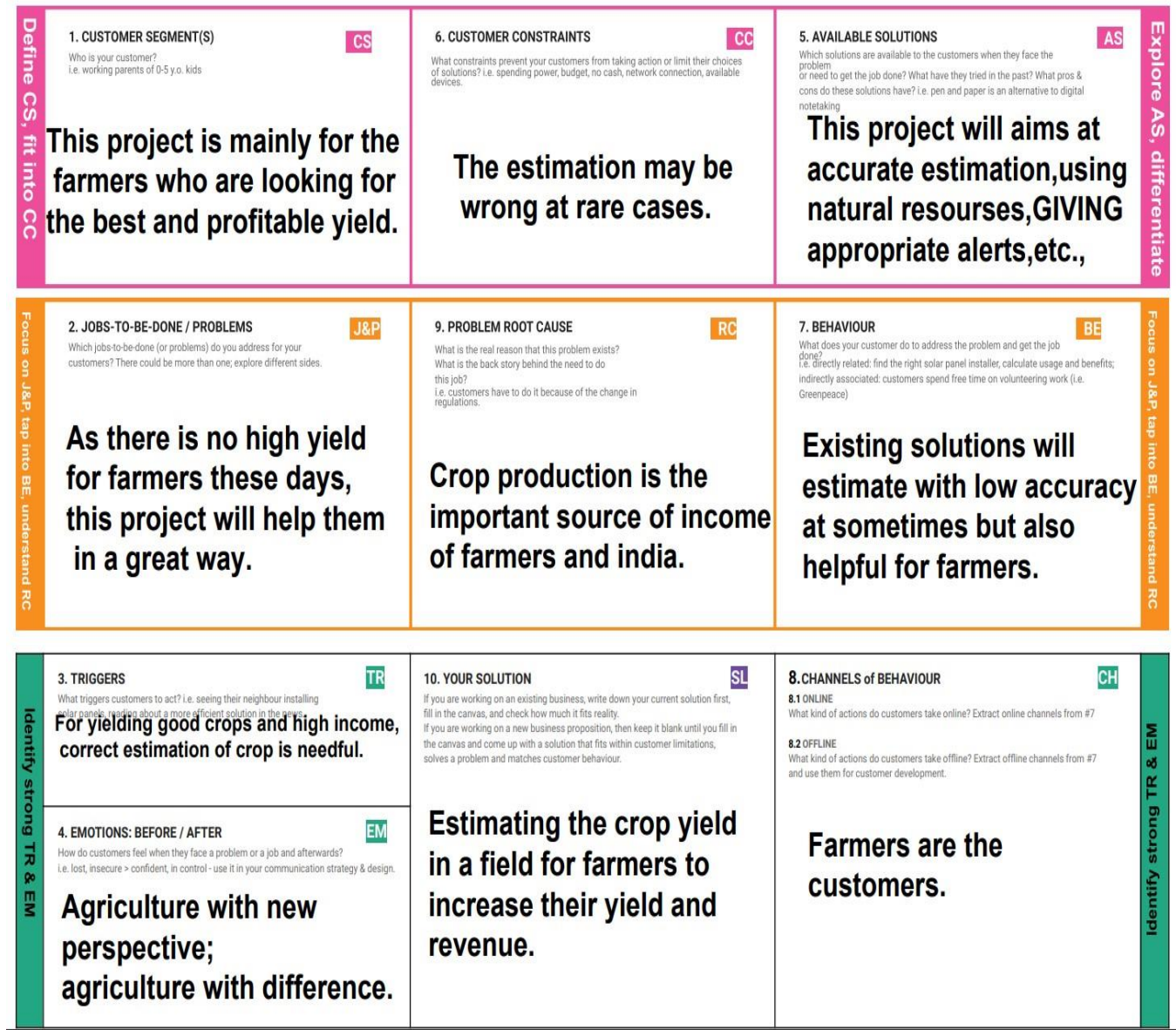**Agriculture with new perspective; agriculture with difference.**

Figure 3.6 Problem Solution Fit

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional Requirement

Following are the functional requirement of the purposed system

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**User Registration**	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	**User Confirmation**	Confirmation via Email Confirmation via OTP
FR-3	**User Profile**	Log in Access the profile
FR-4	**Give the required data**	Take the data given by the user as the input for the analysis
FR-5	**Analysis**	Analyse the yield of crop from the data given by the user
FR-6	**Estimation or Predict the data**	Estimate the crop yield from the analysis,using the software from the data given by the user

Figure 4.1 Functional Requirement

4.2 Non – Functional Requirement

Following are the functional requirement of the purposed system

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Crop recommendations are created and saved, the these recommended crops are sown by farmers for increased crop yield.
NFR-2	Security	The software keeps the users information more securely.
NFR-3	Reliability	Creating the interactive dashboards which is easy to understand and useful for the users.
NFR-4	Performance	It is user friendly software and have high performance.
NFR-5	Availability	The software application is easily available for every user and accessing is easy for them.
NFR-6	Scalability	The proposed system allows the implementation of a flexible methodology that can be used to estimate the yield of crops in different types of lands.

Figure 4.2 Non – Functional Requirement

CHAPTER 5

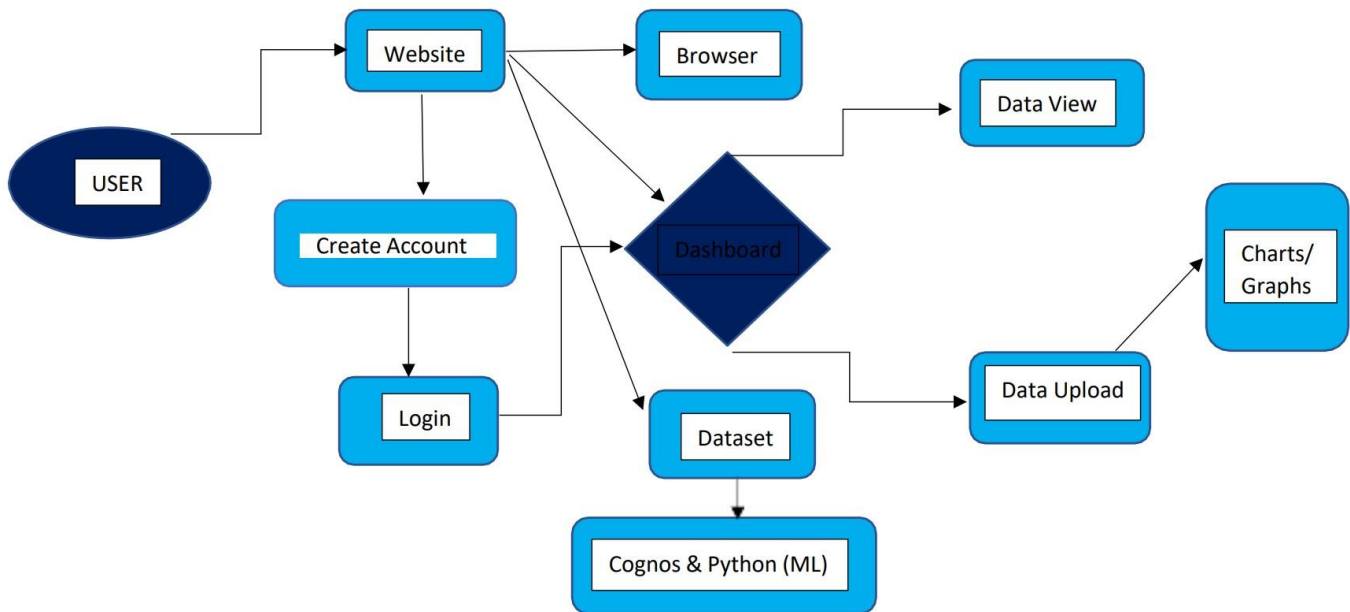# PROJECT DESIGN

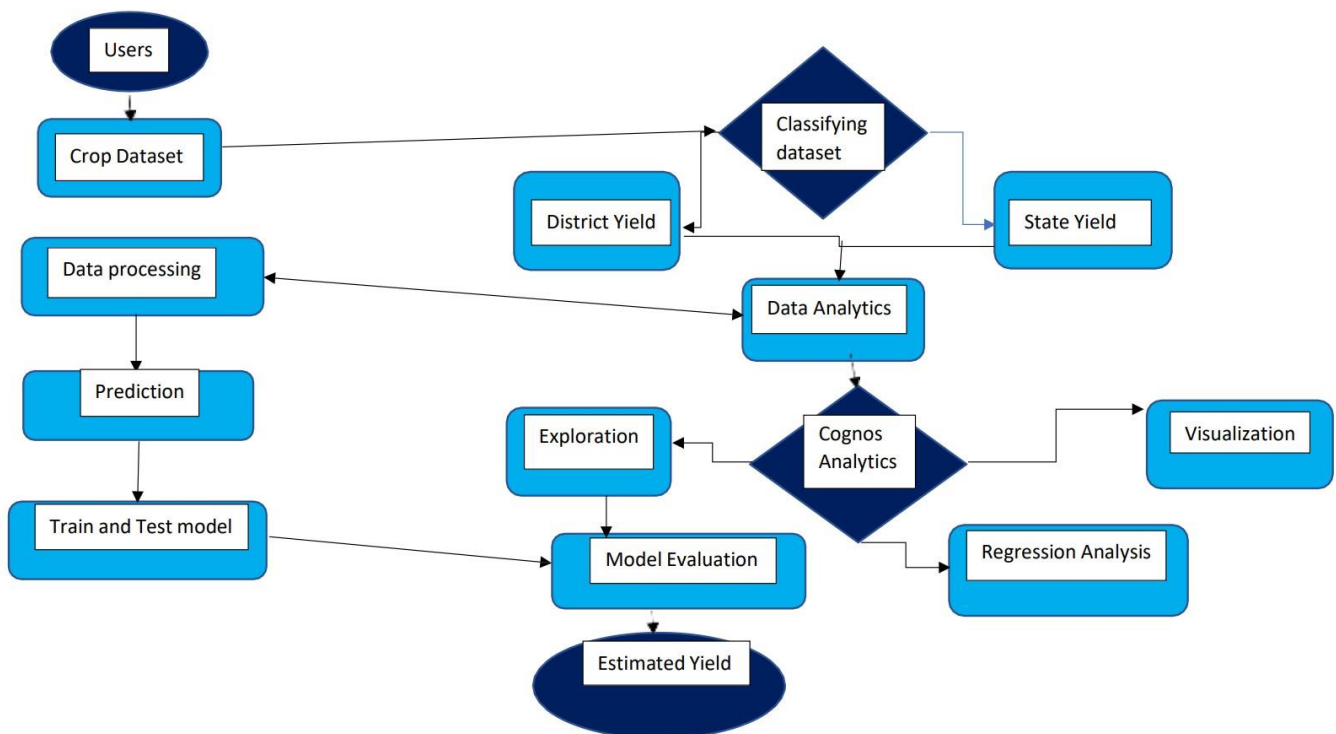## 5.1 Data flow of the Project Design

Figure 5.1 Data Flow of Project

Figure 5.2 Data Flow (Industry Standard – DFD Level 0)

5.2 Solution & Technical Architecture

USER   IBM CLOUD AND   ADMIN
                        COGNOS ANALYTICS

```
                    ┌──────────┐      ┌──────────────┐
                    │  Upload  │ ───► │ Data modules │
                    │  dataset │      │              │
                    └──────────┘      └──────┬───────┘
┌──────────┐                                 │
│          │                                 ▼
│ Dataset  │ ──►                      ┌──────────────┐        ┌──────────────┐
│          │                          │ Exploration  │   ──►  │ Application UI│
└──────────┘                          └──────┬───────┘        └──────────────┘
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                                      ┌──────────────┐
                                      │ Visualization│
                                      └──────┬───────┘
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                                             ▼
                                      ┌──────────────┐
                                      │  Dashboard   │   ──►
                                      └──────────────┘
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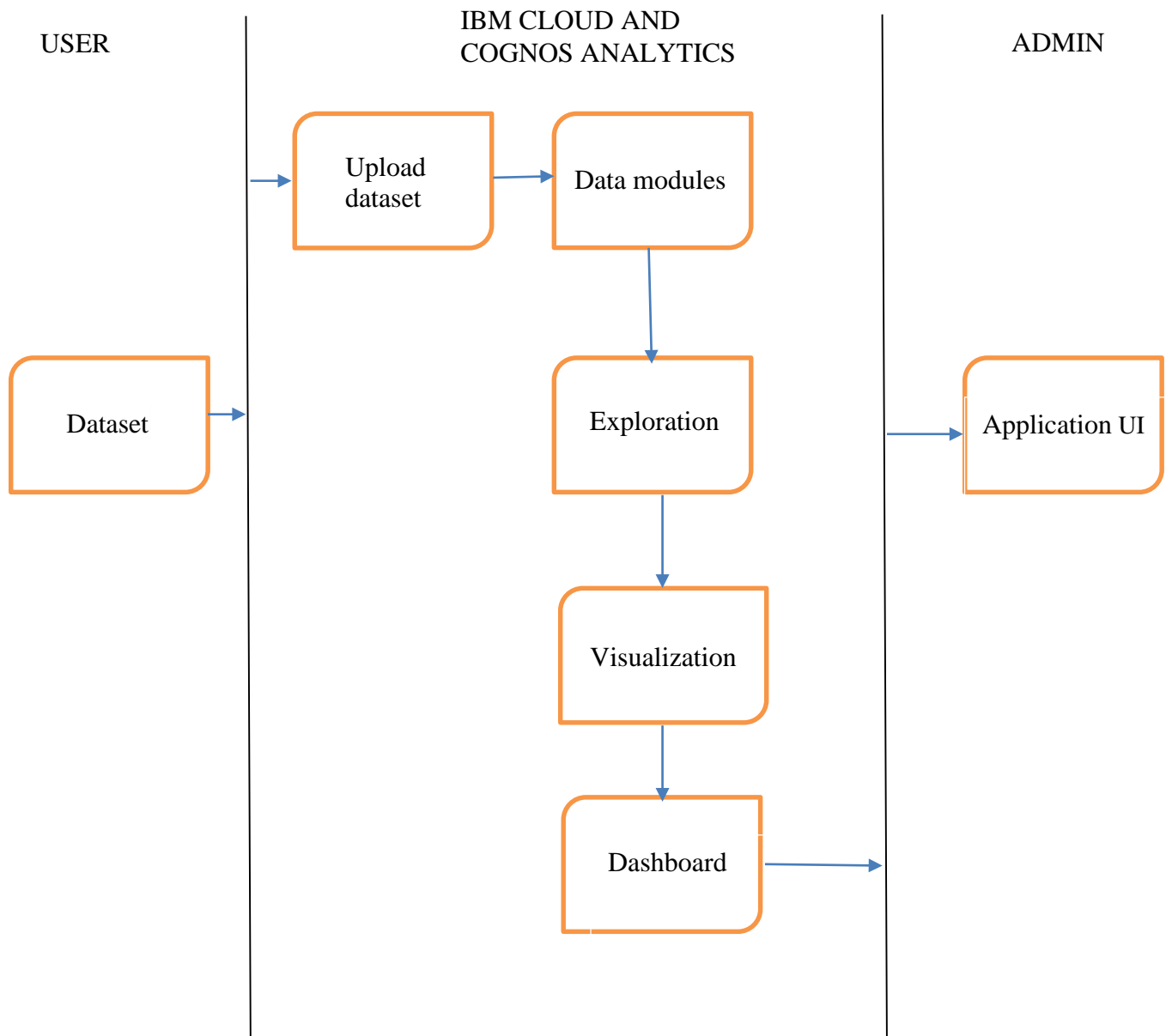
Figure 5.3 Solution & Technical Architecture

Solution Architects are most similar to project managers, ensuring that all parties moving in the right direction at all stages. Technical architects manage all activities   leading to the successful implementation of a new application. A solution architect must have a technical background with at least eight years of work experience in one or more IT areas including but not limited to: IT architecture, infrastructure, and cloud development.

TABLE-1: COMPONENTS & TECHNOLOGIES

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Crop management	Begins with the sowing of seeds, continues with crop maintenance during growth and development and ends with crop harvest, storage and distribution.	Digital technology is used to predict the crop.
3.	Water management	It seeks to use water in a way that provides crops and animals the amount of water they need, enhances productivity, conserves natural resources for the benefit of downstream users and ecosystem services.	Drip irrigation (is slow drop irrigation system)
4.	Pest management	Pest management system in the context of associated environment and population dynamics of the pests species utilizing all suitable technique	Conventional insecticides such as carbomates, Pyrethroids.
5.	Waste management	It helps to maintain a healthy environment for farm animals and can reduce the need for commercial fertilizers while providing other nutrients need for crop production.	Landfilling, incineration, anaerobic digestion, pyrolysis
6.	Heads per Acre	Plant a solid foundation. From planting to stream elongation, access to phosphorus and zinc is critical in driving heads per acre production in fact, early season crop demands during the first 30 to 40 days require 1 lb of phosphorous per day	We need microbial action to release it for uptake again
7.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloud etc.
8.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
9.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc
10.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Figure 5.4 Components & Technologies

TABLE-2: APPLICATION CHARACTERISTICS

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Django is a high-level Python web framework that enables rapid development of secure and maintainable websites	Technology of Opensource framework : Django
2.	Security Implementations	The developed ICT agriculture tools focus on very important agricultural services such as crop detection ,crop predictor will help farmers to make decision in future.	Monitoring and recovery, motion sensor, pressure pads.
3.	Scalable Architecture	i) Increased productivity from warm temperature ii) Decreased moisture stress iii) Possibility of growing new crops iv) Productivity of soil and water	Technology used : 3-tier
4.	Availability	Both website and mobile application interface and developed in local language and the content is available in localized language	Technology used : Distributed servers
5.	Performance	Multiple technologies and services that will improve the usability in agricultural activities	Technology used : IBM Cognos Watson

Figure 5.5 Application Characteristics

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		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-6	I can access the dashboard of mine.		Medium	Sprint-2
Customer (Web user)	Access resources	USN-7	I can use my credentials for accessing my resources.	Other than me, there is less chance to access my resources.	High	Sprint-1
Customer Care Executive		USN-8	As customer care executive I will always be available for the interaction with the customer to clarify the queries.	An executive will note down the customers complaints and solve their problems.	High	Sprint-2
Administrator	Updating data	USN-9	Collecting the data and store it	Checking and updating dataset	High	Sprint-1
Customer tools	Tools	USN-10	I can perform analysis by tools (cognos and with ML)	I have an ease of accessing tools.	High	Sprint-1

Figure 5.5 User Story

CHAPTER 6

PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning and 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	Navadeepan H Nandha Krishnan G
		USN-2	As a user, I will receive confirmation email once I have registered for the application	2	High	Pooja Sri R Induja S
		USN-3	As a user, I can register for the application through Gmail	2	Low	Navadeepan H Induja S
	Login	USN-4	As a user, I can log into the application by entering email & password	2	High	Nandha Krishnan G Pooja Sri R
	Dashboard Working with the Dataset	USN-5	To work on the given dataset, Understand the Dataset.	2	High	Navadeepan H Pooja Sri R
		USN-6	Load the dataset to Cloud platform then Build the required Visualizations.	10	High	Nandha Krishnan G Induja S
Sprint-2	Data Visualization Chart	USN-7	Using the Crop production in Indian dataset, create various graphs and charts to highlight the insights and visualizations. Build a Visualization to showcase Average Crop Production by Seasons.	4	Medium	Navadeepan H
			Build a Visualization to Showcase the Yearly usage of Area in Crop Production.	4	Medium	Pooja Sri R
			Build a visualization to showcase top 10 States in Crop Yield Production by Area.	4	Medium	Nandha Krishnan G
			Build the required Visualization to showcase the Crop Production by State.	4	Medium	Induja S
			Build Visual analytics to represent the Sates with Seasonal Crop Production using a Text representation.	4	Medium	Navadeepan H Nandha Krishnan G

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

CHAPTER 7

CODING AND SOLUTIONING

7.1 Feature 1

- Excel worksheets come with a standard limit of 1,048,576 rows. While performance in Excel will slow well before the said row limit, it's a common requirement for users to analyse datasets over one million rows in size. Congo's Analytics compresses your data so you can extract insights from large datasets. With a well- built data model, Congo's Analytics can help you analyse datasets containing over 100 million rows.

- Cognos Analytics also offers useful features for working with truly large datasets that are greater than several hundred million rows. For example, users can set up aggregation tables in Cognos Analytics. Aggregations take advantage of pre- calculated data to speed up queries, reducing the time needed to render your reports.

- Additional computing power can be unlocked with Cognos Analytics Premium. If your organization needs to store very large datasets in Cognos Analytics, you can purchase dedicated cloud Cognos Analytics Premium instances to enable even faster query times and refresh capabilities.

- While Cognos Analytics supports many standard data visualizations out of the box, it's also possible to build your own with custom data visualizations. By adding open- source data visualization libraries from R and Python, analysts can create highly customizable visualizations to add to their next Cognos Analytics report. With around 750 million users, Excel remains the world's number one data analysis tool.

- If you're comfortable creating PivotTables in Excel, you can use this familiar experience to slice and dice your data, referencing the same datasets used in other Cognos Analytics reports.

- Finally, users can get the latest data from Cognos Analytics datasets by refreshing their Excel connections. This ease of access is a game-changer for organizations stuck between the two platforms.

7.2 Feature 2

- Cognos Analytics can help you build interactive and insightful mapping data visualizations. It comes standard with three different map types: Standard Map, Filled Map (choropleth), or ArcGIS Maps for Cognos Analytics.

- Aligning on one version of the truth across many reports is a challenging undertaking that often ends with inconsistent definitions of metrics and KPIs. One of Cognos Analytics most compelling features is its ability to define measures in a data model and then re-use these calculations across numerous connected reports. By defining your KPI calculations in central datasets, you can ensure "Gross Profit" and "Sales Revenue" return the same numbers, regardless of which report you're viewing.

- This feature differentiates Cognos Analytics from other data visualization tools, which often define KPIs in each report individually.

CHAPTER 8

TESTING

8.1 Test Cases

1. Seasons with Average Productions

As production of crops depends on different seasons, so let's plot the graphs to visualize the average production based on different seasons.
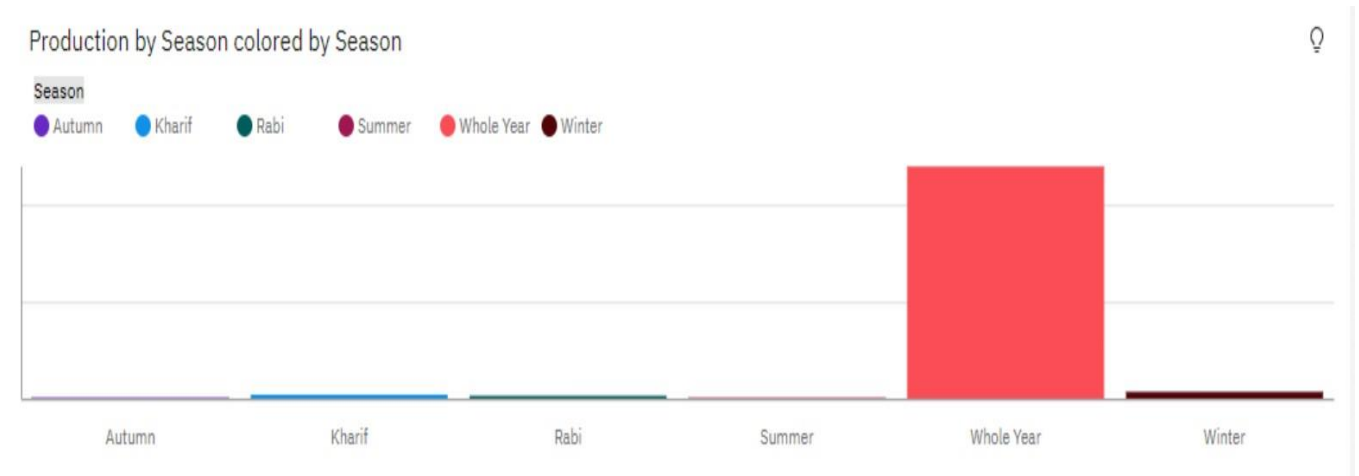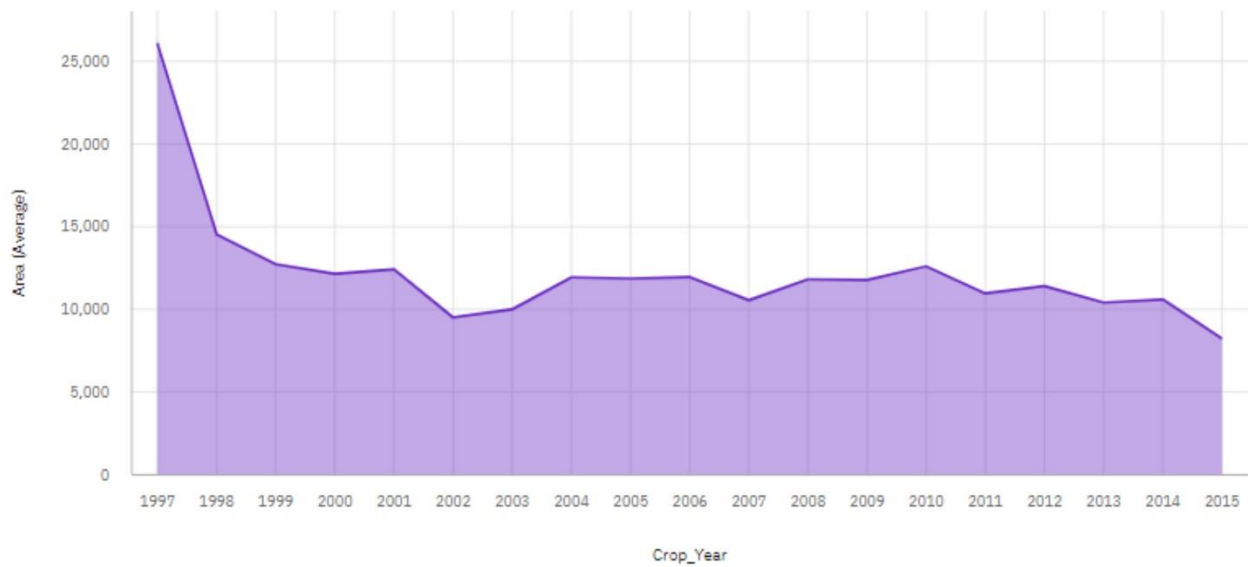

Figure 8.1 Seasons with Average Productions

2. With Years Usage of Area and Production

In our dataset we also have a year's columns by which we will plot a line and area graphs to see the change in these both data with respect to increase in years.
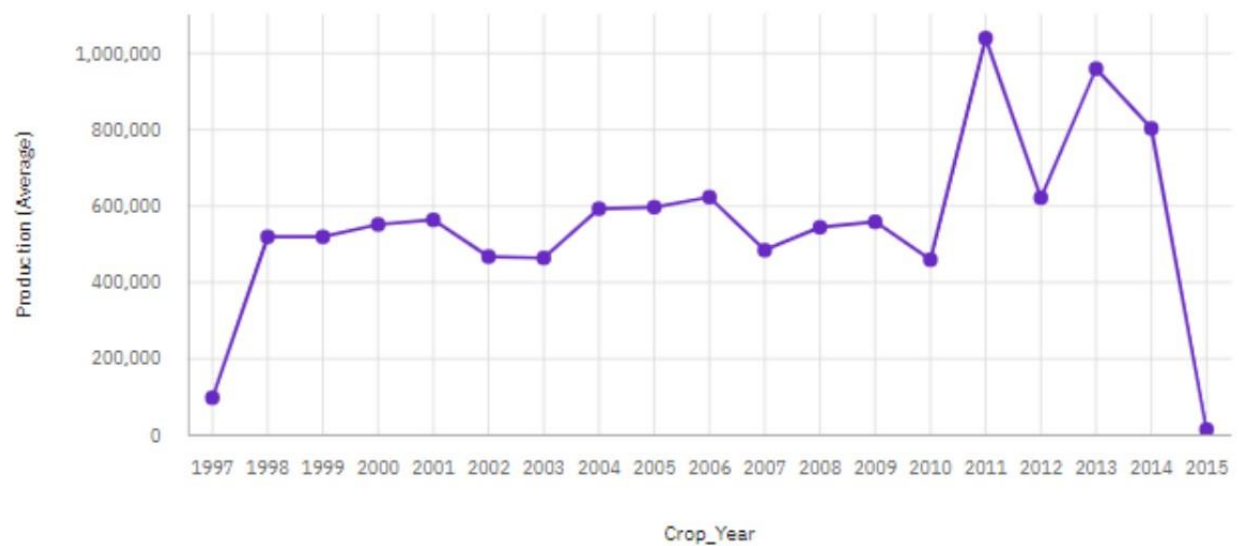
Area by Crop_Year

Production by Crop_Year

Figure 8.2 With Years Usage of **Area And Production**

3. Top 10 States with Most Area

As we have an area data in our dataset, we will be plotting some graphs to visualize the top 10 Indian states.
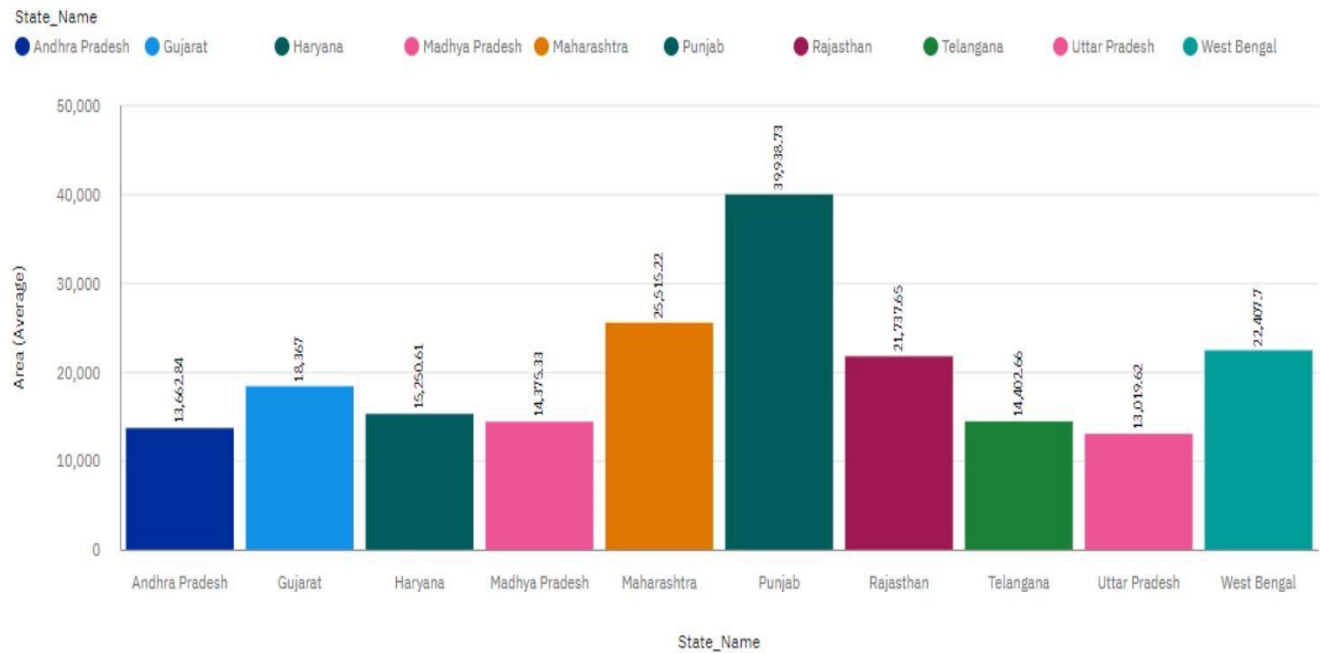
Figure 8.3 Top 10 States with Most Area

4. State with Crop Production

There are so many different crops produced in Indian and most of us don't know which crop is belonging to which state so we will be plotting and highlight the states in map according to different crops.
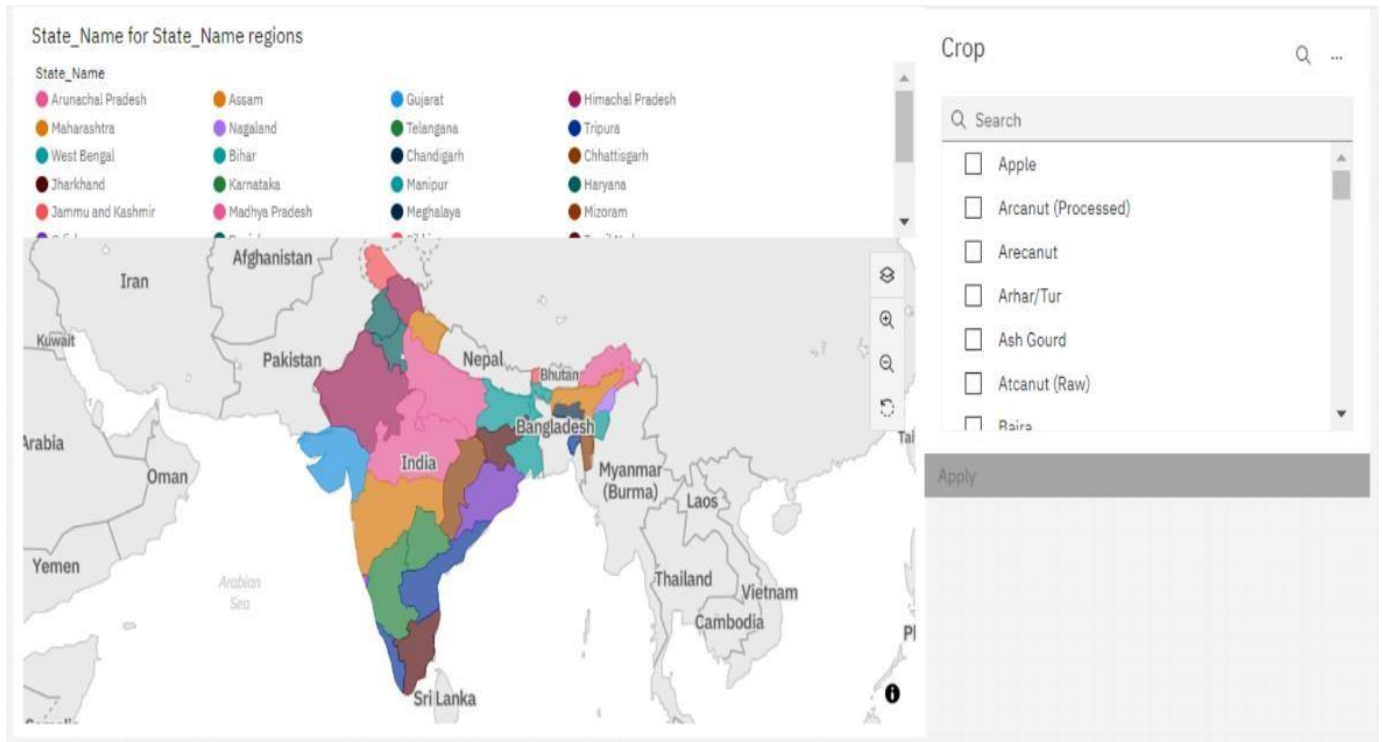
Figure 8.4 State with Crop Production

5. States with The Crop Production Along with Season (Text Table)

Taking forward the previous plot we will be fetching the state name and showing it in a text table whenever different crops are chosen.

States With The Crop Production Along With Season (Text Table)

State_Name and Crop		Season and Crop	
Crop	State_Name	Crop	Season
	Andhra Pradesh		Kharif
	Haryana	Grapes	
	Karnataka		Whole Year
	Madhya Pradesh		
Grapes	Maharashtra		
	Rajasthan		
	Tamil Nadu		
	Telangana		

Figure 8.5 Attrition based on number of companies worked

CHAPTER 9

RESULTS

9.1 Performance Metrics

This project is based on a understanding the crop production of India. Dataset has 2,46,092 data points (rows) and 6 features (columns) describing each crop production related details.

1. State Name - All the Indian State names.

2. District Name -Different District names.

3. Crop Year- contains the crop years.

4. Season – Different seasons for crop production.

5. Area- Total number of areas covered.

6. Production- production of crops. Once you've created views on different tabs in Cognos analytics, you can pull them into a dashboard.
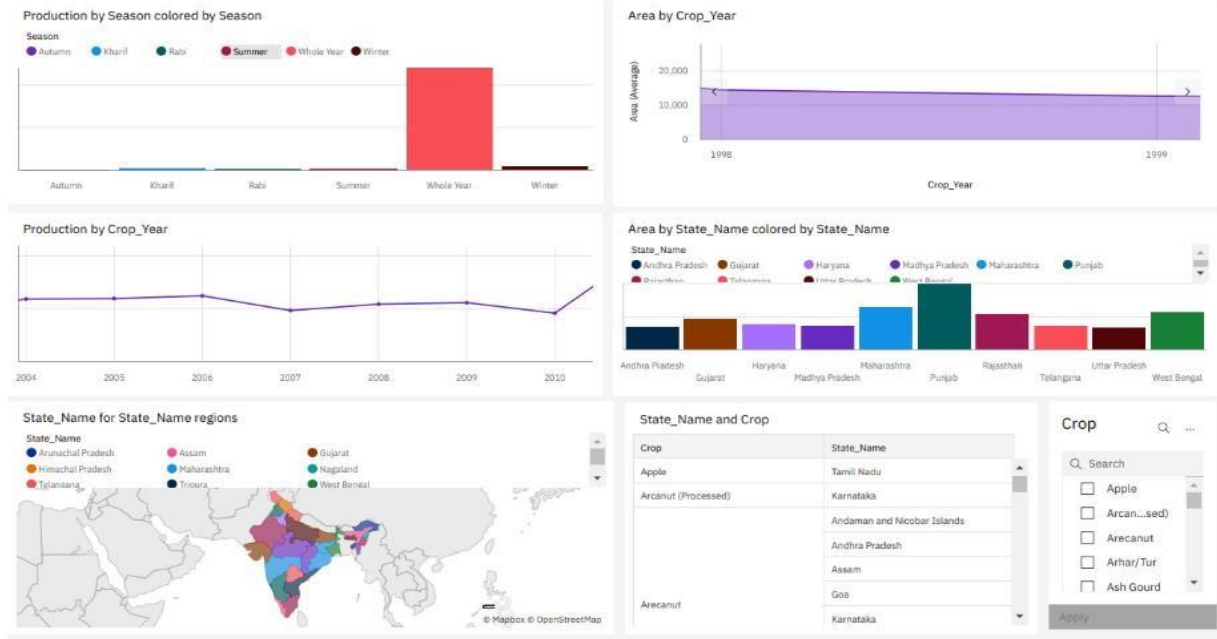
Figure 9.1 Dashboard
CHAPTER 10

ADVANTAGES AND DISADVANTAGES

Advantages:

- Predicting productivity of crop in various climatic conditions can help farmer and other partners in essential basic leadership as far as agronomy and product decision.

- This model can be used to select the most excellent crops for the region and also its yield thereby improving the values and gain of farming also.

- The system identifies the crop disease and gives solution to cure.

- The system will help to provide the precaution tips from crop disease to farmer by analyzing the weather forecast.

Disadvantages: Clouds

The first and most obvious challenge with taking pictures by satellites are clouds. Farmland is, quite deliberately, not in hot dry areas. Regular rain, and associated clouds, means that simply getting pictures of crops can be challenging. In England, for example, it would be almost impossible to find a day without cloud cover over some of the farmland.

Scale

For predictions to be effective this has to be conducted on a national or international scale – i.e predicting the yield of a single farm isn't sufficient. The predictions have to over a wide area to be of any value.

Color

The identification of crops, using satellites orbiting at 800km, is based on a variety of metrics and observations. The most common one used is to look for "green" fields. The challenge with this method is that many areas are green. Grass, forests and other crops – all appear green and look very similar to the required crops. For this reason, the challenge is to filter out the irrelevant "green" and be left with the relevant – the actual crops.

Farm Sizes

If all the farmland was a single large continuous farm the analysis of the crops would be far easier – however, farms tend to be a mixture of small farms and large agribusiness varying in size by the owner, the crop and the economics of the country. Identifying different farms, and what they are growing at different scales becomes complex and prone to error – i.e. Farm A, Size B, is growing Crop C in Fields D, E and F and Farm X, is growing Crop Y in Field Z. These different fields and different crops all need to be identified and allowed for in the overall calculation.

Phenology

To understand a particular crop, e.g. sugar, it is not enough to just differentiate the green fields of farmland from the green fields of woods and grass. There has to be correct identification of the relevant crop. This is complicated as some farmers grow multiple crops – i.e there may be crops of sugar and cassava, which look similar and can look identical to a satellite from 800km away. Knowing that a particular farm has 100 hectares of crops is not useful, you must know if he has 80 hectares of sugar and 20 hectares of cassava.

Area v Yield

Finally, once the crop has been identified and the area calculated, this only gives the area and not the actual yield. The yields will vary depending on a variety of factors including weather conditions and the health of the plant.

CHAPTER 11

CONCLUSION

The proposed technique helps farmers in decision making of which crop to cultivate in the field. This work is employed to search out the gain knowledge about the crop that can be deployed to make an efficient and useful harvesting. This project is a small contribution to the agriculture field and dedicated to all the farmers, to help them in their farming, so that they can get profits and benefits of the new technologies which they don't have any idea of. So finally we want to conclude that as an Engineer we should take responsibility and contribute our knowledge to the betterment of our society or country.

CHAPTER 12

FUTURE SCOPE

In coming years, can try applying data independent system which is a format our system should work. In reference to rainfall can depict whether extra water availability is needed or not. Integrating soil details to the system is an advantage, as for the selection of crops knowledge on soil is also a parameter. This research work can be enhanced to higher level by availing it to whole India.

CHAPTER 13

APPENDIX

13.1 CODE

INDEX.HTML

```html
<!DOCTYPE html>
<html>
<head>
        <meta name="viewport"
         content="width=device-width, initial-scale=1">
    <title>Home</title>
    <style>
body
     {
```

```css
        background-image:url("https://images.unsplash.com/photo-1473773508845-
188df298d2d1?ixlib=rb-
4.0.3&ixid=MnwxMjA3fDB8MHxjb2xsZWN0aW9uLXBhZ2V8MXw0OTE4MzZ8fG
VufDB8fHx8&w=1000&q=80");
        background-repeat: no-repeat;
background-attachment: fixed;        background-
size: 100% 100%;
    }           h1{text-
align: center;        font-
size: 40px;        color:
black;
        }
        .button {
        top:25%;
left:45%;
width:100px;
height:40px;
position: absolute;
z-index: 2;
background: orange;
        }
    #left { text-align: left;
font-size: 35px;        top:
70px;       right: 20;
width: 350px;       height:
80px;
    }
a:link, a:visited {
background-color: #16d3f0;
```

```css
color: white;   padding: 15px
30px;   text-align: center;
text-decoration: none;
display: inline-block; }
a:hover, a:active {
background-color: tomato; }
  #left1 { text-align: left;
font-size: 20px;        color:
SlateBlue;

  }
  #v1 { text-align: left;
font-size: 20px;
color: aliceblue;
  }
  #v2 { text-align: left;
font-size: 20px;
color: aliceblue;
  }
  #t { text-align: left;
font-size: 20px;
color: aliceblue;


  }
  #s { text-align: left;
font-size: 20px;
color: aliceblue;


  }
```

```css
.bottomright {
position: absolute;
bottom: 8px;
right: 16px;   font-
size: 18px; }
.button { background:
 #5E5DF0;
```

border-radius: 999px;   box-shadow:
#5E5DF0 0 10px 20px -10px;   box-sizing:
border-box;   color: #FFFFFF;   cursor:
pointer;

font-family: Inter,Helvetica,"Apple   Color   Emoji","Segoe   UI
Emoji",NotoColorEmoji,"Noto   Color   Emoji","Segoe   UI   Symbol","Android

```
Emoji",EmojiSymbols,-apple-system,system-ui,"Segoe          UI",Roboto,"Helvetica
Neue","Noto Sans",sans-serif;   font-size: 16px;   font-
weight: 700;   line-height: 24px;   opacity: 1;   outline:
0 solid transparent;   padding: 8px 18px;   user-select:
none;
  -webkit-user-select: none;
touch-action: manipulation;
width: fit-content;   word-break:
break-word;   border: 0;
}
    </style>
</head>


<body>
            <div class="bg-img">
```

```
                <h1><p style="color:white;">ESTIMATE THE CROP YIELD USING
DATA ANALYTICS</p></h1>


            <form action="First.html">
                <button type="submit" class="button">Login</button>
```

```
            </form>


    <div class="bottomright">

    <p id="left" style="background-color:powderblue;">TEAM ID :
PNT2022TMID15512   </p>
<p style="border:3px solid TOMATO; color:WHITE;"> Navadeepan H </br> Nandha
Krishnan G </BR> Pooja Sri R</BR>Induja S</P>


</p>


    </div>

            </div>
</body>
</html>
```

FIRST.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Login Page</title>
  <link   href="https://fonts.googleapis.com/css?family=Open+Sans"   rel="stylesheet">
<link                         href="https://maxcdn.bootstrapcdn.com/font-
awesome/4.7.0/css/fontawesome.min.css"                    rel="stylesheet"
```

integrity="sha384wvfXpqpZZVQGK6TAh5PVlGOfQNHSoD2xbE+QkPxCAFlNEevoE

H3Sl0sibVcOQV

nN" crossorigin="anonymous"><link rel="stylesheet" href="./style.css">

```css
<style type="text/css">

@import url('https://fonts.googleapis.com/css?family=Montserrat:400,800');

* {   box-sizing: border-
box;
}


body {   background: #f6f5f7;
display: flex;   justify-content:
center;   align-items: center;   flex-
direction: column;   font-family:
'Montserrat', sans-serif;   height:
100vh;   margin: -20px 0 50px;
}


h1 {   font-weight:
bold;
  margin: 0;
}


h2 {   text-align:
center;
```

```css
    }

    p {   font-size: 14px;
    font-weight: 100;
    line-height: 20px;
    letter-spacing: 0.5px;
    margin: 20px 0 30px;
    }

    span {   font-
    size: 12px;
    }

    a {   color: #333;
    font-size: 14px;   text-
    decoration: none;
    margin: 15px 0;
    }

    button {   border-
    radius: 20px;
      border: 1px solid #FF4B2B; background-color: #FF4B2B; color: #FFFFFF; font-size:
      12px;
      font-weight: bold;   padding: 12px
    45px;   letter-spacing: 1px;   text-
    transform: uppercase;   transition:
    transform 80ms ease-in;
```

```css
}

button:active {
transform: scale(0.95);
}

button:focus {
outline: none;
}

button.ghost {    background-
color: transparent;    border-
color: #FFFFFF;
}

form {    background-color:
#FFFFFF;    display: flex;
align-items: center; justify-
content: center;    flex-
direction: column;  padding: 0
50px;    height: 100%;    text-
align: center;
}

input {    background-
color: #eee;    border:
none;    padding: 12px
```

```css
15px;   margin: 8px 0;
width: 100%;
}


.container {   background-color: #fff;
border-radius: 10px;     box-shadow: 0 14px
28px rgba(0,0,0,0.25),       0 10px 10px
rgba(0,0,0,0.22);   position: relative;
overflow: hidden;   width: 768px;   max-
width: 100%;   min-height: 480px;
}


.form-container { position:
 absolute; top: 0; height:
 100%; transition: all 0.6s
 ease-in-out;
}


.sign-in-container {
left: 0;
 width: 50%;   z-
index: 2;
}


.container.right-panel-active .sign-in-container {
transform: translateX(100%);
}
```

```css
.sign-up-container {
 left: 0;
  width: 50%;
opacity:    0;
z-index: 1;
}


.container.right-panel-active .sign-up-container {
transform: translateX(100%);   opacity: 1;   z-
index: 5;   animation: show 0.6s;
}
@keyframes show {
0%, 49.99% {
opacity: 0;    z-index:
1;
  }


 50%, 100% {
   opacity: 1;    z-
index: 5;
  }
}


.overlay-container {   position:
absolute;   top: 0;   left: 50%;   width:
50%;   height: 100%;   overflow:
```

```css
hidden;   transition: transform 0.6s
ease-in-out;   z-index: 100;
}


.container.right-panel-active .overlay-container{
transform: translateX(-100%);
}


.overlay {
  background: #FF416C; background: -webkit-linear-gradient(to
  right, #FF4B2B, #FF416C); background: linear-gradient(to right,
  #FF4B2B, #FF416C);
  background-repeat: no-repeat;
background-size: cover;   background-
position: 0 0;   color: #FFFFFF;
position: relative;   left: -100%;
height: 100%;   width: 200%;
transform: translateX(0);   transition:
transform 0.6s ease-in-out;
}


.container.right-panel-active .overlay {
transform: translateX(50%);
}


.overlay-panel {
position: absolute;
```

```css
display: flex;   align-
items: center;   justify-
content: center;   flex-
direction: column;
padding: 0 40px;   text-
align: center;
 top: 0;
 height:    100%;   width:
 50%;           transform:
 translateX(0);
 transition: transform 0.6s ease-in-out;
}


.overlay-left {   transform:
translateX(-20%);
}


.container.right-panel-active .overlay-left {
transform: translateX(0);
}


.overlay-right {   right: 0;
transform: translateX(0);
}


.container.right-panel-active .overlay-right {
transform: translateX(20%);
```

```css
}

.social-container {
margin: 20px 0;
}

.social-container a {
  border: 1px solid #DDDDDD;
  border-radius: 50%; display:
  inline-flex;
  justify-content: center;
align-items: center;
margin: 0 5px;   height:
40px;   width: 40px;
}

footer {    background-
color: #222;    color: #fff;
font-size: 14px;    bottom:
0;    position: fixed;
left: 0;    right: 0;    text-
align: center;    z-index:
999;
}

footer p {
margin: 10px 0;
```

```css
}

footer i {
color: red; }


footer a {     color:
#3c97bf;     text-
decoration: none;
}
</style>
</head>
<body>
<h2>Estimate the Crop Yield using Data Analytics</h2>
<div class="container" id="container">
  <div class="form-container sign-up-container">
    <form action="Dashboard.html">
      <h1>Create Account</h1>
      <div class="social-container">
        <a href="#" class="social"><i class="fab fa-facebook-f"></i></a>
        <a href="#" class="social"><i class="fab fa-google-plus-g"></i></a>
        <a href="#" class="social"><i class="fab fa-linkedin-in"></i></a>
      </div>
      <span>or use your email for registration</span>
      <input type="text" placeholder="Name" />
      <input type="email" placeholder="Email" />
      <input type="password" placeholder="Password" />
      <button>Sign Up</button>
```

```html
      </form>
    </div>
    <div class="form-container sign-in-container">
      <form action="Dashboard.html">
        <h1>Sign in</h1>
        <div class="social-container">
          <a href="#" class="social"><i class="fab fa-facebook-f"></i></a>
          <a href="#" class="social"><i class="fab fa-google-plus-g"></i></a>
          <a href="#" class="social"><i class="fab fa-linkedin-in"></i></a>
        </div>
        <span>or use your account</span>
        <input type="email" placeholder="Email" />
        <input type="password" placeholder="Password" />
        <a href="#">Forgot your password?</a>
        <button>Sign In</button>
      </form>
    </div>
    <div class="overlay-container">
      <div class="overlay">
        <div class="overlay-panel overlay-left">
          <h1>Welcome Back!</h1>
          <p>To keep connected with us please login with your personal info</p>
          <button class="ghost" id="signIn">Sign In</button>
        </div>
        <div class="overlay-panel overlay-right">
          <h1>Hello, Friend!</h1>
          <p>Enter your personal details and start journey with us</p>
```

```html
      <button class="ghost" id="signUp">Sign Up</button>
    </div>
  </div>
</div>
</div>
<footer>
  <p>
    Created with <i class="fa fa-heart"></i> by
    <a target="_blank" href="https://florin-pop.com">Florin Pop</a>
    - Read how I created this and how you can join the challenge
    <a  target="_blank"    href="https://www.florin-pop.com/blog/2019/03/double-
slidersign-in-up-form/">here</a>.
  </p>
</footer>
<script type="text/javascript">   const signUpButton =
document.getElementById('signUp'); const signInButton =
document.getElementById('signIn'); const container =
document.getElementById('container');

signUpButton.addEventListener('click', () => {   container.classList.add("right-panel-
active");
});

signInButton.addEventListener('click', () => {   container.classList.remove("right-panel-
active");
});
</script>
```

```
</body>
</html>
```

Dashboard.html
```
<html>
<head>
<link                                                          rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/css/bootstrap.min.css">
 <script
src="https://cdn.jsdelivr.net/npm/jquery@3.6.0/dist/jquery.slim.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/js/bootstrap.bundle.min.js"></scri
pt>    <style>        body
      {

backgroundimage:url("https://c0.wallpaperflare.com/preview/468/930/352/backgrou
nd-websiteplant-wall.jpg");            background-repeat: no-repeat;
background-attachment: fixed;          background-size: 100% 100%;
     }
     .btn-group button {          background-color:
#04AA6D; /* Green background */          border: 1px solid
green; /* Green border */         color: white; /* White text
```

```css
*/        padding: 10px 24px; /* Some padding */
cursor: pointer; /* Pointer/hand icon */

    float: center; /* Float the buttons side by side */
  }


  /* Clear floats (clearfix hack) */
  .btn-group:after {
content: "";        clear:
both;        display:
table;
  }


  .btn-group button:not(:last-child) {        border-
right: none; /* Prevent double borders */
  }


  /* Add a background color on hover */
.btn-group button:hover {        background-
color: #3e8e41;
  }
a:link, a:visited {
background-color: #16d3f0;
color: white;   padding: 15px
30px;   text-align: center;
text-decoration: none;
display: inline-block;
}
```

```
a:hover, a:active {
 background-color: tomato;
}
    </style>
</head>
<body>
  <h1><center> ESTIMATE THE CROP YIELD USING DATA
ANALYTICS</h1></center></h1></br>
  <div class="btn-group">


    <a href ="chart1.html"><button>Seasons with Average Productions</button></a>
    <a href ="chart2.html"><button>With Years of Area and Production</button></a>
    <a href ="chart3.html"><button>Top 10 States with Most Area</button></a>
    <a href ="chart4.html"><button>State with Crop Production</button></a>
    <a href ="chart5.html"><button>States with Crop Production Along with
Season</button></a>
   </div>
  </center>
   </br>
   </br> </br> </br> </br> </br>
<center></br></br>
<a
href="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.public_fol
ders%2FMy%2BTeam%2FDashboard&action=view&mode=dashboard&subView=mod
el000001847041a86e_00000002" target="_blank">Live Dashboard</a></br></br>
</center>
```

```
</body>

  </html>
```

Chart1.html

```
<html>
<head>
<link                                                          rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/css/bootstrap.min.css">
 <script
src="https://cdn.jsdelivr.net/npm/jquery@3.6.0/dist/jquery.slim.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/js/bootstrap.bundle.min.js"></scri
pt>    <style>       body
      {


backgroundimage:url("https://c0.wallpaperflare.com/preview/468/930/352/backgrou
nd-websiteplant-wall.jpg");           background-repeat: no-repeat;
background-attachment: fixed;         background-size: 100% 100%;
    }
    .btn-group button {       background-color:
#04AA6D; /* Green background */        border: 1px solid
green; /* Green border */        color: white; /* White text
*/        padding: 5px 24px; /* Some padding */
cursor: pointer; /* Pointer/hand icon */

      float: center; /* Float the buttons side by side */
```

```css
        }


    /* Clear floats (clearfix hack) */
    .btn-group:after {
content: "";          clear:
both;        display:
table;
    }


    .btn-group button:not(:last-child) {        border-
right: none; /* Prevent double borders */
    }


    /* Add a background color on hover */
.btn-group button:hover {        background-
color: #3e8e41;
    }
a:link, a:visited {
background-color: #16d3f0;
color: white;   padding: 15px
30px;   text-align: center;
text-decoration: none;
display: inline-block;
}


a:hover, a:active {
 background-color: tomato;
```

```
}
.bottomright {
position: absolute;
bottom: 8px;  right:
16px;  font-size:
18px;
}
    </style>
</head>
<body>
  <h1><center>    ESTIMATE    THE    CROP    YIELD    USING    DATA
ANALYTICS</h1></center></h1></br>
  <div class="btn-group">


    <a href ="chart1.html"><button>Seasons with Average Productions</button></a>
    <a href ="chart2.html"><button>With Years of Area and Production</button></a>
    <a href ="chart3.html"><button>Top 10 States with Most Area</button></a>
    <a href ="chart4.html"><button>State with Crop Production</button></a>
    <a href ="chart5.html"><button>States with Crop Production Along with
Season</button></a>
    </div>


    </br>
    </br> </br> </br> </br> </br><center>
 <iframe            src="https://drive.google.com/file/d/1quQWJZKYFVsm3tZKVD-
OWiu_leDn6GLQ/preview" width="640" height="480" allow="autoplay"></iframe>
</center>
```

```html
 <div class="bottomright">
<a href ="Index.html"><button>Home</button></a>
</Div>
</body>


   </html>
```

Chart2.html
```html
<html>
<head>
<link                                                                  rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/css/bootstrap.min.css">
 <script
src="https://cdn.jsdelivr.net/npm/jquery@3.6.0/dist/jquery.slim.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/js/bootstrap.bundle.min.js"></scri
pt>    <style>        body
      {

backgroundimage:url("https://c0.wallpaperflare.com/preview/468/930/352/backgrou
nd-websiteplant-wall.jpg");          background-repeat: no-repeat;
background-attachment: fixed;

      background-size: 100% 100%;
    }
```

```css
    .btn-group button {          background-color:
#04AA6D; /* Green background */          border: 1px solid
green; /* Green border */          color: white; /* White text
*/          padding: 10px 24px; /* Some padding */
cursor: pointer; /* Pointer/hand icon */          float: center;
/* Float the buttons side by side */
    }

    /* Clear floats (clearfix hack) */
    .btn-group:after {
content: "";          clear:
both;          display:
table;
    }

    .btn-group button:not(:last-child) {          border-
right: none; /* Prevent double borders */
    }

    /* Add a background color on hover */
    .btn-group button:hover {
background-color: #3e8e41;
    }
a:link, a:visited {   background-
color: #16d3f0;   color: white;
padding: 15px 30px;   text-align:
```

```
center;   text-decoration: none;

display: inline-block;

}


a:hover, a:active {   background-
color: tomato;

}


     </style>
</head>
<body>
  <h1><center>      ESTIMATE      THE      CROP      YIELD      USING      DATA
ANALYTICS</h1></center></h1></br>
  <div class="btn-group">


    <a href ="chart1.html"><button>Seasons with Average Productions</button></a>
    <a href ="chart2.html"><button>With Years of Area and Production</button></a>
    <a href ="chart3.html"><button>Top 10 States with Most Area</button></a>
    <a href ="chart4.html"><button>State with Crop Production</button></a>
    <a href ="chart5.html"><button>States with Crop Production Along with
Season</button></a>
   </div>


   </br>
   </br> </br> </br> </br> </br><center>
```

```html
 <iframe
src="https://drive.google.com/file/d/1begTC12ELhbIdaSdufJUPZ82_YdWBFFt/preview
" width="640" height="480" allow="autoplay"></iframe>
</center>
<div class="bottomright">
<a href ="Index.html"><button>Home</button></a>
</Div>
</body>

    </html>
```

Chart3.html
```html
<html>
<head>
<link                                                                rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/css/bootstrap.min.css">
 <script
src="https://cdn.jsdelivr.net/npm/jquery@3.6.0/dist/jquery.slim.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/js/bootstrap.bundle.min.js"></scri
pt>    <style>        body
       {
```

```css
        background-
image:url("https://c0.wallpaperflare.com/preview/468/930/352/background-
websiteplant-wall.jpg");          background-repeat: no-repeat;          background-
attachment: fixed;          background-size: 100% 100%;
    }
    .btn-group button {          background-color:
#04AA6D; /* Green background */          border: 1px solid
green; /* Green border */          color: white; /* White text
*/          padding: 10px 24px; /* Some padding */
cursor: pointer; /* Pointer/hand icon */          float: center;
/* Float the buttons side by side */
    }


    /* Clear floats (clearfix hack) */
    .btn-group:after {
content: "";          clear:
both;          display:
table;
    }


    .btn-group button:not(:last-child) {          border-
right: none; /* Prevent double borders */
    }


    /* Add a background color on hover */
    .btn-group button:hover {
background-color: #3e8e41;
```

```
        }
a:link, a:visited {
background-color: #16d3f0;
color: white;   padding: 15px
30px;   text-align: center;
text-decoration: none;
display: inline-block;
}


a:hover, a:active {   background-
color: tomato;
}


    </style>
</head>
<body>
  <h1><center>    ESTIMATE    THE    CROP    YIELD    USING    DATA
ANALYTICS</h1></center></h1></br>
  <div class="btn-group">


    <a href ="chart1.html"><button>Seasons with Average Productions</button></a>
    <a href ="chart2.html"><button>With Years of Area and Production</button></a>
    <a href ="chart3.html"><button>Top 10 States with Most Area</button></a>
    <a href ="chart4.html"><button>State with Crop Production</button></a>


    <a href ="chart5.html"><button>States with Crop Production Along with
Season</button></a>
```

```html
        </div>


        </br>
        </br> </br> </br> </br> </br><center>
 <iframe
src="https://drive.google.com/file/d/1PMNPRNPutD2cVYC9Wddim6fMdQ6aKDOw/pr
eview" width="640" height="480" allow="autoplay"></iframe>
</center>
<div class="bottomright">
<a href ="Index.html"><button>Home</button></a>
</Div>
</body>


    </html>
```

Chart4.html
```html
<html>
<head>
<link                                                          rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/css/bootstrap.min.css">
 <script
src="https://cdn.jsdelivr.net/npm/jquery@3.6.0/dist/jquery.slim.min.js"></script>
 <script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"></script>
<script
```

```
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/js/bootstrap.bundle.min.js"></scri
pt>    <style>        body
        {


backgroundimage:url("https://c0.wallpaperflare.com/preview/468/930/352/backgrou
nd-websiteplant-wall.jpg");          background-repeat: no-repeat;
background-attachment: fixed;         background-size: 100% 100%;
        }
        .btn-group button {          background-color:
#04AA6D; /* Green background */         border: 1px solid
green; /* Green border */         color: white; /* White text
*/         padding: 10px 24px; /* Some padding */
cursor: pointer; /* Pointer/hand icon */         float: center;
/* Float the buttons side by side */
        }


        /* Clear floats (clearfix hack) */
        .btn-group:after {
content: "";         clear:
both;         display:
table;
        }


        .btn-group button:not(:last-child) {          border-
right: none; /* Prevent double borders */
        }
```

```
      /* Add a background color on hover */

      .btn-group button:hover {
background-color: #3e8e41;
      }
a:link, a:visited {
background-color: #16d3f0;
color: white;   padding: 15px
30px;   text-align: center;
text-decoration: none;
display: inline-block;
}


a:hover, a:active {   background-
color: tomato;
}


      </style>
</head>
<body>
   <h1><center>   ESTIMATE   THE   CROP   YIELD   USING   DATA
ANALYTICS</h1></center></h1></br>
   <div class="btn-group">

      <a href ="chart1.html"><button>Seasons with Average Productions</button></a>
      <a href ="chart2.html"><button>With Years of Area and Production</button></a>
      <a href ="chart3.html"><button>Top 10 States with Most Area</button></a>
      <a href ="chart4.html"><button>State with Crop Production</button></a>
```

```html
    <a href ="chart5.html"><button>States with Crop Production Along with
Season</button></a>
    </div>


    </br>
    </br> </br> </br> </br> </br><center>
<iframe
src="https://drive.google.com/file/d/1ed_lpT4NIKfxj6Dh9EXYMjiy70oE1KUF/preview
" width="640" height="480" allow="autoplay"></iframe>
</center>
<div class="bottomright">
<a href ="Index.html"><button>Home</button></a>
</Div>
</body>


    </html>
```

Chart5.html

```html
<html>
<head>
<link                                                     rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/css/bootstrap.min.css">

<script src="https://cdn.jsdelivr.net/npm/jquery@3.6.0/dist/jquery.slim.min.js"></script>
<script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"></script>
```

```html
  <script
src="https://cdn.jsdelivr.net/npm/bootstrap@4.6.1/dist/js/bootstrap.bundle.min.js"></scri
pt>    <style>        body
      {

backgroundimage:url("https://c0.wallpaperflare.com/preview/468/930/352/backgrou
nd-websiteplant-wall.jpg");           background-repeat: no-repeat;
background-attachment: fixed;        background-size: 100% 100%;
      }
    .btn-group button {        background-color:
#04AA6D; /* Green background */        border: 1px solid
green; /* Green border */        color: white; /* White text
*/        padding: 10px 24px; /* Some padding */
cursor: pointer; /* Pointer/hand icon */        float: center;
/* Float the buttons side by side */
      }


    /* Clear floats (clearfix hack) */
    .btn-group:after {
content: "";        clear: both;
display: table;
      }


    .btn-group button:not(:last-child) {        border-
right: none; /* Prevent double borders */
      }
```

```css
    /* Add a background color on hover */
.btn-group button:hover {        background-
color: #3e8e41;
    }
a:link, a:visited {
background-color: #16d3f0;
color: white;   padding: 15px
30px;   text-align: center;
text-decoration: none;
display: inline-block;
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    <a href ="chart1.html"><button>Seasons with Average Productions</button></a>
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    <a href ="chart3.html"><button>Top 10 States with Most Area</button></a>
    <a href ="chart4.html"><button>State with Crop Production</button></a>
```

```html
      <a href ="chart5.html"><button>States with Crop Production Along with
Season</button></a>
    </div>


    </br>
    </br> </br> </br> </br> </br><center>
<iframe        src="https://drive.google.com/file/d/1_g1pVrsUVvvhJ6ZViB27iqErF_fR6-
MA/preview" width="640" height="480" allow="autoplay"></iframe>
</center>
<div class="bottomright">
<a href ="Index.html"><button>Home</button></a>
</div>
</body>


    </html>
```

Style.css body {   background-image: linear-gradient(135deg, #9dbfa0 10%,
#04e592 100%); background-size: cover;

  background-repeat: no-repeat;
background-attachment: fixed;   font-family:
"Open Sans", sans-serif;   color: #333333;
 }

 .box-form {   margin: 0 auto;   width:
80%;   background: #FFFFFF;
border-radius: 10px;   overflow:

```css
hidden;    display: flex;    flex: 1 1
100%;    align-items: stretch;    justify-
content: space-between;    box-shadow:
0 0 20px 6px #090b6f85;
 }
 @media (max-width: 980px) {
.box-form {    flex-flow:
wrap;    text-align: center;
align-content: center;    align-
items: center;
   }
 }
 .box-form div {
  height: auto;
 }
 .box-form .left {    color:
#f6efef;    background-size:
cover;    background-repeat:
no-repeat;    font-size: 20px;
background-image:
url("https://i.pinimg.com/736x/5d/73/ea/5d73eaabb25e3805de1f8cdea7df4a42--
tumblrbackgrounds-iphone-phone-wallpapers-iphone-wallaper-tumblr.jpg");
overflow: hidden;
 }
 .box-form .left .overlay {
padding: 40px;    width:
100%;    height: 100%;
```

```css
background: #31b662ad;
overflow: hidden;    box-
sizing: border-box;
 }
 .box-form .left .overlay h1 {
font-size: 10vmax;    line-
height: 1;    font-weight:
900;    margin-top: 40px;
margin-bottom: 20px;
 }
 .box-form .left .overlay span p {
  margin-top: 100px;
  font-weight: 900;
 }
 .box-form .left .overlay span a {
background: #3b5998;    color: #FFFFFF;
margin-top:200px;    padding: 14px 50px;
border-radius: 100px;    display: inline-
block;    box-shadow: 0 3px 6px 1px
#042d4657;
 }
 .box-form .left .overlay span a:last-child {
background: #1dcaff;    margin-left: 70px;
 }
 .box-form .right {
padding:     120px;
overflow: hidden;
```

```css
    }
  @media (max-width: 980px) {
.box-form .right {      width:
100%;
    }
  }
  .box-form .right h5 {
font-size:      6vmax;
line-height: 0;
  }
  .box-form .right p {
font-size: 14px;    color:
#B0B3B9;
  }
  .box-form .right .inputs {
overflow: hidden;
  }
  .box-form .right input {     width:
100%;    padding: 10px;    margin-
top: 25px;    font-size: 16px;
border: none;    outline: none;
border-bottom: 2px solid #B0B3B9;
  }
  .box-form .right .remember-me--forget-password {
display: flex;    margin: 30;    justify-content:
space-between;    align-items: center;
  }
```

```css
.box-form .right .remember-me--forget-password input {
margin: -10;    margin-right: 7px;    width: auto;
 }
 .box-form .right button {
float: right;    color: #fff;
font-size: 16px;
padding: 12px 35px;
border-radius: 50px;
display: inline-block;
border: 0;    outline: 0;
  box-shadow: 0px 4px 20px 0px #49c628a6;    background-image: linear-
gradient(135deg, #70F570 10%, #49C628 100%);
 }


 label {    display:
block;    position:
relative;    margin-
left: 30px;
 }


 label::before {    content: '
\f00c';    position: absolute;
font-family: FontAwesome;
background: transparent;
border: 3px solid #70F570;
border-radius: 4px;    color:
transparent;    left: -30px;
```

```css
  transition: all 0.2s linear;
  }


  label:hover::before {    font-
family: FontAwesome;
content: ' \f00c';    color: #fff;
cursor: pointer;
background: #70F570;
  }


  label:hover::before .text-checkbox {
background: #70F570;
  }


  label span.text-checkbox {
display: inline-block;
height: auto;    position:
relative;    cursor: pointer;
transition: all 0.2s linear;
  }


  label input[type="checkbox"] {
display: none;
  }
```