



# ESTIMATE THE CROP YIELD

## USING DATA ANALYTICS

DOMAIN: DATA ANALYTICS.

TEAM ID: PNT2022TMID14203

### TEAM MEMBERS:

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## 1. INTRODUCTION

Agriculture is important for human survival because it serves the basic. A well-known fact the majority of population (>55%) in India is into agriculture. Due to variations in climatic

Estimate the crop yield using data analytics

conditions, there exist bottlenecks for increasing the crop production in India. It has become a challenging task to achieve desired targets in agriculture based crop yield. Various factors are to be considered which have direct impact on productivity of the crops.

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 data in agriculture is identification of effectiveness of data analytics.

The present project on crop production in India is one of the important sources of income and india is one of the top countries to produce crops. As per the project we will be analysing some important visualization, creating a dashboard and by going through these we will get most of the insights into crop production in India.

## **1.1. PROJECTOVERVIEW**

The Yield and productivity of different types of crops among all over states of India is to be estimated and to be predicted using the IBM Cognos Analytics with the factors of season, area, production and crop year it depends.

Using IBM Cognos analytics with crop production dataset the visualization, exploration, dashboard, story, report is to be charted.

## **1.2. PURPOSE**

The train and test model of data can be easily predictable. By using the analytics, it

is a clear and effective way of displaying the terms and in-depth factors and it also gives the analysis that the particular parameter depends on what type of data i.e., categorical or numerical.

It visualizes the effective way of crop yield analysis and its dependent and independent factors.

## 2. LITERATURE SURVEY

### 2.1. EXISTING PROBLEM

INTRODUCTION		SURVEY/BODY OF REVIEW			CONCLUSION	
Year	Title	Problem Definitions	Methodology (Algorithm Used)	Input Parameter	Results	Future Scope
November-2020 International Journal of Engineering Research & Technology (IJERT) Volume 8 Issue 12	Crop Yield Prediction using KNN Model	In this paper the main goal is to create a user-friendly interface for farmers, which gives the analysis of crop yield prediction which is based on available datasets and to maximize and predict the crop yield productivity.	<p><u>Tools used:</u></p> <ol style="list-style-type: none"> <li>1. Python Flask</li> <li>2. RStudio</li> </ol> <p><u>Algorithms used:</u></p> <ol style="list-style-type: none"> <li>1. The Auto Regression Moving Average (ARMA)</li> <li>2. K Nearest Neighbours' (KNN)</li> </ol>	Rainfall, Temperature and groundwater level dataset are taken from Indian metrological department. In this module, rainfall water data set is taken for Indian data for past ten years. The data is converted into data frame and pre-processed. Then using 'arima' function, the model is prepared for the given data set and predicted for upcoming years.	<p><u>Advantages:</u></p> <p>The study has successfully predicted the rainfall, temperature and ground water level, which in return helps in estimation of crop yield</p> <p><u>Disadvantages:</u></p> <p>This study mainly focuses on the prediction of rain water, temperature and ground water levels.</p>	According to the results, temperature is best predicted by the ARIMA model and the accuracy of predictions made for rainfall by ARMA model is also good. Rainfall, which is an important factor for the prediction of crop yield is difficult to estimate precisely. This project classifies the ground water level data set records using KNN to predict the model for future test record data sets. In future, logistic regression can be applied to further classify the data.

INTRODUCTION		SURVEY/BODY OF REVIEW			CONCLUSION	
Year	Title	Problem Definitions	Methodology (Algorithm Used)	Input Parameter	Results	Future Scope
July-September 2017 JCPS Volume 10 Issue 3	Analysis of Agricultural Data Using Big Data Analysis	This study deals with the analysis of agricultural data which helps in better understanding of agriculture in India.	<u>Tools used:</u>  MapReduce, Hadoop Distributed File System and YARN MapReduce.	The authors have used the datasets in which the crops have been categorized based on the season, based on Minimum price announced by the government, based on temperature, so that they will be able to visualize a different kind of data.	<u>Advantages:</u>  1. Cost reduction, 2. Accuracy of prediction, 3. Faster and Better decision making by using distribute solutions.	1. Getting feedback from users to improve interface.  2. Including IoT to encourage more e-farming.  3. Using cloud to store and retrieve data.  4. Using text analysis to find out the opinions of common people.
			<u>Algorithms used:</u>  1. Simple Linear Regression 2. Decision Tree		<u>Disadvantages:</u>  1. As a result of ignorance a large amount of products become wasted. 2. Lack of geographical analysis done.	

INTRODUCTION		SURVEY/BODY OF REVIEW			CONCLUSION	
Year	Title	Problem Definitions	Methodology (Algorithm Used)	Input Parameter	Results	Future Scope
October 2017 JOURNAL OF MANAGEMENT (JOM) Volume 4, Issue 2	THE ASCENDANCY OF BIG DATA ANALYTICS FOR AGRICULTURAL COMPETITIVENESS: THE THEORETICAL FRAMEWORK TO AUGMENT THE AGRICULTURAL MANAGEMENT SYSTEM	This study aims to establish economically and efficiently sustainable analytics models of agriculture, help farmers to systematize themselves to advance their livelihood	<u>Tools used:</u>  Power BI, Oracle Visual Analyzer, Tableau, Fusion chart, Canvas	Various factors like finding effective crop hybrids, selecting the pesticides, air moisture, irrigation management, temperature, rainfall, pricing, market data etc., contribute to farmers profitability.	<u>Advantages:</u>  The predictive analytics will be useful to face the challenges of profound agricultural crisis in India.	1. Providing a roadmap or framework for big data management.  2. Use more advanced algorithms, IoT for e-farming and use cloud to store and retrieve data.  3. Implementing framework in Dynamic nature.
			<u>Algorithms used:</u>  1. K means clustering algorithm 2. Regression model 3. K-nearest neighbours' algorithm		<u>Disadvantages:</u>  Major concerns of authors: 1. Data quality and Integrity 2. Data access rights 3. Data timeliness 4. Data ethics and Independence	

INTRODUCTION		SURVEY/BODY OF REVIEW			CONCLUSION	
Year	Title	Problem Definitions	Methodology (Algorithm Used)	Input Parameter	Results	Future Scope
2018 IJRAR December 2018, Volume 5, Issue 4	CROP YIELD PREDICTION IN AGRICULTURE USING DATA MINING PREDICTIVE ANALYTIC TECHNIQUES	In this study, the authors have collected various datasets and predicted crop yields using various regression technique. Regression analysis was tested for the effective prediction or forecast of the agriculture yield for various crops in Tamilnadu state	<u>Algorithms used:</u> 1.Linear Regression 2.Logistic Regression 3.Polynomial Regression 4.Ridge Regression 5. Multiple Linear Regression 6. K-Means algorithm.	Regression analysis, it observes the relation between an independent (predictor) and dependent (target) variables. This technique helps to estimate through time series data and finds the underlying effect among these variables. Regression analysis indicates the significant relationships between dependent variable and independent variable and it indicates the strength of impact of multiple independent variables on a dependent variable.	<u>Advantages:</u> Regression analysis helps in making prediction and forecasting for crop yield both in near and long term.  <u>Disadvantages:</u> This focus only on the crop yield prediction, factors such as climatic changes are completely ignored.	The future work can be aimed at the analysis of the entire set of data and will be devoted to suitable strategies for improving the efficiency of the proposed algorithm. The clustering and regression are one of the capable tool in field of data mining which can be used in several different ways.

## 2.2. References

*Ravisankar, K., Sidhardha, K. and Prabadevi, B., 2017. Analysis of agricultural data using big data analytics. Journal of Chemical and Pharmaceutical Sciences, 10(3), pp.1132-1135.*

*JOURNAL OF MANAGEMENT (JOM) Volume 4, Issue 2, October 2017 ISSN 2347 – 3940 (Print Version) Ss, Sasikala & Supervisor, Research & Devi D, Renuka. (2017). THE ASCENDANCY OF BIG DATA ANALYTICS FOR AGRICULTURAL COMPETITIVENESS: THE THEORETICAL FRAMEWORK TO AUGMENT THE AGRICULTURAL MANAGEMENT SYSTEM.*

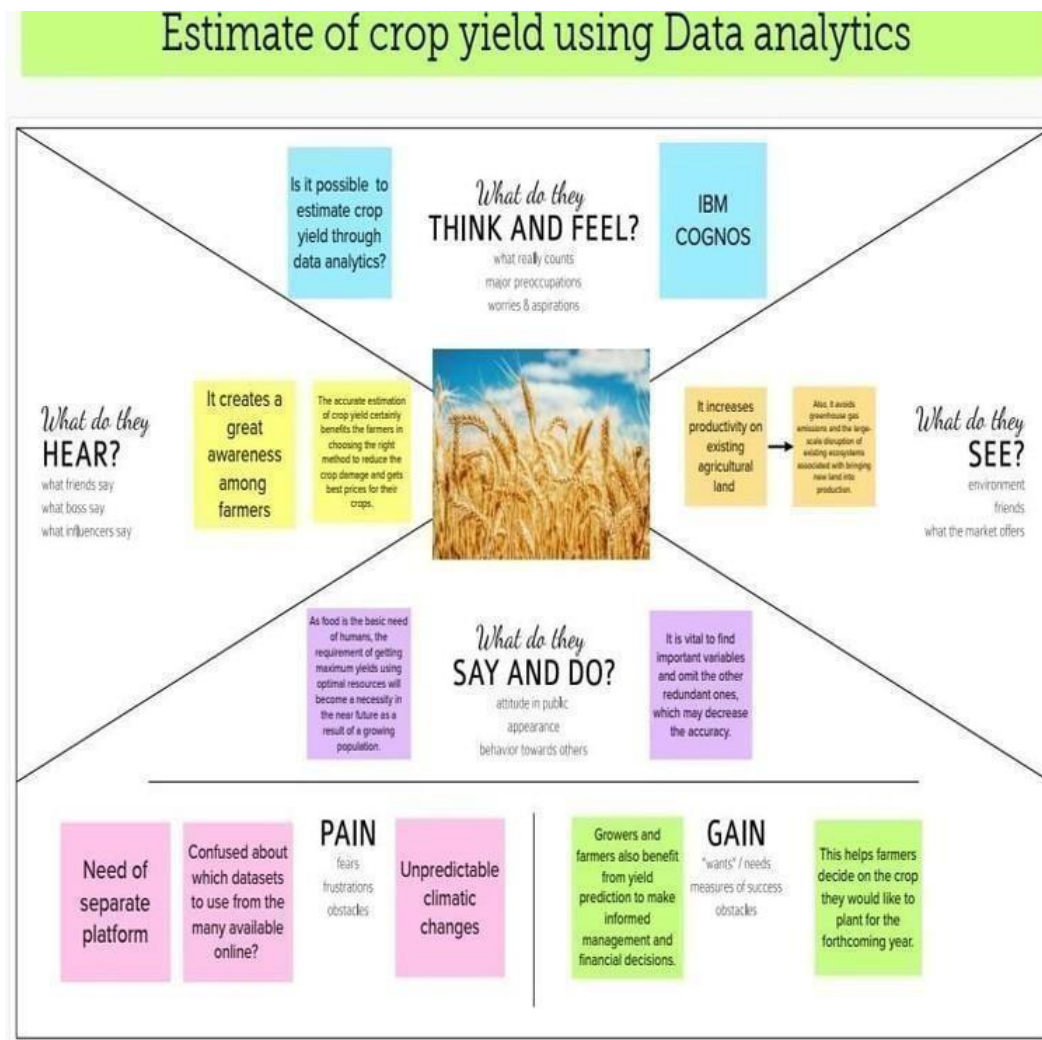
*November-2020 International Journal of Engineering Research & Technology (IJERT) Volume 8 Issue 12. Dr. V. Latha Jothi (1), Neelambigai A (2), Nithish sabari S (3), Santhosh K (4). Crop Yield Prediction using KNN Model.*

*2018 IJRAR December 2018, Volume 5, Issue 4. 1 P.Surya, 2 Dr. I. Laurence Aroquiaraj. CROP YIELD PREDICTION IN AGRICULTURE USING DATA MINING PREDICTIVE ANALYTIC TECHNIQUES*

## 2.3. Problem Statement Definition

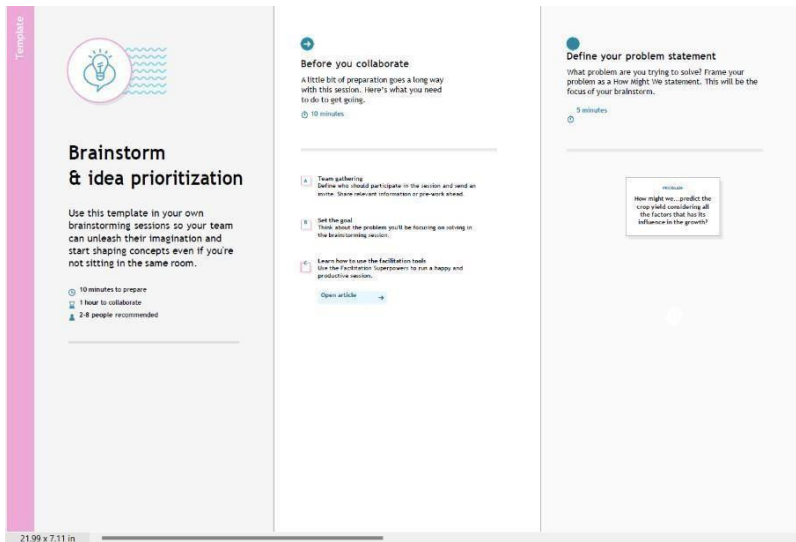
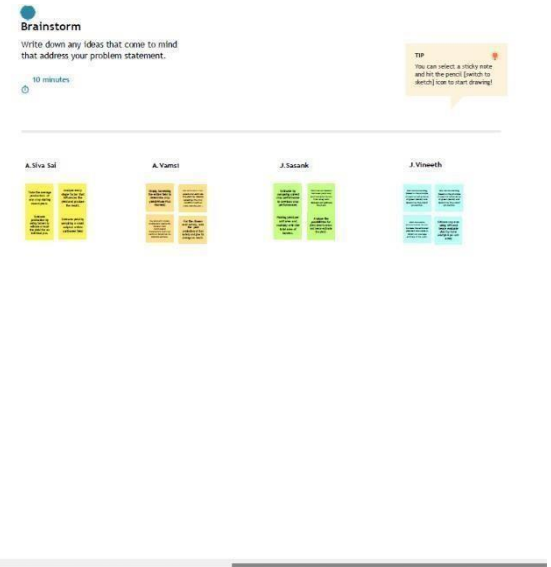
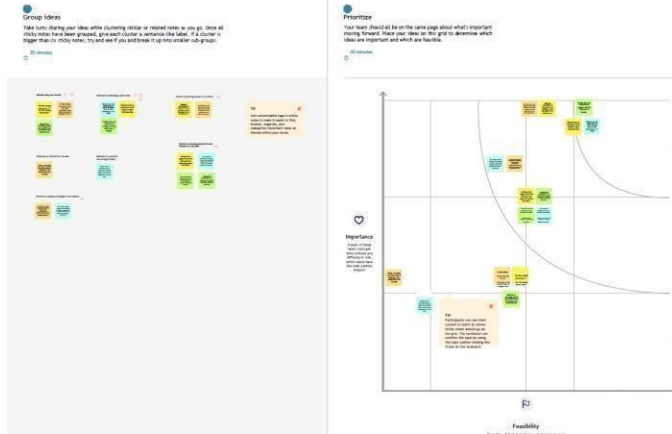
### 3. IDEATION & PROPOSED SOLUTION

#### 3.1. Empathy Map Canvas



Estimate the crop yield using data analytics

## 3.2. Ideation & Brainstorming



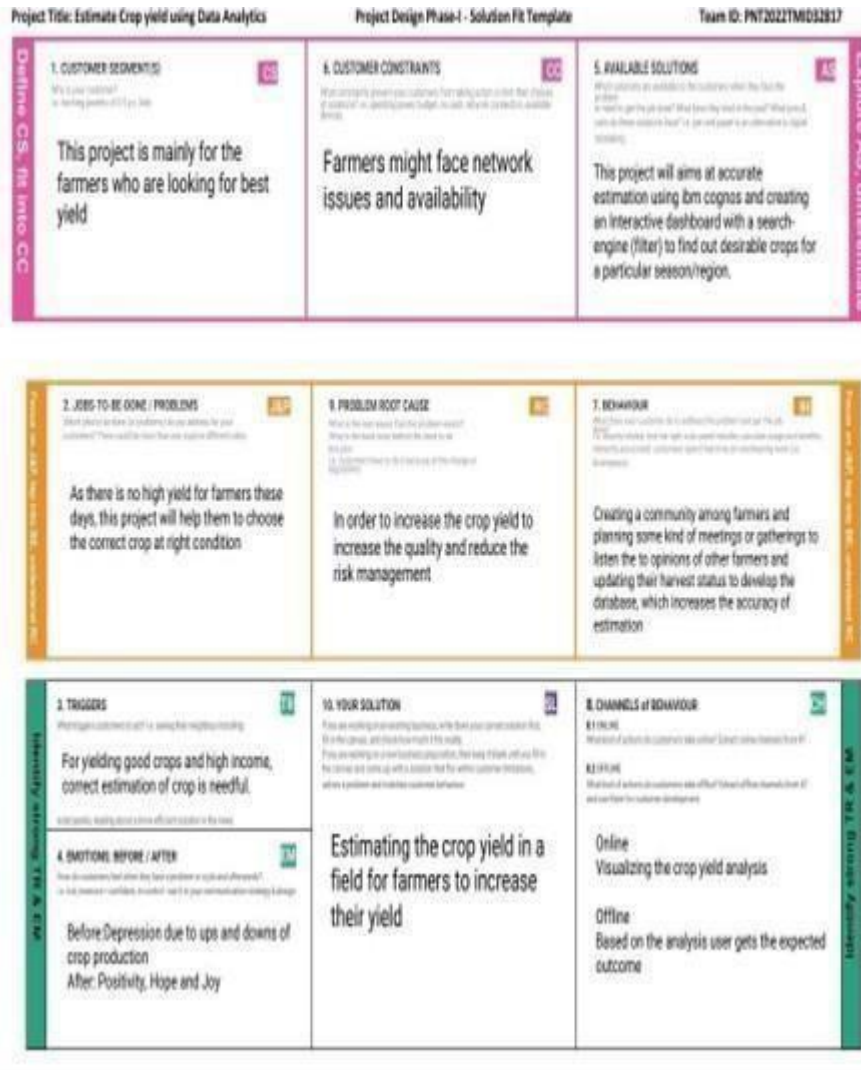
## 3.3. Proposed Solution

Estimate the crop yield using data analytics

S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	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.
2.	Idea / Solution description	With the help of dataset that was given to us, we are planning to create multiple analysis graphs/charts in IBM Cognos Analytics, which will help us to get a better understanding of crop yield in India.
3.	Novelty / Uniqueness	1.Attractive Dashboard with aesthetic visualisation. 2.Creating unique search engine in Dashboard. 3.Providing expert suggestions to farmers.
4.	Social Impact / Customer Satisfaction	1.Help farmers and growers to make better managerial and financial decisions. 2.This helps farmers to choose an accurate crop for a specific season and region.
5.	Business Model (Revenue Model)	Helps in making the policy based, research oriented, development and investment related decisions that aim to influence future crop yield.
6.	Scalability of the Solution	This method has been implemented in various parts of the world in which the studies report that it was found to be progressive in reporting prediction accuracy percentage of the compared methodologies with conventional designs and an improved performance.

### 3.4. Proposed Solution Fit





## 4. REQUIREMENT ANALYSIS

### 4.1. Functional requirement

### Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Requirement	Knowledge of seeds ,crops ,mechanism ,soil ,climate & agriculture science. Right use of resources like soil and water. Time management .Market demand drive production.
FR-2	User Business rules	Three laws - the farmers produce trade and commerce(promotion and facilitation)act ,the farmers agreement of price assurance and farm services act and the essential commodities act
FR-3	User Factors	Crop prediction is highly sensitive to climate. It is affected by long-term trend in average rainfall and temperature, interannual climate variability, shocks during specific phonological stages and extreme weather events.
FR-4	User Importance	Crop yield estimates constitute a particular important productivity metric, both an aggregate level as well as in plot-level productivity analysis and impact evaluations of new technologies and policy interventions.
FR-5	User Objectives	Formulation and implementation of policies and programmes aimed at achieving rapid agricultural growth through optimum utilization of land, water, soil and plant resources of the state.
FR-6	User Improvement	It becomes necessary to increase the crop variety to produce disease-resistance offsprings of the crops. It also helps in providing better and superior varieties based on the quality and quantity of the yield.

## 4.2. Non-Functionalrequirement

### Non-functional Requirements:

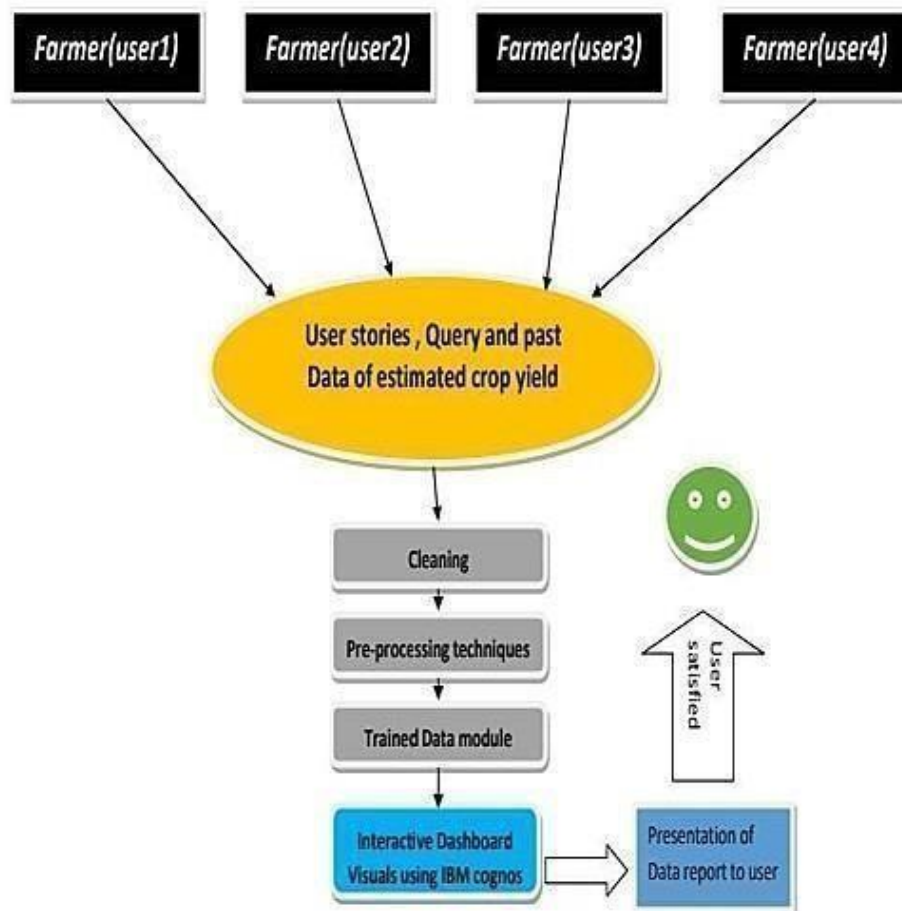
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	To empower farmers and to increase the productivity there is need to provide the best dissemination tool for their farming activities.
NFR-2	Security	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.
NFR-3	Reliability	This will remove multilingual issues and bridge the gap between farmers and technology.Effective tool that all farmers can use for management of all kind of crops....
NFR-4	Performance	Multiple technologies and services that will improve the usability in agricultural activities.
NFR-5	Availability	Both website and mobile application interface and developed in local language and the content is available in localized language.
NFR-6	Scalability	i)Increased productivity from warm temperature ii)Decreased moisture stress iii)Possibility of growing new crops iv)Productivity of soil and water

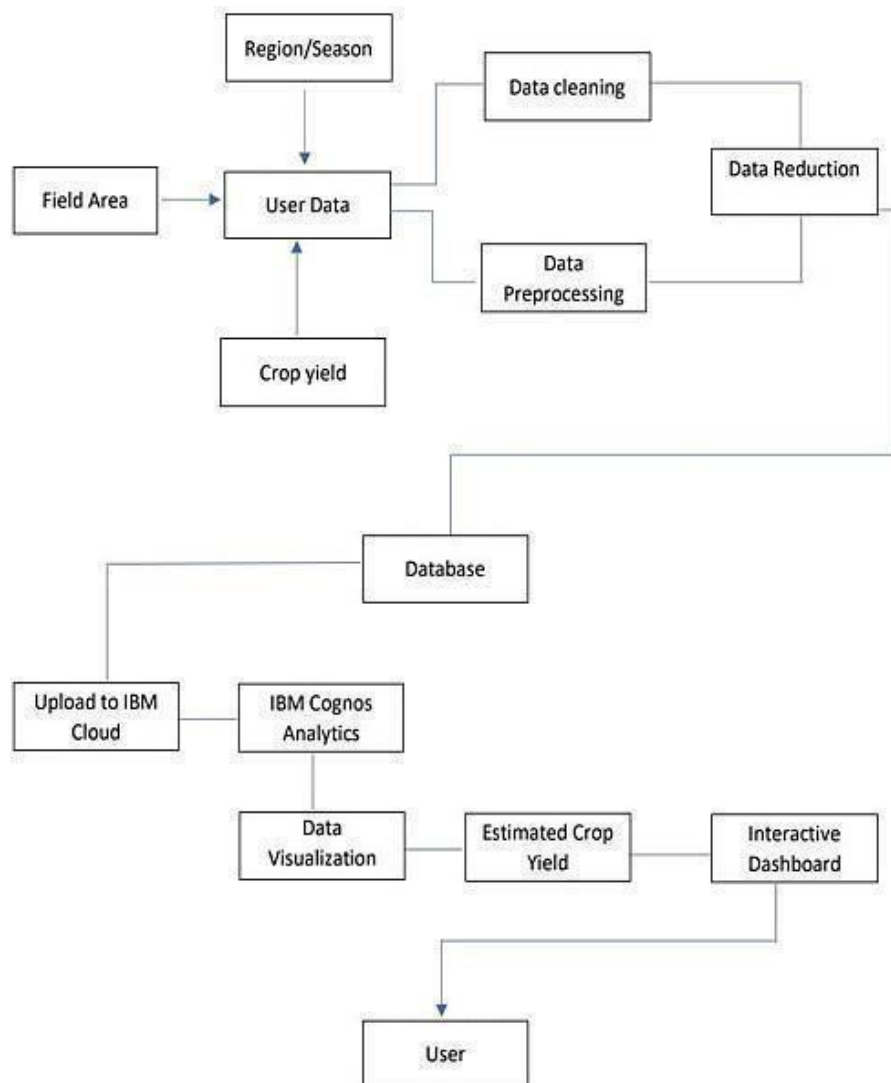
## 5. PROJECT DESIGN

### 5.1. Data Flow Diagrams

Data Flow :



## 5.2. Solution & Technical Architecture



## 6. PROJECT PLANNING & SCHEDULING

### 6.1. Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
Sprint-1	Registration	USN-1	As a user, I can register for by entering my Agri - id card and request.	2	High
		USN-3	As a user, I can register for the application through Gmail	2	Medium
	Login	USN-4	As a user, I can Call and request or Approach for dataset	4	High
	Working with the Dataset	USN-5	To work on the given dataset, Understand the Dataset.	2	High
		USN-6	Load the dataset to Cloud platform then Build the required Visualizations.	10	High

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority
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
			*Showcase the Yearly usage of Area in Crop Production.	4	Medium
			Build Visual analytics to represent the States with Seasonal Crop Production using a Text representation.	4	Medium
Sprint-3	Creating The dashboard	USN-8	Create the Dashboard by using the created visualizations.	20	High
Sprint-4	Export The Analytics	USN-9	Export the created Dashboard	20	High

### 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

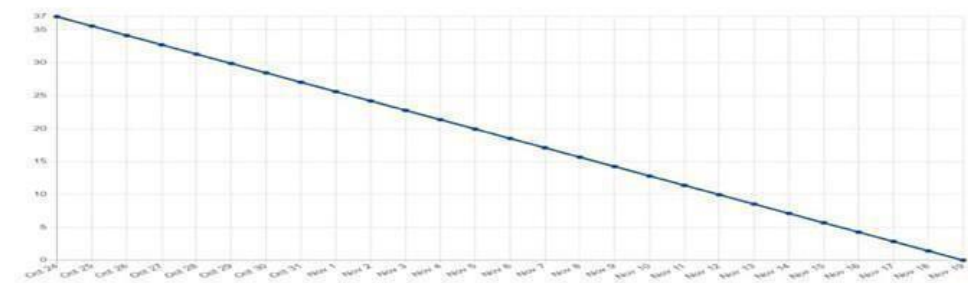


## 6.3. Reports from JIRA

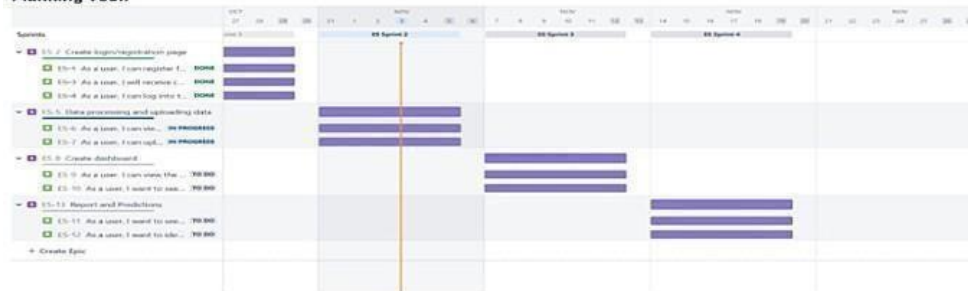
### Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

### Overall Burndown Chart:



### Planning Tool:



### Backlog:



## 7. CODING & SOLUTIONING

### *Importing Data*

```
import pandas as pd
    #importing panda library with an alias pd

    #Reading csv files into avariable df
df = pd.read_csv("crop_production.csv")
```

	Season \	State_Name	District_Name	Crop_Year	
0	Andaman and	Nicobar Islands	NICOBARS	2000	Kharif
1	Andaman and	Nicobar Islands	NICOBARS	2000	Kharif
2	Andaman and	Nicobar Islands	NICOBARS	2000	Kharif
3	Andaman and	Nicobar Islands	NICOBARS	2000	Whole
Year					
4	Andaman and	Nicobar Islands	NICOBARS	2000	Whole
Year					
...		...	...	...	
...					
246086		West Bengal	PURULIA	2014	Summer
246087		West Bengal	PURULIA	2014	Summer



246088	West Bengal	PURULIA	2014	Whole
Year				
246089	West Bengal	PURULIA	2014	Winter

246090	West Bengal	PURULIA	2014	Winter
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	Crop	Area	Production
0	Arecanut	1254.0	2000.0
1	Other Kharif pulses	2.0	1.0
2	Rice	102.0	321.0
3	Banana	176.0	641.0
4	Cashewnut	720.0	165.0
...	...	...	...
246086	Rice	306.0	801.0
246087	Sesamum	627.0	463.0
246088	Sugarcane	324.0	16250.0
246089	Rice	279151.0	597899.0
246090	Sesamum	175.0	88.0

[246091 rows x 7

columns]df.head(10)

	State_Name	District_Name	Crop_Year
Season \			
0	Andaman and Nicobar Islands	NICOBARS	2000 Kharif
1	Andaman and Nicobar Islands	NICOBARS	2000 Kharif
2	Andaman and Nicobar Islands	NICOBARS	2000 Kharif
3	Andaman and Nicobar Islands	NICOBARS	2000 Whole Year
4	Andaman and Nicobar Islands	NICOBARS	2000 Whole Year
5	Andaman and Nicobar Islands	NICOBARS	2000 Whole Year
6	Andaman and Nicobar Islands	NICOBARS	2000 Whole Year

Estimate the crop yield using data analytics

7 Andaman and Nicobar Islands      NICOBARS      2000      Whole Year

8	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year
9	Andaman and Nicobar Islands	NICOBARS	2000	Whole Year

	Crop	Area	Production
0	Arecanut	1254.0	2000.0
1	Other Kharifpulses	2.0	1.0
2	Rice	102.0	321.0
3	Banana	176.0	641.0
4	Cashewnut	720.0	165.0
5	Coconut	18168.0	65100000.0
6	Dry ginger	36.0	100.0
1.	Sugaí cane	1.0	2.0
2.	Sweet potato	5.0	15.0
9	Tapioca	40.0	169.0

```
df.tail(10)
```

	State_Name	District_Name	Crop_Year	Season	
Crop \					
246081	West Bengal	PURULIA	2014	Rabi	Rapeseed
&Mustard					
246082	West Bengal	PURULIA	2014	Rabi	
Safflower					
246083	West Bengal	PURULIA	2014	Rabi	
Urad					
246084	West Bengal	PURULIA	2014	Rabi	
Wheat					
246085	West Bengal	PURULIA	2014	Summer	
Maize					
246086	West Bengal	PURULIA	2014	Summer	
Rice					
246087	West Bengal	PURULIA	2014	Summer	
Sesamum					
246088	West Bengal	PURULIA	2014	Whole Year	
Sugarcane					
246089	West Bengal	PURULIA	2014	Winter	
Rice					
246090	West Bengal	PURULIA	2014	Winter	
Sesamum					

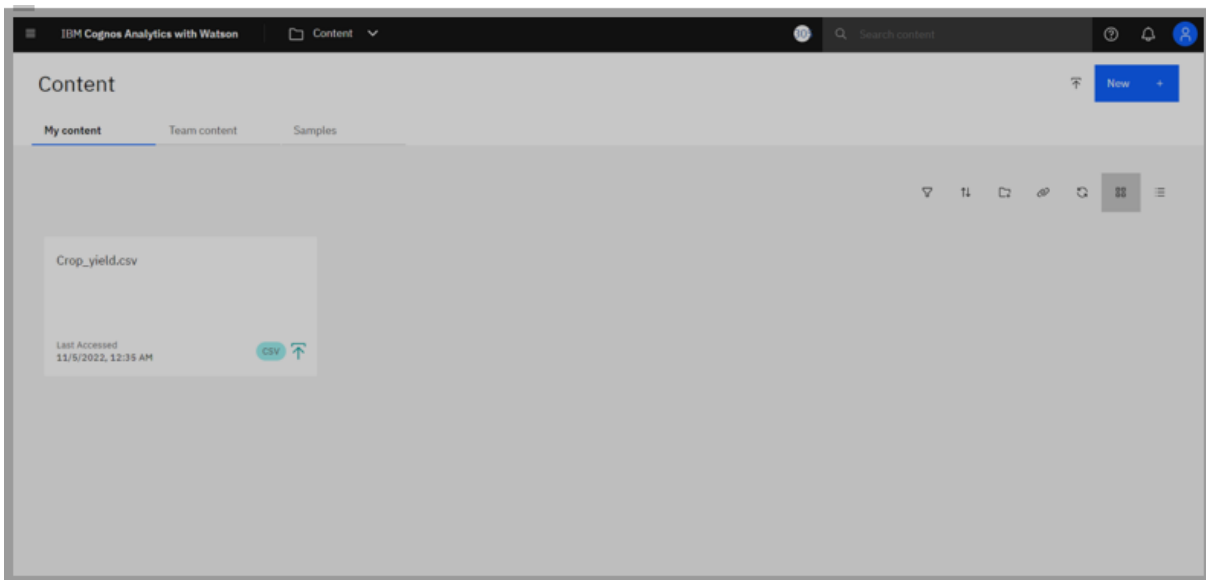
	Area	Production
246081	1885.0	1508.0
246082	54.0	37.0
246083	220.0	113.0
246084	1622.0	3663.0
246085	325.0	2039.0
246086	306.0	801.0
246087	627.0	463.0
246088	324.0	16250.0
246089	279151.0	597899.0
246090	175.0	88.0

```
df.sample(10)
```

	State_Name	District_Name	Crop_Year	Season \
109430	Madhya Pradesh	GUNA	2002	Whole Year
3729	Andhra Pradesh	KADAPA	2009	Kharif
37765	Bihar	MUZAFFARPUR	2014	Autumn
141932	Meghalaya	WEST KHASI HILLS	2014	Kharif
120990	Madhya Pradesh	SHAHNOL	2002	Whole Year
209910	Uttar Pradesh	FARRUKHABAD	2010	Summer
57521	Gujarat	AHMADABAD	2012	Kharif
215654	Uttar Pradesh	JAUNPUR	2013	Rabi
166342	Rajasthan	BARMER	2008	Rabi
112621	Madhya Pradesh	KATNI	1999	Whole Year

	Crop	Area	Production
109430	Pome Fruit	62.0	0.0
3729	Rice	52423.0	153757.0
37765	Rice	31319.0	69515.0
141932	Banana	521.0	3032.0
120990	Other Vegetables	262.0	0.0
209910	Moong (Green Gram)	768.0	789.0
57521	Sesamum	1600.0	800.0
215654	Onion	366.0	7444.0
166342	Linseed	13.0	12.0
112621	Garlic	51.0	158.0

## *Uploading Dataset into IBM Cognos*



## **8. Testing**

### **8.1. Test Case**

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage_TC_001	Functional	Home Page	Verify user is able to see the Login/Signup popup when user clicked on My account button	1. Enter URL and click go 2. Click on My Account dropdown button 3. Verify login/Signup popup displayed or not	<a href="#">D:\VS\web_develop\BM\Homepage.html</a>	Login/Signup popup should display	Working as expected	Pass	Steps are clear to follow along.	N	NI	M3-Vishwanath
LoginPage_TC_002	UI	Home Page	Verify the UI elements in Login/Signup popup	1. Enter URL and click go 2. Click on My Account dropdown button 3. Verify login/Signup popup with below UI elements: a. email text box b. password text box c. Login button d. New customer? Create account link e. Last password? Recovery password link	<a href="#">D:\VS\web_develop\BM\Registration.html</a>	Application should show below UI elements: a. email text box b. password text box c. Login button with orange colour d. New customer? Create account link e. Last password? Recovery password link	Working as expected	Pass	Steps are clear to follow along.	N	BUG-1234	M3-Vishwanath
LoginPage_TC_003	Functional	Home page	Verify user is able to log into application with Valid credentials	1. Enter URL and click go 2. Click on My Account dropdown button 3. Enter Valid username/email in Email text box 4. Enter valid password in password text box 5. Click on login button	Username: Vishwa password: 1232	User should navigate to user account homepage	Working as expected	Pass	Steps are clear to follow along.	N	NI	M3-Vishwanath and M4-Palanisappan
Accessing_Capnos_p_g_001	Functional	Story	Verify whether the user is able to view the story by using the credentials	1. Enter URL and click go 2. Enter the mail and password	Username: vishnavinarasimhamarch@gmail.com password: Vaishnav*Sa7	Application should the expected result(Story)	Working as expected	Pass	Steps are clear to follow along.	N	NI	M3-Vaishnavi
Accessing_Capnos_p_g_002	Functional	Report	Verify whether the user is able to view the report by using the credentials	1. Enter URL and click go 2. Enter the mail and password	Username: vickypalanisappan12@gmail.com password: Vik@1232	Application should the expected result(Report)	Working as expected	Pass	Steps are clear to follow along.	N	NI	M4-Palanisappan
Accessing_Capnos_p_g_003	Functional	Dashboard	Verify whether the user is able to view the dashboard by using the credentials	1. Enter URL and click go 2. Enter the mail and password	Username: srinudharsan.r@gmail.com password: Rsnj@2000	Application should the expected result(Dashboard)	Working as expected	Pass	Steps are clear to follow along.	N	NI	M2-Srinudharsan
Accessing_Capnos_p_g_004	Functional	Visualizations	Verify whether the user is able to view the dashboard by using the credentials	1. Enter URL and click go 2. Enter the mail and password	Username: vickypalanisappan12@gmail.com password: Vic@1232	Application should the expected result(Visualizations)	Working as expected	Pass	Steps are clear to follow along.	N	NI	M2-Srinudharsan

Accessing_Capnos_p_g_005	Functional	Explorations	Verify whether the user is able to view the dashboard by using the credentials	1. Enter URL and click go 2. Enter the mail and password	Username: vishnavinarasimhamarch@gmail.com password: Vaishnav*Sa7	Application should the expected result(Explorations)	Working as expected	Pass	Steps are clear to follow along.	N	NI	M3-Vaishnavi
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Estimate the crop yield using data analytics

# 8.2 User Acceptance Testing

## 1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] 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	8	4	2	2	16
Duplicate	4	2	3	0	9
External	2	3	0	1	6
Fixed	22	7	4	18	51
Not Reproduced	0	0	1	0	1
Skipped	1	1	0	0	2
Won't Fix	4	0	2	1	7
Totals	41	17	12	22	92

### 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	4	0	0	4
Client Application	45	0	4	49
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. Result

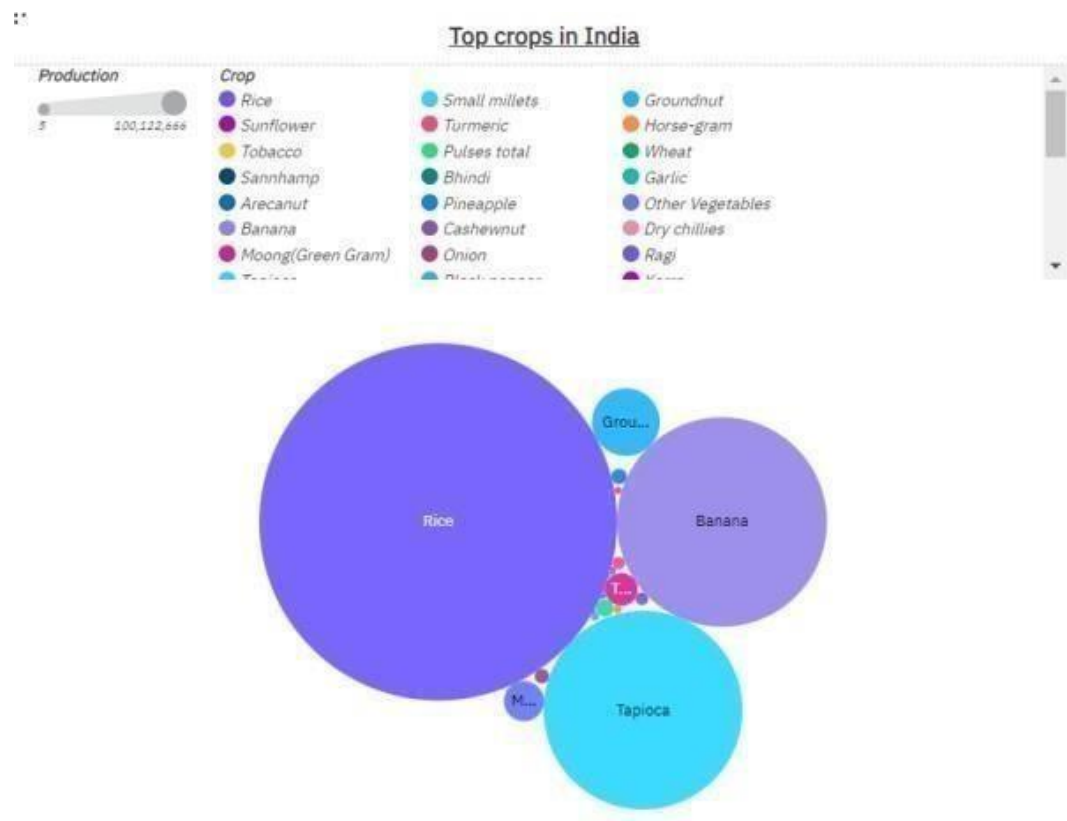
#### Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - <a href="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.public_folders%2Fcrop%2Bproduction%2Banalysis%2Fcrop%2Bproduction%2Banalysis&amp;action=view&amp;mode=dashboard&amp;subView=model0000018446bb2594_00000000">https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.public_folders%2Fcrop%2Bproduction%2Banalysis%2Fcrop%2Bproduction%2Banalysis&amp;action=view&amp;mode=dashboard&amp;subView=model0000018446bb2594_00000000</a>
2.	Data Responsiveness	CROP PRODUCTION DATASET The dataset contains 7 rows and 246091 record and dataset contains different state name, different district name, crop year, crop, area, season and production
3.	Amount Data to Rendered (DB2 Metrics)	To connect IBM Db2 database cloud with IBM Cognos analytics By using IBM Db2 to create Dashboard, Report, Story, Visualization and Exploratory data analytics (EDA)
4.	Utilization of Data Filters	Utilization of data filters - 13
5.	Effective User Story	No of Scene Added – 7 <a href="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.public_folders%2FPROJECT%2FNew%2Bstory&amp;action=view&amp;sceneId=model0000018447339a54_00000000&amp;sceneTime=0">https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.public_folders%2FPROJECT%2FNew%2Bstory&amp;action=view&amp;sceneId=model0000018447339a54_00000000&amp;sceneTime=0</a>
6.	Descriptive Reports	No of Visualizations / Graphs – 1/6 <a href="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folder%2FYield_report&amp;action=edit">https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folder%2FYield_report&amp;action=edit</a>

Estimate the crop yield using data analytics





## 10. Advantages & Disadvantages

### Advantages

- **The precision agriculture market continues to evolve, allowing farmers to embrace data-driven solutions.**
- **While the future opportunities for data analytics in agriculture are limitless, there are already strong benefits emerging, such as increasing innovation and productivity.**
- **Data analytics has enormous potential for the cost to output ratio, optimizing timely actionable information, and much more.**
- **The utilization of big data within agriculture is driving a growing demand for specialized tools and platforms that collect, analyze, and provide useful data to**

improve farming.

- >
  - Data analytics provides businesses to make innumerable decisions everyday and intricate complexities involves the various factors influencing them.
  - Data analytics can help farmers monitor the health of crop in real time, create predictive analytics related to future yields and can help farmers make resources management

## Disadvantages

- It includes data and metadata gaps, insufficient data storage, preservation, and documentation, lack of scalable spatio-temporal data analytics methods, and inadequate secure data-sharing mechanisms.
- Security issues, ethical issues the deliberate abuse of big data by malevolent and intentional misuse.
- It requires more knowledge and skills, it involves risk. It is critical if you're farming for commercial purposes and want to ensure that your crops produce certain characteristics, such as size, shape, weight and colour and your crop are disease resistance

## 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 agriculture with reference to using IT trends like data analytics in the infancy. As the food is the basic need of humans, the requirement of getting the maximum yield 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

## **12. Future Scope**

- Predict appropriate crop and maximum yield in the climate change.
- Create an android app Collection of data, Analytics of it and modification of the algorithm.
- IoT application in agriculture, automation in production line and man free agriculture which is the future of the world, this is the first step of it.
- Find the percentage yield to happen from the match given percentage in terms of % error

## **13. Appendix**

1. Demo video link: <https://www.youtube.com/watch?v=cFcfpc33mzM>
2. Github link: <https://github.com/IBM-EPBL/IBM-Project-47475-1660799664>