



ESTIMATE THE CROP YIELD USING DATA ANALYTICS

A PROJECT REPORT

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1. INTRODUCTION

Farming is a significant source of revenue for many people in developing countries. Modern agricultural growth has been influenced by several innovations, environments, techniques, and civilizations. Furthermore, information technology may change the way farmers make decisions and thus allow them to yield the best results. Agriculture-related data mining techniques are used for decision-making. Using enormous amounts of data, data mining extracts the most significant and useful information. Due to the diversity of agricultural data, including soil data, crop data, and weather data, we now use machine learning for crop and plant yield prediction. Plant growth prediction is proposed for monitoring the plant yield effectively. It is also applicable to the automated process of farming is the beginning of a new era in Bangladesh that will be suitable for the farmers who seek experts to take suggestions about the appropriate crop on the specific locations of their land and don't want to forget any step of the cultivation throughout the process. Although the opinion of experts is the most convenient way, this application is designed to give accurate solutions in the fastest manner possible. This research's main objective is to bring the farming process a step closer to the digital platform.

1.1 Project Overview

Machine learning searches out-think the future from the past dossier. Machine learning (ML) is a type of artificial intelligence (AI) that determines calculations accompanying the strength to discover without being definitely prioritized. Machine learning focuses on the incident of Computer Programs that can change when unprotected to the new dossier and the fundamentals of Machine Learning, implementation of a plain machine intelligence treasure utilizing python. The process of preparation and prediction includes the use of specific algorithms. It feeds the preparation dossier to a treasure, and the algorithm uses this preparation dossier to present forecastings on a new test dossier. Machine learning may be roughly divided into three knowledgeable classifications. There are directed education, unsupervised education, and support education. The supervised education program is two together given the recommendation dossier and the

matching description to discover data expected branded by a human early. Unsupervised knowledge has no label. It determined the learning treasure. This invention has to resolve the grouping of the recommendation data. Finally, Reinforcement knowledge dynamically communicates the accompanying allure atmosphere and it receives a helpful or negative response to correct allure efficiency.

Data chemists use many various types of machine learning algorithms to find patterns in python that bring about litigable acumens. At an extreme level, these various algorithms can be top-secret into two groups established by the habit they “determine” about the dossier to form predictions: directed and alone education. Classification is the process of calling the class of likely dossier points. Classes are sometimes named as aims/ labels or types. Classification predicting shaping is the task of approximating a mapping function from recommendation variables(X) to individual manufacturing variables(y). In machine intelligence and enumerations, categorization is a supervised knowledge approach at which point the calculating program learns from the dossier recommendation likely to it and then uses this education to categorize new attention. This basic document file concedes the possibility of utterly bi-class (like identifying whether the life is male or female or that the mail is marketing mail or non-marketing mail) or possibly multi-class too. Some models of categorization questions are talk acknowledgment, calligraphy recognition, biography rhythmical labeling, document categorization, etc.

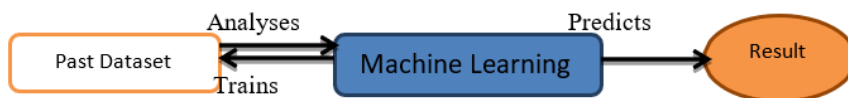


Fig: Process of Machine learning

Supervised Machine Learning is the most experienced machine intelligence that uses directed education. Supervised education places have recommendation variables (X) and an amount changing (y) and use a treasure to determine the plan function from the recommendation to the manufacturing is $y = f(X)$. The aim searches out and approximates the plan function so well that when you have a new recommendation dossier (X) you can forecast the amount variables (y) for that dossier. Techniques of Supervised Machine Learning algorithms involve logistic reversion, multi-class categorization, Decision Trees and support heading machines, etc. Supervised knowledge demands that the dossier used to train the invention is before marked accompanying correct answers. Supervised knowledge questions may be further grouped into Classification questions. This question has as its aim the creation of a brief model that can anticipate the profit of the reliant attribute from the attribute variables. The distinctness middle from two points two together tasks is the event that the weak attribute is mathematical for explicit categorization. A categorization model attempts to draw few judgments from noticed principles. Given individual or more inputs a categorization model will try to anticipate the profit of individual or more consequences. A categorization question is when the harvest changeable is a type, in the way that “coral” or “vulgar”.

Agriculture is one of the ultimate main professions trained in our country. It is the fullest for-profit business and plays a main duty in overall incidents of the country. About 60 % of the land in the country is secondhand for farming in consideration of the needs of 1.2 billion communities. Thus, renovation of farming is very main and accordingly will lead the peasants of our country towards profit. Data logical (DA) is the process of testing dossier sets in consideration of drawing decisions about the news they hold, more and more accompanying the aid of specific structures and programs. Earlier yield prognosis was acted by taking everything in mind the grower's knowledge on the field and crop. However, as environmental change occurs every day very expeditiously, peasants are strained to nurture crops to greater extent crops. Being this is the current position, many of the bureaucracy doesn't have enough information about the new crops and are imperfectly informed about the latest trends and the benefits they take while ranching bureaucracy. Also, the farm output may be raised by understanding and predicting crop depiction in a different material environment. Thus, the projected whole takes the area of the consumer as an recommendation. From the site, the

vitamins of the soil in the way that Nitrogen, Phosphorous, and Potassium are acquired. This motionless dossier is the cropped result and the dossier had a connection with demands of miscellaneous crops got from miscellaneous websites. It applies machine intelligence and prognosis invention to recognize the pattern between the dossier and before processing it as per recommendation environments.

Preparing the Dataset:

The test of ability dataset is immediately provided to the machine intelligence act in accordance with the basis concerning this basic document file the model is prepared. Every new detail suffused concurrently with an activity of use form acts as a test basic document file. After the movement of the experiment, model prediction is located upon the deduction it decides on the support of the preparation dossier sets. Satellite Imagery (Remote Sensing Data), has existed usually for forecasting crop yield. This dataset is collected utilizing the sensors backed on satellites or planes, that discover the strength (electromagnetic waves), mirrored or diffracted from the surface of the ground. Remote perceiving dossier has a lot of strength bands to offer, but primarily only a few of the ruling class have existed secondhand for crop yield forecasting. Yet, skilled are few nations that have reliable produce appropriate physiognomy utilizing the bands that are usually discounted, and they have existed successfully accompanying reconstructing results accompanying that. In a case concerning this dataset, most families exceptionally survey the extreme-order importance of the features. Based on these datasets public has secondhand algorithms like Regression models, Random Forest, Nearest Neighbor, etc.

The table shows details of the datasets:

Variable	Description
Crop	Crop name
State Name	Indian state name

District Name	District name list of each state
Cost of Cultivation (₹/Hectare) C2	Cultivation amount for C2 Scheme
Cost of Production (₹/Quintal) C2	Production amount for A2+FL Scheme
Yield (Quintal/ Hectare)	Yield of crop
Crop year	Crop year list
District Name	District name for each state
Area	Total area of each place
Rainfall	Water availability of each crop
Average humidity	directly influences the water relations of plant and indirectly affects leaf growth
Mean Temperature	Climate of each crop
Cost Production of per yield crop	Cost of crop yield

1.1 Purpose

Agriculture is an ultimate main subdivision that influences the frugality of India. It donates to 18% of India's Gross Domestic Product (GDP) and gives service to 50% of the people of India. People of India are undertaking Agriculture for age but the results are never fulfilling on account of miscellaneous determinants that influence the crop yield. To answer the needs of about 1.2 billion families, it is very main to have a good yield of crops. Due to determinants like soil type, snow, source feature, lack of mechanics conveniences, etc. The crop yield is straightforwardly

affected. To focus on achieving crop yield forecasting arrangement by utilizing Machine learning methods by achievement reasoning on the farming dataset. For judging acts, Accuracy is secondhand as one of the determinants. The classifiers are further distinguished by accompanying the principles of Precision, Recall, and score. The lesser the advantage of mistake, the more correct the invention will work. The result is an established contrast between the classifiers.

Scope

The opportunity concerning this project search out explore a dataset of crop records for agricultural area utilizing machine intelligence method. To labeling crop envisioning by laborer is more difficult. We try to humiliate this risk determinant behind excerpt of the crop.

Objectives:

1. Data validation
2. Data Cleaning/ Preparing
3. Data Visualization
4. Using more algorithm with comparing to predict more accuracy

2. LITERATURE SURVEY

2.1 Existing problem

S.No	Author	Title	Source	Findings
1	Samihan Deshmukh, Devesh, Dhannawat, Mohit Dalvi	Application of Data Analytics in Agriculture Sector for Soil Health Analysis	IEEE XPLORE 2019 5th International Conference on Computing Communication Control and Automation (ICCUBEA)	In this paper, for soil health analysis they compared prediction of different soil elements with different machine learning algorithms. This survey will be very useful for those who are building products related to soil health analysis and prediction.
2	M.Chandrababha, Rajesh Kumar Dhanaraj	Machine learning based Pedantic Analysis of Predictive Algorithms in Crop Yield Management	IEEE 2018 5th IEEE International Conference on Parallel, Distributed and Grid Computing (PDGC)	In this paper, we observed that, various algorithm operates well with different factors but when considering error rates as performance measure, recurrent neural network (RNN) works well when compared to other algorithms. When considering accuracy as performance measure, BayesNet performs very well

				for rice crop and produces an accuracy of 97.53%.
3	Aakash G Ratkal, Gangadhar Akalwadi, Vinay N Patil,Kavi Mahesh -	Farmer's Analytical Assistant	2016 IEEE International Conference on Cloud Computing in Emerging Markets	In this paper,it is intended to help farmers to make educated choices about the crop which he plans to grow next.We have Implemented features like production prediction and price prediction which will help the farmer make a reasonable estimate of the price and yield
4	Cristanel Razafimandimby, Valeria Loscri, Anna Maria Vegni, Alessandro Neri	Efficient Bayesian Communication Approach For Smart Agriculture Applications	IEEE 2017	In this paper, we observed that they Presented an inference-based approach–namely, BIA– applied to the PEACH network, with the aim of avoiding useless data transmission.The strong correlation between temperature and humidity data was taken into account for this study.
5	V.Roopaa,C. Emilin Shyni	Data Driven Approach For Farm Re-Modeling	IEEE 2017	In this paper,we observed that they digitize farming and Agricultural activities

		Using Prediction Analytics		so that the farmers can check on the requirements of the crops and correctly predict their growth. The proposed system is being modeled such that the field area is being set up with sensors being located at specific locations, drones are set up for weekly monitoring.
6	Namgiri Suresh, N. V. K. Ramesh, Syed Inthiyaz, P. Poorna Priya, Kurra Nagasowmi ka,	Crop Yield Prediction Using Random Forest Algorithm	IEEE 2019	In this paper, it showed that practical use of data mining techniques in predicting crop yield.
8	Shivi Sharma, Hemraj Saini	Big Data Analytics for Crop Prediction Mode Using Optimization Technique	IEEE 2018 5th IEEE International Conference on Parallel, Distributed and Grid Computing (PDGC)	In this paper, it presents a hybrid model i.e. SVM_GWO that uses a combinational approach for improving the classification accuracy, recall, precision, f-measure by selecting the optimal parameters settings in SVM.
9	Shreya V.	Crop Yield	IEEE	In this paper, the final

	Bhosale, Ruchita A. Thombare, Prasanna G. Dhemey, An agha N. Chaudhari	Prediction Using Data Analytics and Hybrid Approach	2018 Fourth International Conference on Computing Communication Control and Automation	result contains crop names which is suggested in that region for specified rainfall as well as land of farmer in acres. The predicted yield as crop count attribute is displayed in kg/acre format. The attribute yield describes the average production of that crop in 1 acre.
10	Potnuru Sai Nishant, Pinapa Sai Venkat, Bollu Lakshmi, Av inash, B. Jabber	Crop Yield Prediction based on Indian Agriculture using Machine Learning	IEEE 2020 International Conference for Emerging Technology (INCET)	This paper predicts the yield of almost all kinds of crops that are planted in India. The paper uses advanced regression techniques like Kernel Ridge, Lasso and ENet algorithms to predict the yield and uses the concept of Stacking Regression for enhancing the algorithms to give a better prediction.

2.2 References

1. P.Priya, U.MuthaiahM.Balamurugan . Predicting yield of the crop using machine learning algorithm. International Journal of Engineering Research
2. J.Jeong, J.Resop , N.Mueller and team . Random forests for global and regional crop yield prediction.PLoS ONE Journal.
3. Narayanan Balkrishnan and Dr. Govindarajan Muthukumarasamy . Crop production Ensemble Machine Learning model for prediction. International Journal of Computer Science and Software Engineering (IJCSSE).
4. S.Veenadhari , Dr. Bharat Misra , Dr. CD Singh. Machine learning approach for forecasting crop yield based on climatic parameters. International Conference on Computer Communication and Informatics (ICCCI).
5. Shweta K Shahane , Prajakta V Tawale . Prediction On Crop Cultivation. Journal of Advanced Research in Computer Science and Electronics Engineering (IJARCSEE) Volume 5, Issue 10, October 2016.
6. D Ramesh ,B Vishnu Vardhan. Analysis Of Crop Yield Prediction Using Data Mining Techniques. IJRET: International Journal of Research in Engineering.

2.3 Problem Statement Definition

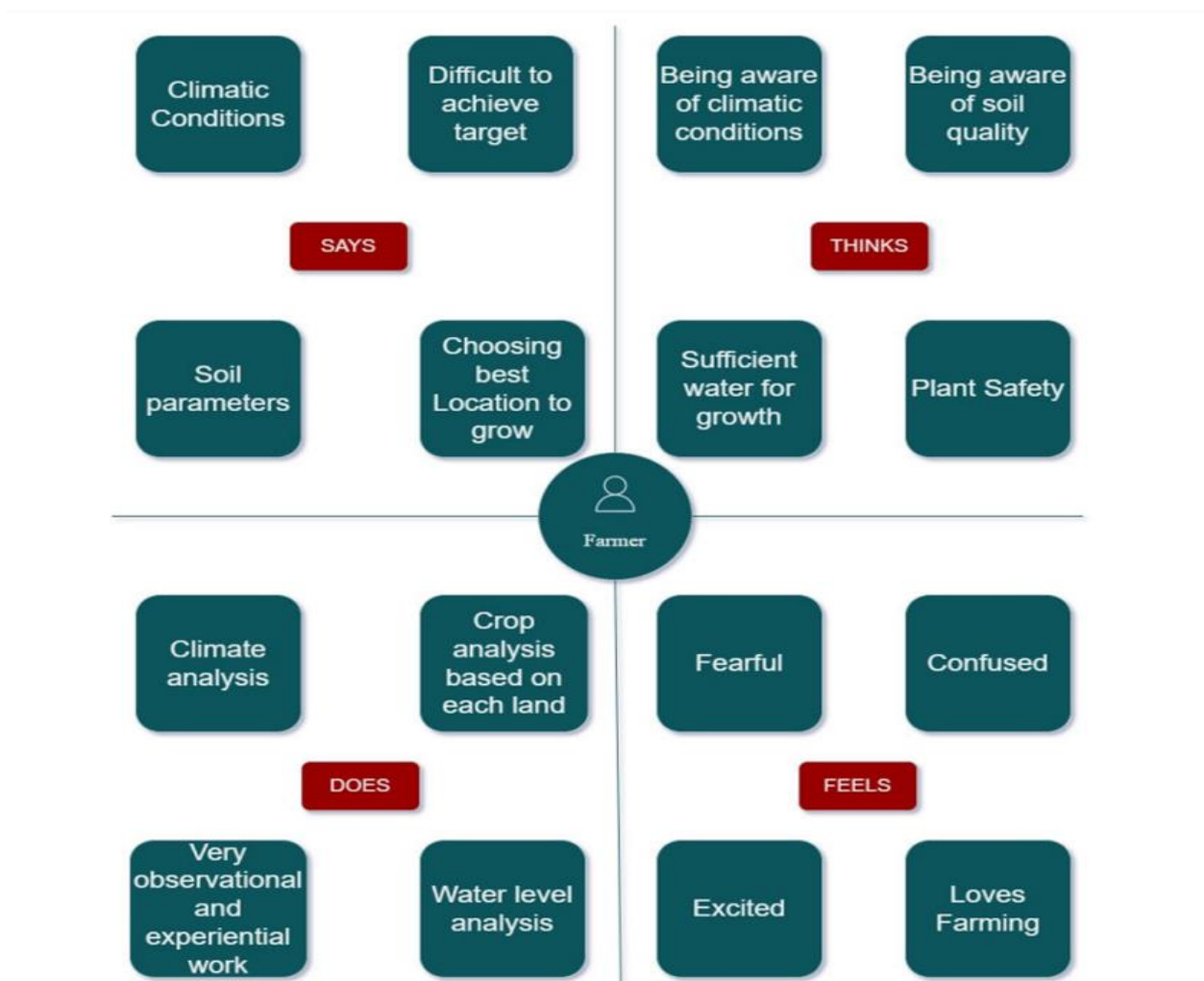
The estimation of crop yield at a small scale is crucial to food security and harvest management. Based on previous crop forecasts and soil quality analysis, machine learning is applied to achieve high yields throughout the technology solution. A major purpose of this project is to predict crop yield, which is extremely useful for farmers in planning for harvest and selling their grain harvests. Predict the optimal crop for our country's corresponding regions and crop seasons using a machine learning algorithm. This project aims to predict yields based on location and weather data. According to the climate and soil parameters, this study looks at which crops will yield high yields within the given area.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An understanding drawing is a cooperative imagination used to articulate what we hear about the type of consumer. It externalizes information about consumers in order to


- 1) Constitute a joint understanding of consumer needs, and
- 2) Aid hesitation.



3.1.1 Empathy Map Canvas

3.2 Ideation & Brainstorming


Template



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.


⌚ 10 minutes to prepare
👥 1 hour to collaborate
👤 2-8 people recommended



Before you collaborate


A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

⌚ 10 minutes




Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.



Set the goal


Think about the problem you'll be focusing on solving in the brainstorming session.



Learn how to use the facilitation tools

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔




Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

⌚ 5 minutes


Problem Statement

The estimation of crop yield at a small scale is crucial to food security and harvest management. Based on previous crop forecasts and soil quality analysis, machine learning is applied to achieve high yields throughout the technology solution. A major purpose of this project is to predict crop yield, which is extremely useful for farmers in planning for harvest and selling their grain harvests. Predict the optimal crop for our country's corresponding regions and crop seasons using a machine learning algorithm. This project aims to predict yields based on location and weather data. According to the climate and soil parameters, this study looks at which crops will yield high yields within the given area.




Key rules of brainstorming


To run a smooth and productive session




Stay in topic.




Encourage wild ideas.




Defer judgment.



Listen to others.



Go for volume.



If possible, be visual.

14

2

Brainstorm

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

🕒 10 minutes

Swetha S



Serena Sofranica P



Vaishnupriya S



Preethi R



3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

🕒 20 minutes

Proposed System



Architectural components



Parameters in Dataset



Crop model engine



Advantages



Limitations



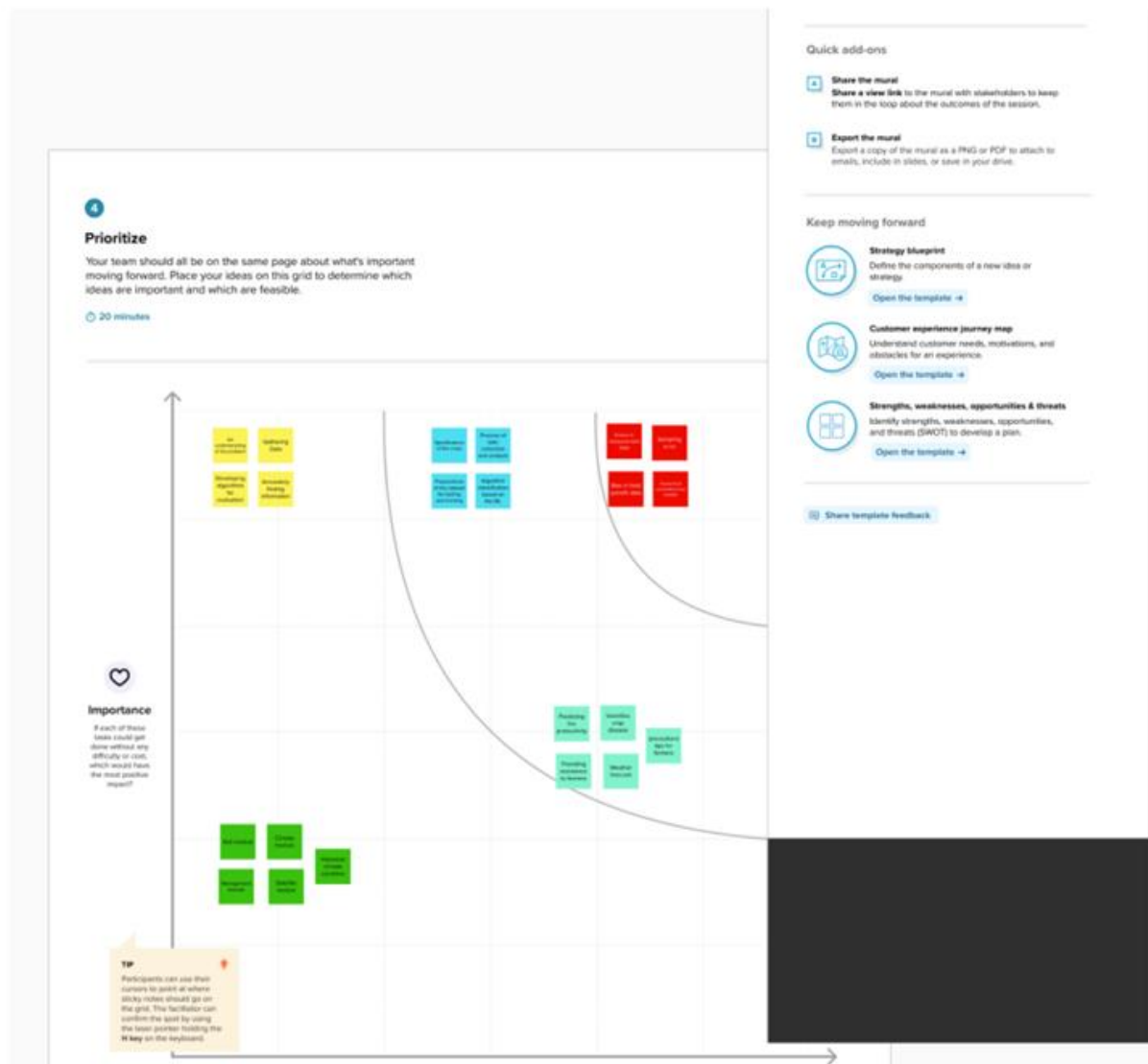


Fig 3.2.1 Ideation & Brainstorming

3.3 Proposed Solution

Exploratory Data Analysis:

In this portion of the report, you will load in the dossier, check for cleanness, and trim and clean your dataset for analysis. Make sure that you document your steps painstakingly and legitimize your cleansing resolutions.

Training the Dataset

- The first line imports the iris data set which is already predefined in the sklearn module. The Iris data set is basically a table that contains information about various varieties of iris flowers.
- For example, to import any algorithm and train_test_split class from sklearn and NumPy module for use in this program.
- Then we encapsulate load_data() method in data_dataset variable. Further, we divide the dataset into training data and test data using the train_test_split method. The X prefix in the variable denotes the feature values and the y prefix denotes the target values.
- This method divides the dataset into training and test data randomly in the ratio of 67:33. Then we encapsulate any algorithm.
- In the next line, we fit our training data into this algorithm so that the computer can get trained using this data. Now the training part is complete.

Testing the Dataset

- Now we have the dimensions of a new flower in a NumPy array called 'n' and we want to predict the species of this flower. We do this using the predict method which takes this array as input and spits out the predicted target value as output.
- So the predicted target value comes out to be 0. Finally, we find the test score which is the ratio of no. of predictions found correct and the total predictions made. We do this using the scoring method which basically compares the actual values of the test set with the predicted values.

Advantages

- ★ Our goal is push for assisting farmers, government using our predictions. All these publications state they have done better than their competitors but there is no article or public mention of their work being used practically to assist the farmers. If there are some genuine problems in rolling out that work to the next stage, then identify those problems and try solving them.
- ★ It is targeted to those farmers who wish to professionally manage their farms by planning, monitoring, and analyzing all farming activities.

Application

- ★ It is an integrated farm management application using the mobile app.
- ★ Agricultural sector to automate to identify the crop prediction process (real-time world) and predict by desktop application/web application.

<div>Define CS, fit into CC</div> <div><h3>1. CUSTOMER SEGMENT(S)</h3><div>CS</div><p>Who is your customer?</p><ul style="list-style-type: none">• The customer who is having trouble estimating crop yields.• For customers, it is difficult due to the requirement for more statistical data analysis.• Customers in the agricultural sector are the ones who need products or services.</div>	<div><h3>6. CUSTOMER CONSTRAINTS</h3><div>CC</div><p>What constraints prevent your customers from taking action or limit their choices of solutions?</p><ul style="list-style-type: none">• There is a high cost associated with pesticides.• Natural resources cannot be efficiently stored due to a lack of a proper system.• A large amount of data needs to be analyzed, which makes preparation and support difficult.</div>	<div><h3>5. AVAILABLE SOLUTIONS</h3><div>AS</div><p>Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have?</p><p>Solutions:</p><p>Pros:</p><ul style="list-style-type: none">• The estimation process was lacking a proper tool in the past. Utilizing grain weight and some crop models, farmers estimated their crop yield on their own.<p>Cons:</p><ul style="list-style-type: none">• A systematic approach is not provided by this method and it does not provide much profit.<div>Explore AS, differentiate</div></div>
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Focus on J&P, tap into BE, understand RC		2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. <ul style="list-style-type: none"> Productivity is increased by using the least amount of resources possible. Assisting the customer with marketing, harvesting, and crop rotation Achieving a more organic farming environment by reducing pesticide use 	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. <ul style="list-style-type: none"> For an individual, it is nearly impossible to achieve a high yield since most data is verified and researched over a long period of time. It is simply impossible to accomplish. Inadequate storage system for natural resources. There is an excessive cost associated with pesticides and other agricultural products. 	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace) <ul style="list-style-type: none"> Various criteria can be evaluated by this model in order to determine what crop to plant for the next season. Crop rotation can be accomplished through this application. 	Focus on J&P, tap into BE, understand RC	
Focus on BE, tap into J&P, understand RC		3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. <ul style="list-style-type: none"> Customer is provoked when they learn the advantages and features of different communication methods 	10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. Using agricultural datasets to implement a machine learning-based prediction system for crop yields. By processing the datasets according to cultivation areas, this analysis will enable the calculation of maximum crop yields based on various parameters. With the use of DA techniques, the problem can be solved, and it can help predict the crop's productivity. Predictions like these will be helpful when it comes to logistics in business.	8. CHANNELS OF BEHAVIOUR CH 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 <ul style="list-style-type: none"> An online platform will host the application and all data will be stored there. 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. <ul style="list-style-type: none"> Offline platforms are not available for this model. 	Focus on BE, tap into J&P, understand RC	
Focus on J&P, tap into BE, understand RC		4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design. <p>BEFORE:</p> <ul style="list-style-type: none"> The customer feels confused and overwhelmed before using this approach because there are too many factors such as climatic conditions and prices for better seeds, low demand for the market, and a very low yield. <p>AFTER:</p> <ul style="list-style-type: none"> The application can predict crop yields and estimate profits, which improves the economic stability of the customer. 			Focus on J&P, tap into BE, understand RC	

Fig 3.4 Problem Solution Fit

4. REQUIREMENT ANALYSIS

General

Requirements are the basic constraints that are required to develop a system. Requirements are collected while designing the system. The following are the requirements that are to be discussed.

- Functional requirements
- Non-Functional requirements
- Environment requirements
 - A. Hardware requirements
 - B. software requirements

4.1 Functional requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Dataset Requirement	Analyze the dataset and then load it into a cloud platform. Make the necessary visualizations afterward. Provide solutions for visual analytics
FR-4	Data visualization charts	To highlight Required insights, visualization, various charts and graphs created.

4.2 Non-Functional Requirements:

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

FR. No.	Non-Functional Requirement	Description
NFR-1	Usability	Agriculturists, the Indian government, and anyone else involved in the agricultural sector will find these insights useful.
NFR-2	Security	Currently, data is securely loaded in IBM's cloud platform, and Cognos manages access to data via IBM's Cognos framework.
NFR-3	Reliability	Analysis and interpretation of the insights are accurate and useful.
NFR-4	Performance	The system predicts accurate results as well as being faster.
NFR-5	Availability	Every insight is available to users whenever they want it, and any results they need can be retrieved anywhere and at any time.
NFR-6	Scalability	Adding different features or data can still get you useful insights based on data, and it can be scaled well.

Environmental Requirements:

1. Software Requirements:

Operating System: Windows

Tool: Anaconda with Jupyter Notebook and IBM Cognos Analytics

2. Hardware requirements:

Processor: Pentium IV/III

Hard disk: minimum 80 GB

RAM: minimum 2 GB

Anaconda Navigator:

Anaconda Navigator is a desktop graphical user interface (GUI) included in Anaconda distribution that allows users to launch applications and manage conda packages, environments, and channels without using command-line commands. Navigator can search for packages on Anaconda Cloud or in a local Anaconda Repository, install them in an environment, run the packages and update them. It is available for Windows, macOS, and Linux.

Conda:

Conda is an open-source, cross-platform, language-agnostic package manager and environment management system that installs, runs, and updates packages and their dependencies. It was created for Python programs, but it can package and distribute software for any language (e.g., R), including multi-languages. The Conda package and environment manager is included in all versions of Anaconda, Miniconda, and Anaconda Repository.

The Jupyter Notebook:

The Jupyter Notebook is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Uses include: data cleaning and transformation, numerical simulation, statistical modeling, data visualization, machine learning, and much more.

Notebook Document:

Notebook documents (or “notebooks”, all lowercase) are documents produced by the Jupyter Notebook App, which contain both computer code (e.g. python) and rich text elements (paragraph, equations, figures, links, etc...). Notebook documents are both human-readable documents containing the analysis description and the results (figures, tables, etc.) as well as executable documents which can be run to perform data analysis.

Jupyter Notebook App:

The Jupyter Notebook App is a server-client application that allows editing and running notebook documents via a web browser. The Jupyter Notebook App can be executed on a local desktop requiring no internet access (as described in this document) or can be installed on a remote server and accessed through the internet. In addition to displaying/editing/running notebook documents, the Jupyter Notebook App has a “Dashboard” (Notebook Dashboard), a “control panel” showing local files and allowing to open notebook documents or shutting down their kernels.

5. PROJECT DESIGN

5.1 Data flow Diagram

Overview of the system:

This helps all possible choice areas to complete activity additional conventions. It should find Accuracy of the preparation dataset, Accuracy of the experiment dataset, Specification, False Positive rate, accuracy, and recall by equating treasure utilizing python law. The following Involvement steps are,

- 1) Define a problem
- 2) Prepare data
- 3) Evaluating algorithms
- 4) Improving results
- 5) Predicting results

Project Goals:

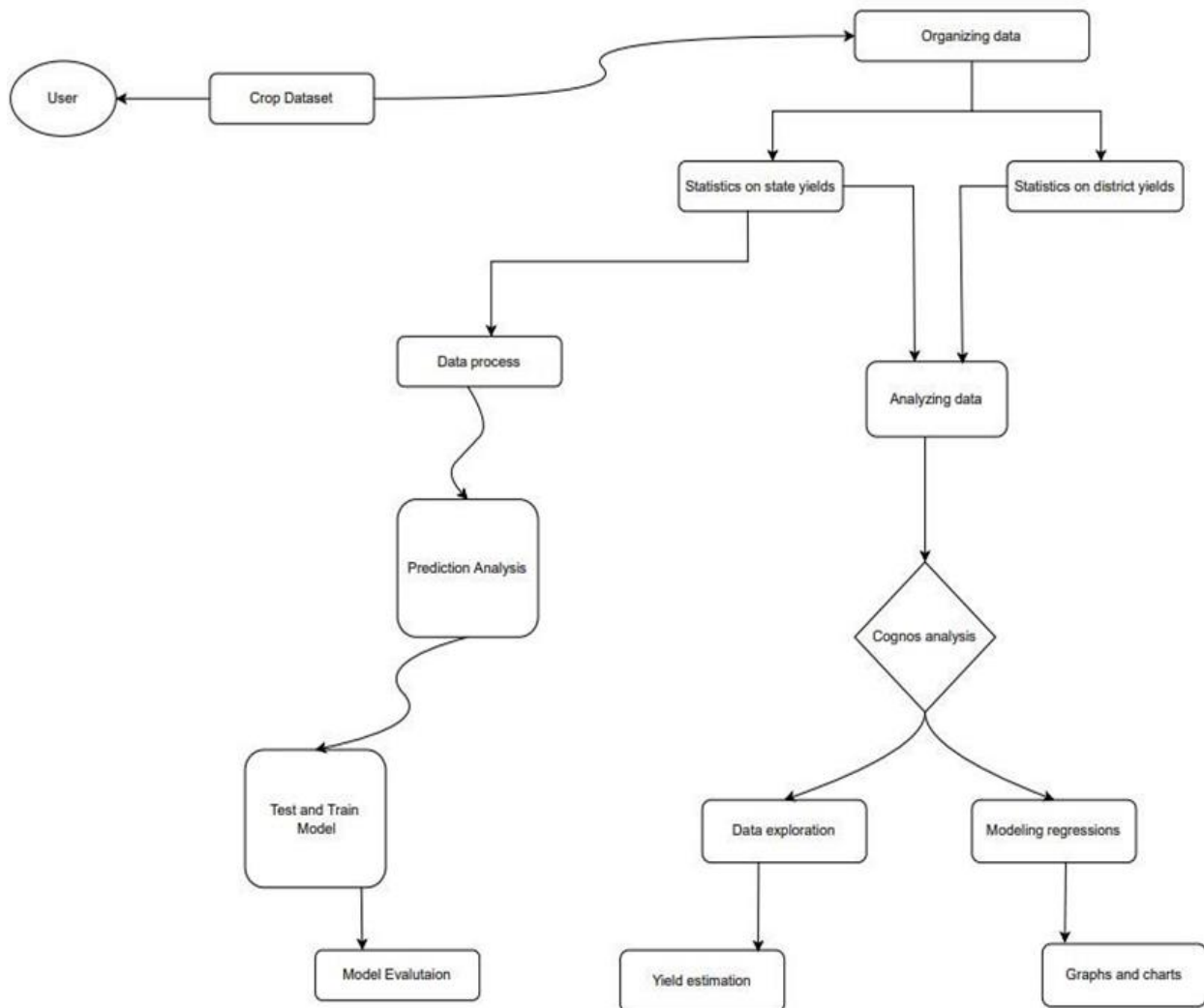
1. Exploration data analysis of variable identification
 - Loading the given dataset
 - Import required libraries packages
 - Analyze the general properties
 - Find duplicate and missing values
 - Checking unique and count values
2. Uni-variate data analysis
 - Rename, add data and drop the data
 - To specify data type
3. Exploration data analysis of bi-variate and multi-variate
 - Plot diagram of pair plot, heatmap, bar chart, and Histogram
4. Method of Outlier detection with feature engineering
 - Pre-processing the given dataset

- Splitting the test and training dataset
- Predicting on the accuracy

Data collection:

The basic document file calm for foreseeing past rancher list of yield is split into a Training set and Test set. Generally, 7:3 percentages are used to split the Training set and Test set. The Data Model that was built utilizing Random Forest, logistic, and Decision shrub algorithms are used on the Training set and established the test result veracity, Test set guess is accomplished.

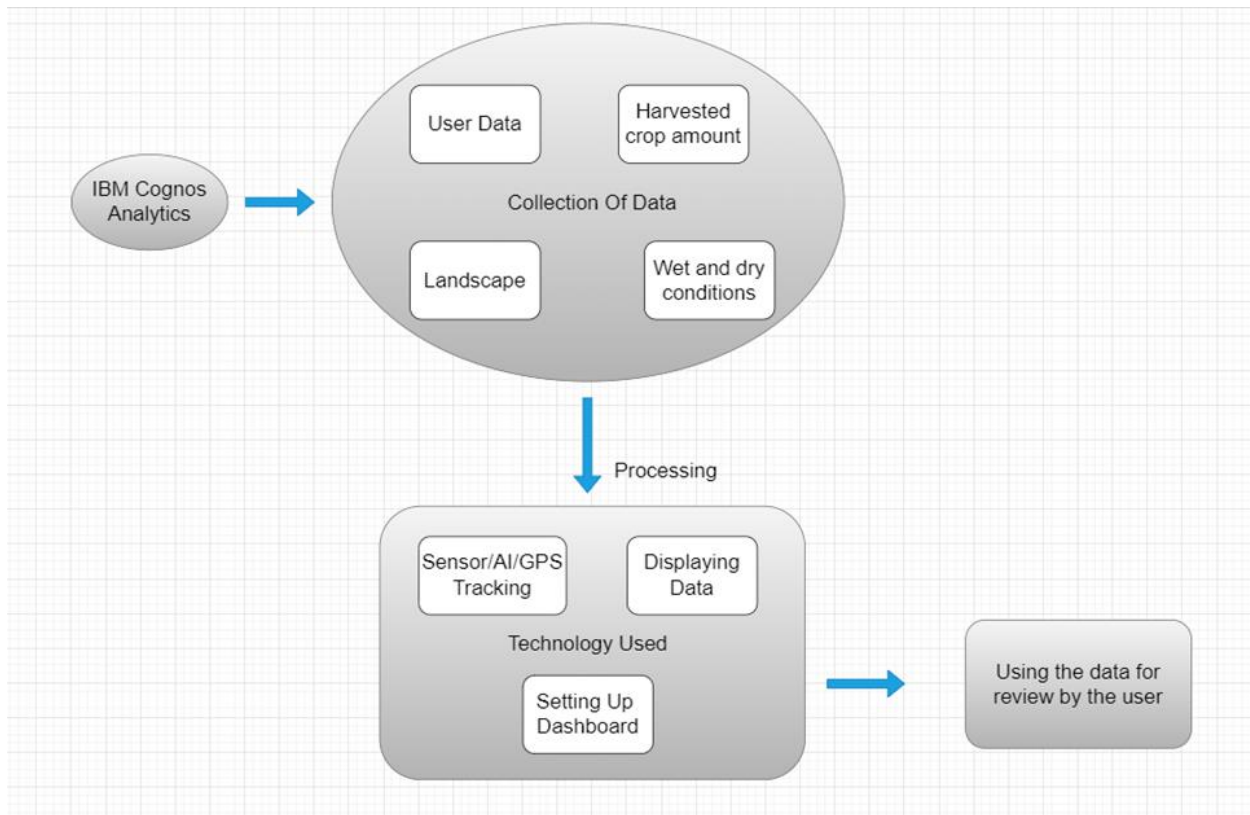
Work flow diagram



Solution & Technical Architecture

Create cells freely to explore your data and you should not perform too many operations in each cell. One option that you can take with this project is to do a lot of explorations in an initial notebook. These don't have to be organized but make sure you use enough comments to understand the purpose of each code cell. Then, after you're done with your analysis, create a duplicate notebook where you will trim the excess and organize your steps so that you have a flowing, cohesive report, and make sure that you keep your reader informed on the steps that you are taking in your investigation. Follow every code cell, or every set of related code cells, with a markdown cell to describe to the reader what was found in the preceding cell. Try to make it so that the reader can then understand what they will be seeing in the following cell.

Business diagram/system architecture: - Phase II



5.2 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

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
		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)	Activity	USN-7	I can register for the application through any web browser.	I can get an notification from the browser	Low	Sprint 1
Customer Care Executive	Access resources	USN-8	I can use my credentials For accessing my resources.	Other than me, there is less chance to access my resources.	High	Sprint 1
Administrator	Satellite visioning	USN-9	As, a user I can vision the geographic area		Medium	Sprint 2
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

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation:

S.no	Milestone	Activities	Start Date	End Date
1	Solution Requirement	Creating the IBM Cognos for creating dashboard and data visualization charts.	22-Aug-2022	24-Aug-2022
2	Project Objectives	Prepare the project objectives.	22-Aug-2022	24-Aug-2022
3	Project Flow	Prepare the project flow.	22-Aug-2022	24-Aug-2022
4	IBM Cloud Account	Creating IBM cloud account.	22-Aug-2022	24-Aug-2022
5	IBM Cognos Analytics	Creating IBM Cognos account.	22-Aug-2022	24-Aug-2022
6	Working with the Dataset	Understanding the dataset loading the dataset.	24-oct-2022	19-Nov-2022

7	Data Visualization Charts	Seasons with average productions with years usage of area and production top 10 states with most area state with crop production states with the crop production along with season	24-oct-2022	19-Nov-2022
8	Creating the Dashboard	Creating the dashboard	24-oct-2022	19-Nov-2022
9	Export the Analytics	Export the analytics	24-oct-2022	19-Nov-2022
10	Ideation Phase	Literature Survey on the selected project & information gathering prepare empathy map ideation	22-Aug-2022	17-Sept-2022

11	Project Design Phase - I	Proposed Solution Problem Solution Fit Solution Architecture	22-Aug-2022	17-Sept-2022
12	Project Design Phase - II	Customer Journey Functional Requirement Data Flow Diagrams Technology Architecture	22-Aug-2022	01-Oct-2022

13	Project Planning Phase	Prepare Milestone & Activity List Sprint Delivery Plan	17-Oct-2022	22-Oct-2022
14	Project Development Phase	1.Project Development - Delivery of Sprint-1 2.Project Development - Delivery of Sprint-2 3.Project Development - Delivery of Sprint-3 4. Project Development - Delivery of Sprint-4	24-Aug-2022	19-Nov-2022

6.2 Sprint Delivery Schedule:

Template to create product backlog and sprint schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for by entering my Agri - id card and request..	2	High	Vaishnupriya S Swetha S Serena Sofranica P Preethi R
		USN-3	As a user, I can register for the application through Gmail	2	Medium	Vaishnupriya S Swetha S
	Login	USN-4	As a user, I can Call and request or Approach for dataset	4	High	Serena Sofranica P Preethi R
	Working with the Dataset	USN-5	To work on the given dataset, Understand the Dataset.	2	High	Vaishnupriya S Swetha S Serena Sofranica P Preethi R
		USN-6	Load the dataset to Cloud platform then Build the required Visualizations.	10	High	Vaishnupriya S Swetha 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	Vaishnupriya S
			*Showcase the Yearly usage of Area in Crop Production.	4	Medium	Swetha .S
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			Build a visualization to show case top 10 States in Crop Yield Production by Area.	4	Medium	Serena Sofranica P
			Build the required Visualization to showcase the Crop Production by State.	4	Medium	Preethi R
			Build Visual analytics to represent the States with Seasonal Crop Production using a Text representation.	4	Medium	Serena Sofranica P Preethi R
Sprint-3	Creating The dashboard	USN-8	Create the Dashboard by using the created visualizations.	20	High	Vaishnupriya S Swetha S
Sprint-4	Export The Analytics	USN-9	Export the created Dashboard	20	High	Serena Sofranica P Preethi R

Project Tracker, Velocity & Burn down Chart: (4 Marks)

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

Velocity:

We have a 24-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

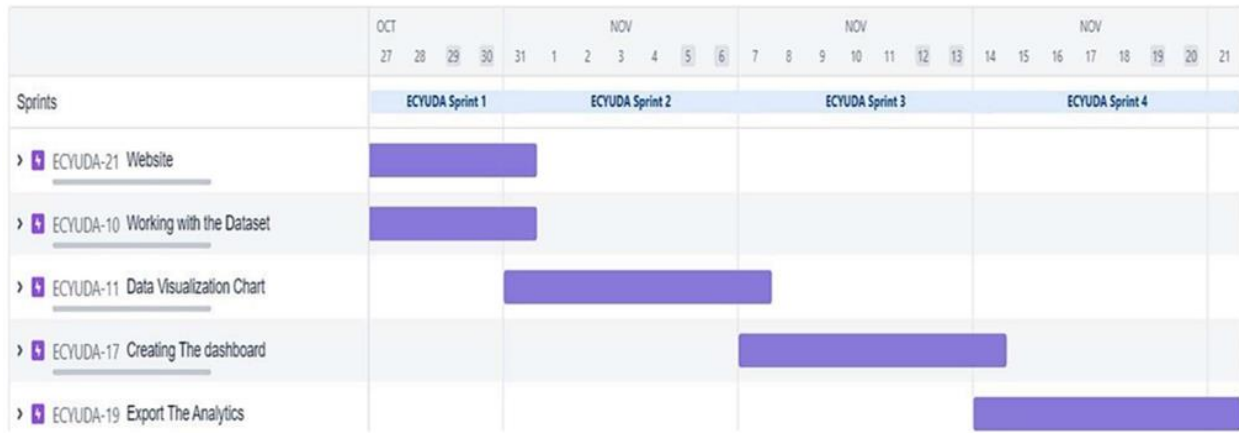
$$AV = \text{Sprint Duration} / \text{Velocity} = 24 / 20 = 1.2$$

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.

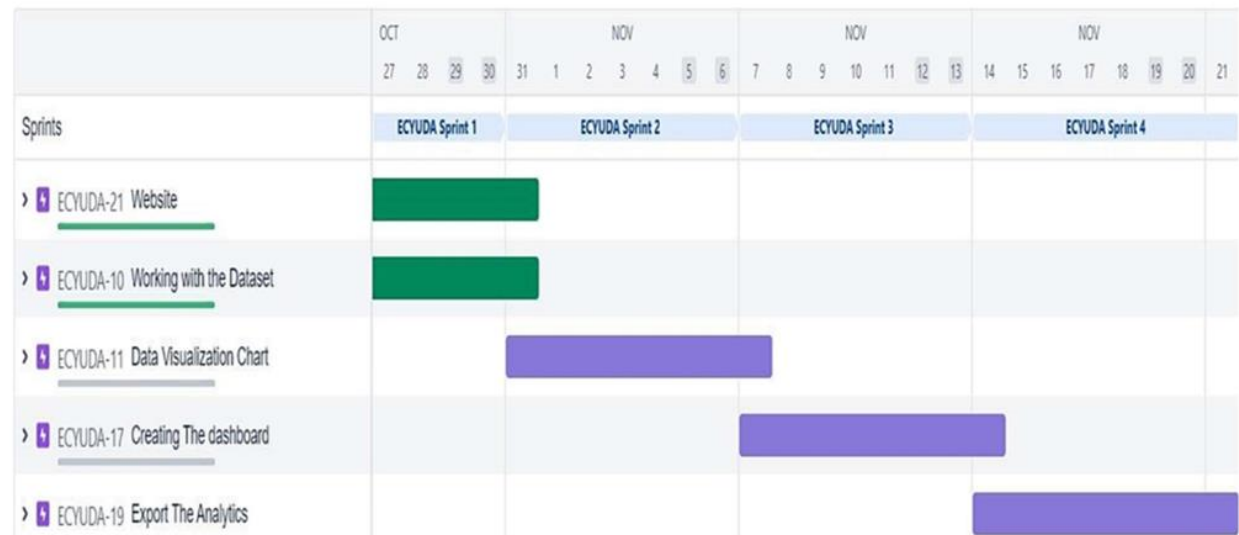


6.3 REPORTS FROM JIRA

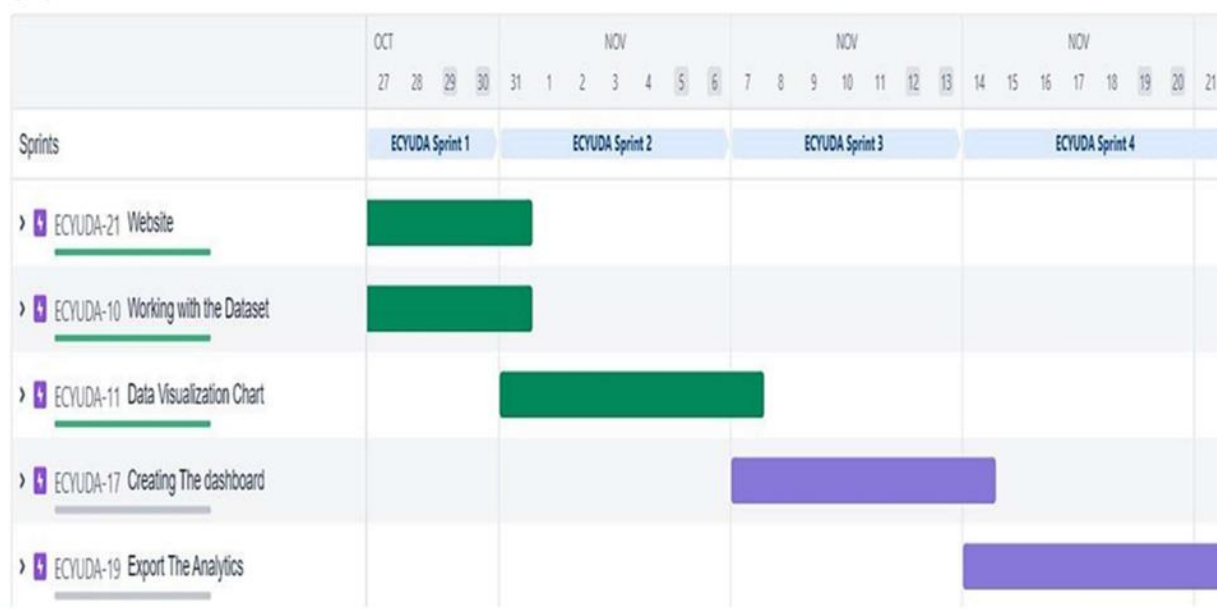
(I) BEFORE START OF THE SPRINT:



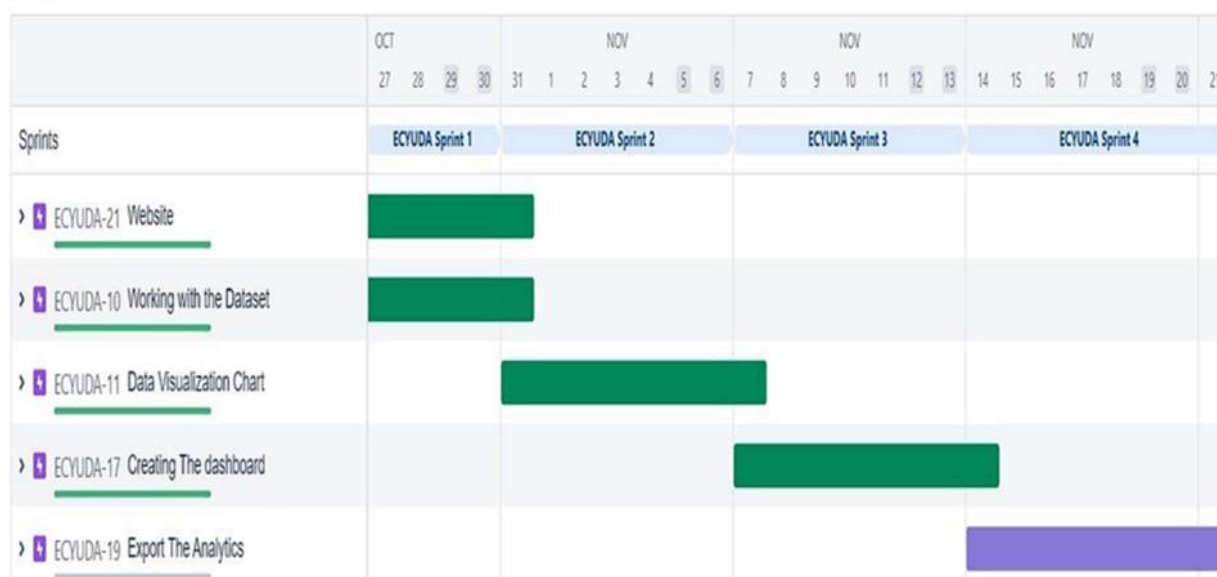
(II) SPRINT 1:

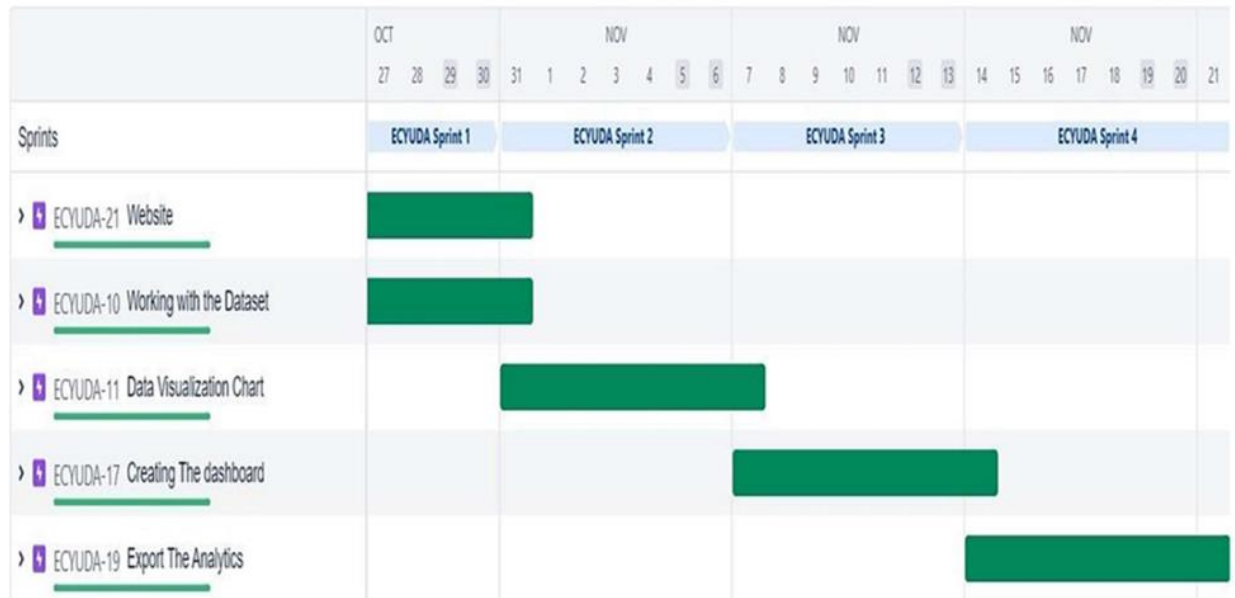


(III) SPRINT 2:



(IV) SPRINT 3:



(V) SPRINT 4:

7. CODING & SOLUTION

7.1 FEATURE 1

DASHBOARD DESIGN

The dashboard is created using IBM Cognos tool which efficiently visualises a given data. The design is incorporated along with page and provides excellent insights on various data regarding crops.

User_page

```
<?php
@include 'config.php';
session_start();
if(!isset($_SESSION['user_name'])){
    header('location:login_form.php');
}
?>
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>user page</title>
    <style>
a:link {
    color: green;
    background-color: transparent;
    text-decoration: none;
}
a:visited {
    color: blue;
    background-color: transparent;
    text-decoration: none;
}
a:hover {
```

```

color: red;
background-color: transparent;
text-decoration: underline;
}

a:active {
color: yellow;
background-color: transparent;
text-decoration: underline;
}
</style>
<!-- custom css file link -->
<link rel="stylesheet" href="css/style.css">

</head>
<body>

<div class="container">

  <div class="content">
    <h3>Welcome <span><?php echo $_SESSION['user_name'] ?></span></h3>
    <br><br>
    <h1>Estimation of Crop yeild analysis of India</h1>
    <br><br>
    <br><br>
    <p><a
href="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&id=i2650535E
EED740C6A90F8CCE7678723E&objRef=i2650535EEED740C6A90F8CCE7678
723E&options%5BdisableGlassPrefetch%5D=true&options%5Bcollections%5D%
5BcanvasExtension%5D%5Bid%5D=com.ibm.bi.dashboard.canvasExtension&opt
ions%5Bcollections%5D%5BfeatureExtension%5D%5Bid%5D=com.ibm.bi.dashb
oard.core-
features&options%5Bcollections%5D%5Bbuttons%5D%5Bid%5D=com.ibm.bi.da
shboard.buttons&options%5Bcollections%5D%5Bwidget%5D%5Bid%5D=com.ibm
m.bi.dashboard.widgets&options%5Bcollections%5D%5BcontentFeatureExtensio
n%5D%5Bid%5D=com.ibm.bi.dashboard.content-
features&options%5Bcollections%5D%5BsaveServices%5D%5Bid%5D=com.ibm
.bi.dashboard.saveServices&options%5Bcollections%5D%5Btemplates%5D%5Bi
d%5D=com.ibm.bi.dashboard.templates&options%5Bcollections%5D%5Bvisualiz
ationExtension%5D%5Bid%5D=com.ibm.bi.dashboard.visualizationExtensionCA

```

&options%5Bcollections%5D%5BboardModel%5D%5Bid%5D=com.ibm.bi.dashboard.boardModelExtension&options%5Bcollections%5D%5BcontentTypes%5D%5Bid%5D=com.ibm.bi.dashboard.contentTypes&options%5Bcollections%5D%5BserviceExtension%5D%5Bid%5D=com.ibm.bi.dashboard.serviceExtension&options%5Bcollections%5D%5BlayoutExtension%5D%5Bid%5D=com.ibm.bi.dashboard.layoutExtension&options%5Bcollections%5D%5BcolorSetExtensions%5D%5Bid%5D=com.ibm.bi.dashboard.colorSetExtensions&options%5Bconfig%5D%5Bproduct%5D=CA&options%5Bconfig%5D%5BeditPropertiesLabel%5D=true&options%5Bconfig%5D%5BenableCustomVisualizations%5D=true&options%5Bconfig%5D%5BassetTags%5D%5B%5D=dashboard&options%5Bconfig%5D%5BfilterDock%5D=true&options%5Bconfig%5D%5BshowMembers%5D=true&options%5Bconfig%5D%5Bupgrades%5D=dashboard-core%2Fjs%2Fdashboard%2Fupgrades&options%5Bconfig%5D%5BassetType%5D=exploration&options%5Bconfig%5D%5BgeoService%5D=CA&options%5Bconfig%5D%5BsmartTitle%5D=true&options%5Bconfig%5D%5BnavigationGroupAction%5D=true&options%5Bconfig%5D%5BenableDataQuality%5D=false&options%5Bconfig%5D%5BmemberCalculation%5D=false&isAuthoringMode=false&boardId=i2650535EEED740C6A90F8CCE7678723E"target="_blank">IBM COGNOS</p>

Login

Register

Logout

</div>

</div>

</body>

</html>

Register_form

```
<?php
```

```
@include 'config.php';
```

```
if(isset($_POST['submit'])){\
```

```
    $name = mysqli_real_escape_string($conn, $_POST['name']);
```

```
    $email = mysqli_real_escape_string($conn, $_POST['email']);
```

```
    $pass = md5($_POST['password']);
```

```
    $cpass = md5($_POST['cpassword']);
```



```

    $user_type = $_POST['user_type'];
    $select = " SELECT * FROM user_form WHERE email = '$email' && password
= '$pass' ";
    $result = mysqli_query($conn, $select);
    if(mysqli_num_rows($result) > 0){
        $error[] = 'user already exist!';
    }else{
        if($pass != $cpass){
            $error[] = 'password not matched!';
        }else{
            $insert = "INSERT INTO user_form(name, email, password, user_type)
VALUES('$name','$email','$pass','$user_type')";
            mysqli_query($conn, $insert);
            header('location:login_form.php');
        }
    }
};

```

```

?>
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Register form</title>

    <!-- custom css file link -->
    <link rel="stylesheet" href="css/style.css">

</head>
<body>

<div class="form-container">

    <form action="" method="post">
        <h3>Register</h3>
        <?php

```

```

    if(isset($error)){
        foreach($error as $error){
            echo '<span class="error-msg">'. $error. '</span>';
        };
    };
?>
<input type="text" name="name" required placeholder="enter your name">
<input type="email" name="email" required placeholder="enter your email">
<input type="password" name="password" required placeholder="enter your
password">
    <input type="password" name="cpassword" required placeholder="confirm
your password">
    <select name="user_type">
        <option value="user">User</option>
        <option value="admin">Admin</option>
    </select>
    <input type="submit" name="submit" value="register now" class="form-btn">
    <p>Already have an account? <a href="login_form.php">LOGIN
NOW</a></p>
</form>

</div>

</body>
</html>

```

Login_form

```

<?php

@include 'config.php';

session_start();

if(isset($_POST['submit'])){

    $email = mysqli_real_escape_string($conn, $_POST['email']);
    $pass = md5($_POST['password']);

```

```
$select = " SELECT * FROM user_form WHERE email = '$email' && password  
= '$pass' ";
```

```
$result = mysqli_query($conn, $select);
```

```
if(mysqli_num_rows($result) > 0){
```

```
    $row = mysqli_fetch_array($result);
```

```
    if($row['user_type'] == 'admin'){
```

```
        $_SESSION['admin_name'] = $row['name'];  
        header('location:admin_page.php');
```

```
    }elseif($row['user_type'] == 'user'){
```

```
        $_SESSION['user_name'] = $row['name'];  
        header('location:user_page.php');
```

```
    }
```

```
    }else{
```

```
        $error[] = 'incorrect email or password!';
```

```
    }
```

```
};
```

```
?>
```

```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
<head>
```

```
    <meta charset="UTF-8">
```

```
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
```

```
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
```

```
    <title>Login form</title>
```

```
    <!-- custom css file link -->
```

```
    <link rel="stylesheet" href="css/style.css">
```

```

</head>
<body>
<div class="form-container">
  <form action="" method="post">
    <h3>Login</h3>
    <?php
    if(isset($error)){
      foreach($error as $error){
        echo '<span class="error-msg">'.$error.'</span>';
      };
    };
    ?>
    <input type="email" name="email" required placeholder="enter your email">
    <input type="password" name="password" required placeholder="enter your
password">
    <input type="submit" name="submit" value="login now" class="form-btn">
    <p>Don't have an account? <a href="register_form.php">REGISTER
NOW</a></p>
  </form>

</div>

</body>
</html>

```

Config

```

<?php

$conn = mysqli_connect('localhost','root','','user_db');

?>

```

Logout

```

<?php

@include 'config.php';

session_start();

```

```
session_unset();
session_destroy();

header('location:login_form.php');

?>
```

Style

```
@import
url('https://fonts.googleapis.com/css2?family=Poppins:wght@100;200;300;400;500;600&display=swap');

*{
  font-family: 'Berlin sans BF';
  margin:0; padding:0;
  box-sizing: border-box;
  outline: none; border:none;
  text-decoration: none;
}

.container{
  min-height: 100vh;
  display: flex;
  align-items: center;
  justify-content: center;
  padding:20px;
  padding-bottom: 60px;
}

.container .content{
  text-align: center;
}

.container .content h3{
  font-size: 40px;
  color:rgb(51, 51, 51);
}

.container .content h3 span{
```

```

background: rgb(184, 154, 46);
color:#fff;
border-radius: 5px;
padding:0 15px;
}

.container .content h1{
  font-size: 50px;
  color:rgb(51, 51, 51);
}

.container .content h1 span{
  color:rgb(33, 41, 203);
}

.container .content p{
  font-size: 30px;
  margin-bottom: 20px;
}

.container .content .btn{
  display: inline-block;
  padding:10px 30px;
  font-size: 30px;
  background: rgb(223, 38, 109);
  color:white;
  margin:0 5px;
  text-transform: capitalize;
}

.container .content .btn:hover{
  background: rgb(97, 198, 94);
}

.form-container{
  min-height: 100vh;
  display: flex;
  align-items: center;
  justify-content: center;
  padding:20px;

```

```

padding-bottom: 60px;
background: #eee;
}

.form-container form{
padding:20px;
border-radius: 5px;
box-shadow: 0 5px 10px rgba(16, 98, 156, 0.1);
background:linear-gradient(skyblue,lightgreen);
text-align: center;
width: 500px;
}

.form-container form h3{
font-size: 30px;
text-transform: uppercase;
margin-bottom: 10px;
color:#333;
}

.form-container form input,
.form-container form select{
width: 100%;
padding:10px 15px;
font-size: 17px;
margin:8px 0;
background: #eee;
border-radius: 5px;
}

.form-container form select option{
background: #fff;
}

.form-container form .form-btn{
background: #dcb342;
color:white;
text-transform: capitalize;
font-size: 20px;
cursor: pointer;
}

```

```

}

.form-container form .form-btn:hover{
  background: rgb(20, 190, 220);
  color:#fff;
}

.form-container form p{
  margin-top: 10px;
  font-size: 20px;
  color:rgb(234, 15, 26);
  font-weight: bold;
}

.form-container form p a{
  color:rgb(8, 4, 11);
}

.form-container form .error-msg{
  margin:10px 0;
  display: block;
  background: crimson;
  color:#fff;
  border-radius: 5px;
  font-size: 20px;
  padding:10px;
}

```


localhost/project/login_form.php

Inbox (607) - 19120... (PDF) Speech Reco...

LOGIN

enter your email

enter your password

Login Now

Don't have an account? REGISTER NOW

localhost/project/register_form.php

Inbox (607) - 19120... (PDF) Speech Reco...

REGISTER

enter your name

enter your email

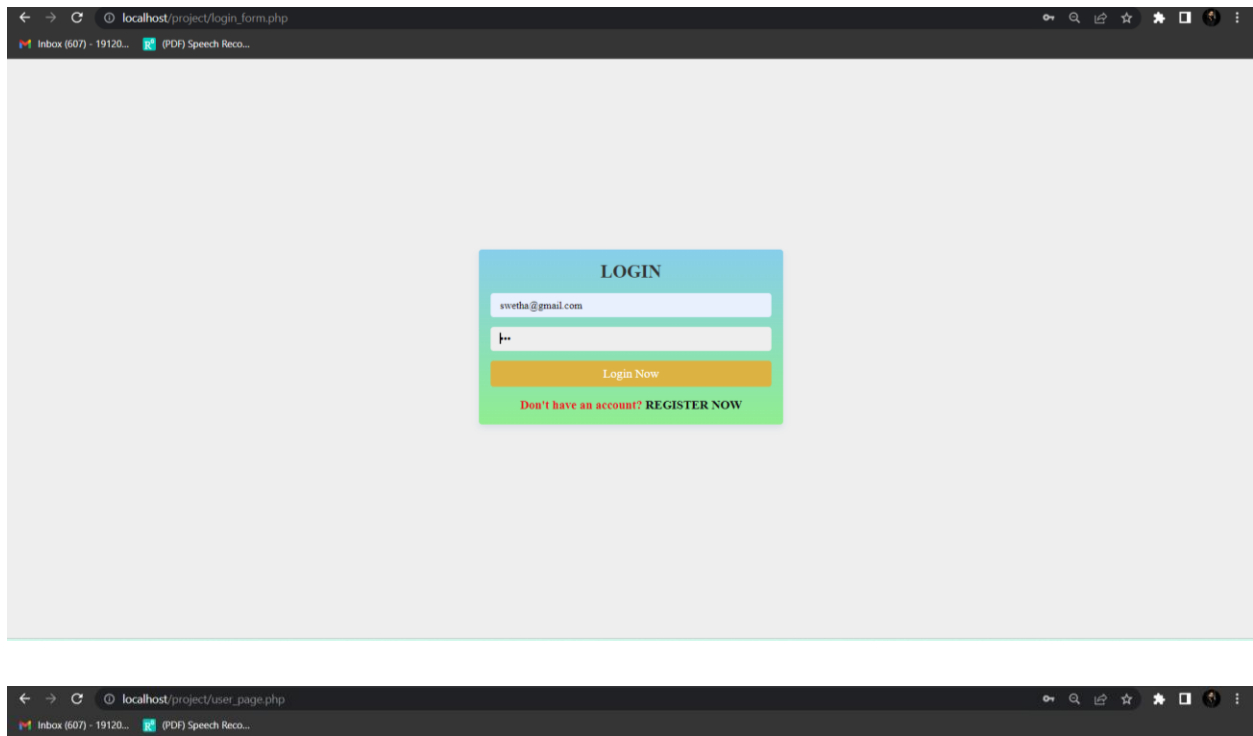
enter your password

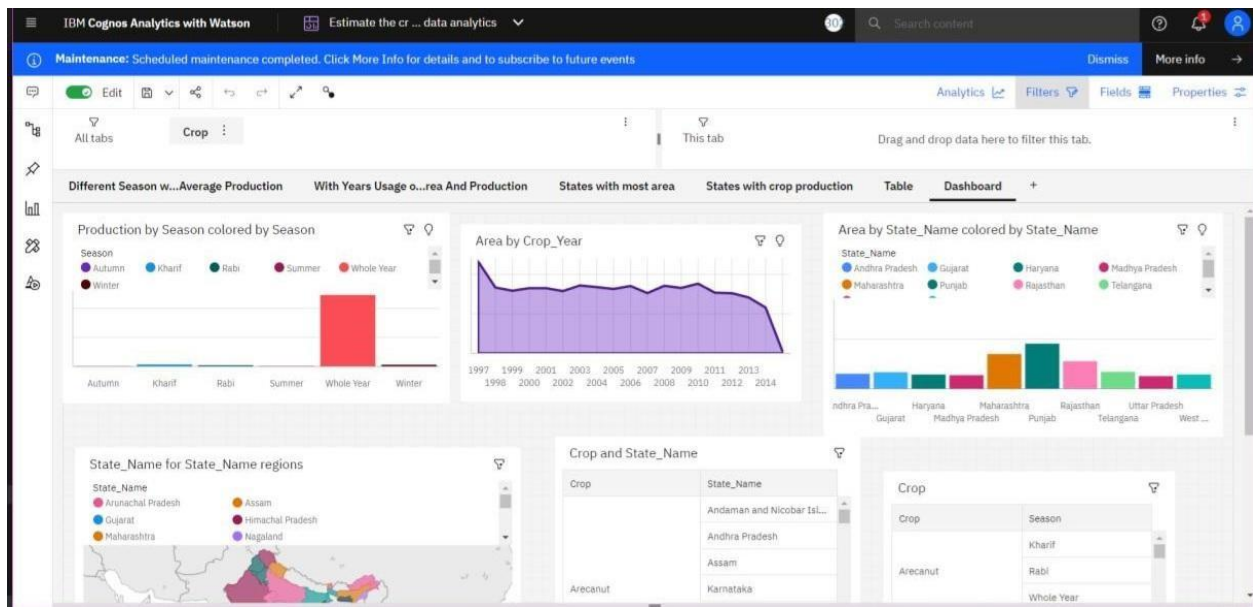
confirm your password

User

Register Now

Already have an account? LOGIN NOW

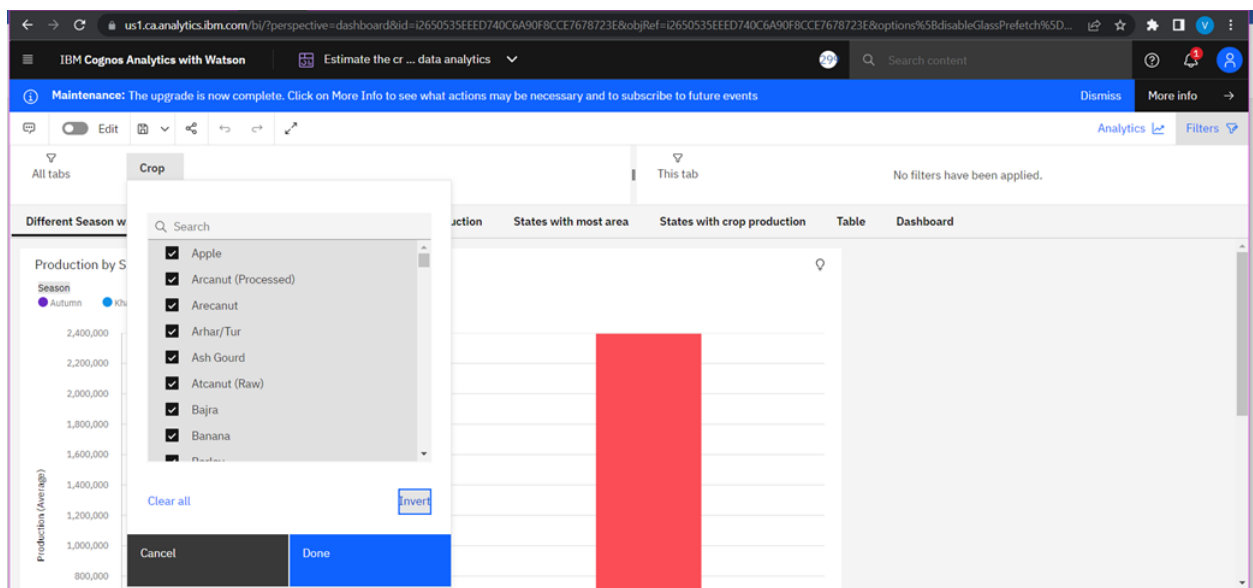




7.2 Feature 2

DATA FILTERS:

The filters used for classifying different parameters of the dataset can be efficiently done using the Cognos tool. The particular state with the specific crop can be visualized.



8. TESTING

8.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Result	Status
Home Page _ TC_OO1	Functional	Homepage	Verify the user is able to see the Login/Sign up popup when the user clicked on Login Button in the Homepage	1. Enter URL and click go 2. Click on Login Button 3. Verify login/Sign up popup is displayed or not	Login page should pop up as soon as the Login button is clicked.	Pass
The Login page _ TC_OO2	U1	Login Page	Verify the UI elements in the Login/Sign up popup	1. Enter URL and click go 2. Click on login button 3. Verify login/Sign up popup with below UI elements: a.email text box b.password text	Application should show below UI elements: a.login with Twitter & Facebook b.password text box c.Login button with	Fail

				box c. Login button d.New customer ? Create account link e.Last password ? Recovery password link	orange color d.Last password ? Recovery password link	
Login Page_ TC_OO3	Functional	Dashboard Page	Verify the user is able to log into the application with Valid credentials	1. Enter URL(log in.html) and click go 2.ClicK on My Account dropdow n button 3. Enter a Valid username /email in Email text box 4.Enter valid password in password text box 5.Click on login	User should navigate to user account homepag e	Pass

				button		
Login page_ TC_004	Functional	Dashboard Page	Verify user is able to view the dashboard and see the charts	1.Enter URL 2.Click on the different charts that the user wants 3.The embedde d link will be able to display the charts from cognos	Applicati on should show the expected charts from cognos	Pass

8.2. USER ACCEPTANCE TESTING

(I) PURPOSE OF DOCUMENT

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

Section	Total Cases	Not Tested	Fail	Pass

Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	3	0	0	3

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	19
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	18	35
Not Reproduce d	1	0	0	0	1
Skipped	0	0	1	1	2

Won't Fix	0	0	2	1	3
Totals	25	9	12	24	70


(II)TEST CASE ANALYSIS

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

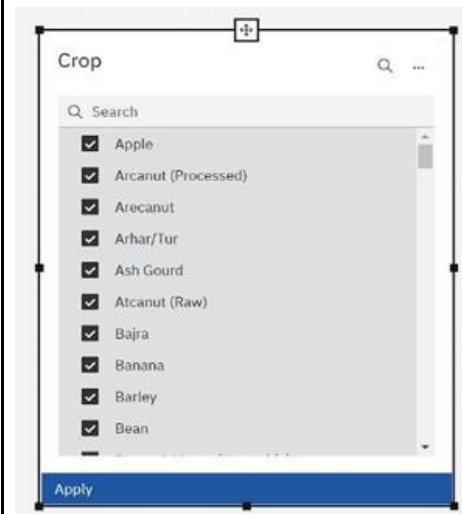
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	5	0	0	4
Version Control	2	0	0	2

9. RESULTS

9.1 Performance Metrics

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	<p>No of Visualizations - 8</p>  <p>The screenshot shows a dashboard with the title 'Crop'. It features a sidebar with filters for 'Crop' (Wheat, Rice, Maize, etc.), 'State' (Andhra Pradesh, Karnataka, etc.), and 'Year' (2018, 2019, etc.). The main area contains several visualizations: a map of India showing crop production by state, a bar chart titled 'Production by State (increased by State)', a line chart titled 'Production by Crop (Year)', and a table titled 'State Name and Crop'. The table lists states and their corresponding crops, such as Andhra Pradesh (Wheat, Rice, Maize) and Karnataka (Wheat, Rice, Maize).</p>
2.	Data Responsiveness	Faster
3.	Amount Data to Rendered (DB2 Metrics)	<p>Data's Rendered:</p> <ul style="list-style-type: none"> 2,46,091 – Records 7 - Fields

4.	Utilization of Data Filters	Yes, Utilized
5.	Effective User Story	No. of Scene Added - 9
6.	Descriptive Reports	No. of Visualizations / Graphs - 7



10.ADVANTAGES & DISADVANTAGES

Advantages:

- Our goal is push for assisting farmers, government using our predictions. All these publications state they have done better than their competitors but there is no article or public mention of their work being used practically to assist the farmers. If there are some genuine problems in rolling out that work to next stage, then identify those problems and try solving them.
- It is targeted to those farmers who wish to professionally manage their farm by planning, monitoring and analyzing all farming activities.
- Achieving the maximum crop at minimum yield is the ultimate Aim of the project.
- Early detection of problems and management of that problems can help the farmers for better crop yield.
- For the better understanding of the crop yield, we need to study of the huge data with the help of machine learning algorithm so it will give the accurate yield for that crop and suggest the farmer for a better crop.

Disadvantages:

- The obtained result for the crop yield prediction using SMO classifier gives less accuracy when compared to naïve Bayes, multilayer perceptron and Bayesian network.
- Previously yield is predicted on the bases of the farmers prior experience but now weather conditions may change drastically so they cannot guess the yield.

11.CONCLUSION

The examining process begun from dossier cleansing and transform, missing worth, preliminary reasoning and ultimately model construction and judgment. Finally,we conclude the crop utilizing machine learning treasure accompanying various results. This produces few of the following visions about crop forecasting. As maximum types of crops will be concealed under this system, rancher grant permission convene about the crop that grant permission never have happened refined and lists out all likely crops, it helps the grower in decision making of that crop to nurture. Also, this whole takes into concern ancient times result of dossier that will help the farmer catch awareness into the demand and the cost of differing crops in advertise.

12.FUTURE SCOPE

- Remaining SMLT algorithms will be include to verdict high-quality veracity accompanying administering to call the crop yield and cost.
- Agricultural area wants to mechanize the detecting the yield crops from fitness process (actual time for action or event).
- To mechanize this process by show the prophecy result in netting use or producing publications with computer software request.
- To optimize the work to implement in Artificial Intelligence environment.

13.APPENDIX

Source Code:

Dashboard.html

```
<!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
  <meta charset="utf-8">
  <link rel="stylesheet" href="stylee.css">
  <title>Crop Production Analysis</title>
</head>
<body>
  <h1>Estimation of Crop yeild analysis of India</h1>
  <br /><br />
  <div class=fr>
    <iframe
      src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&id=i2650535E
      EED740C6A90F8CCE7678723E&objRef=i2650535EEED740C6A90F8CCE767
      8723E&options%5BdisableGlassPrefetch%5D=true&options%5Bcollections%5D
      %5BcanvasExtension%5D%5Bid%5D=com.ibm.bi.dashboard.canvasExtension&
      options%5Bcollections%5D%5BfeatureExtension%5D%5Bid%5D=com.ibm.bi.d
      ashboard.core-
      features&options%5Bcollections%5D%5Bbuttons%5D%5Bid%5D=com.ibm.bi.d
      ashboard.buttons&options%5Bcollections%5D%5Bwidget%5D%5Bid%5D=com.
      ibm.bi.dashboard.widgets&options%5Bcollections%5D%5BcontentFeatureExten
      sion%5D%5Bid%5D=com.ibm.bi.dashboard.content-
      features&options%5Bcollections%5D%5BsaveServices%5D%5Bid%5D=com.ib
      m.bi.dashboard.saveServices&options%5Bcollections%5D%5Btemplates%5D%5
      Bid%5D=com.ibm.bi.dashboard.templates&options%5Bcollections%5D%5Bvisu
      alizationExtension%5D%5Bid%5D=com.ibm.bi.dashboard.visualizationExtensio
```

nCA&options%5Bcollections%5D%5BboardModel%5D%5Bid%5D=com.ibm.bi
.dashboard.boardModelExtension&options%5Bcollections%5D%5BcontentTypes
%5D%5Bid%5D=com.ibm.bi.dashboard.contentTypes&options%5Bcollections%
5D%5BserviceExtension%5D%5Bid%5D=com.ibm.bi.dashboard.serviceExtensio
n&options%5Bcollections%5D%5BlayoutExtension%5D%5Bid%5D=com.ibm.b
i.dashboard.layoutExtension&options%5Bcollections%5D%5BcolorSetExtension
s%5D%5Bid%5D=com.ibm.bi.dashboard.colorSetExtensions&options%5Bconfig
%5D%5Bproduct%5D=CA&options%5Bconfig%5D%5BeditPropertiesLabel%5
D=true&options%5Bconfig%5D%5BenableCustomVisualizations%5D=true&opt
ions%5Bconfig%5D%5BassetTags%5D%5B%5D=dashboard&options%5Bconfi
g%5D%5BfilterDock%5D=true&options%5Bconfig%5D%5BshowMembers%5
D=true&options%5Bconfig%5D%5Bupgrades%5D=dashboard-
core%2Fjs%2Fdashboard%2Fupgrades&options%5Bconfig%5D%5BassetType%
5D=exploration&options%5Bconfig%5D%5BgeoService%5D=CA&options%5B
config%5D%5BsmartTitle%5D=true&options%5Bconfig%5D%5BnavigationGro
upAction%5D=true&options%5Bconfig%5D%5BenableDataQuality%5D=false&
options%5Bconfig%5D%5BmemberCalculation%5D=false&isAuthoringMode=f
alse&boardId=i2650535EEED740C6A90F8CCE7678723E"

width="100%"

height="100%"

scrolling="auto"></iframe>

</div>

</body>

</html>

styles.css

@import

url('https://fonts.googleapis.com/css2?family=Poppins:wght@400;500;600;700&
display=swap');

```
body{

    background-color:#5F7A61;

    width: 100%;

    height: 100%

}

h1{
color: white;
align-items: center;
align-content: center;
text-align: center;
padding-top: 30px;
font-family: 'Cinzel';
}

.fr{

    background-color: #ffffff;

    width: 90%;

    height: 80%;

    position: absolute;

    margin-left: 50px;

    margin-right: 50px;

    margin-bottom:50px;

    padding: 20px 20px 20px 20px;
```

```
border-radius: 20px;
box-shadow: 0 20px 40px rgba(38, 33, 61, 0.2);
}

#f1{

width: 100%;

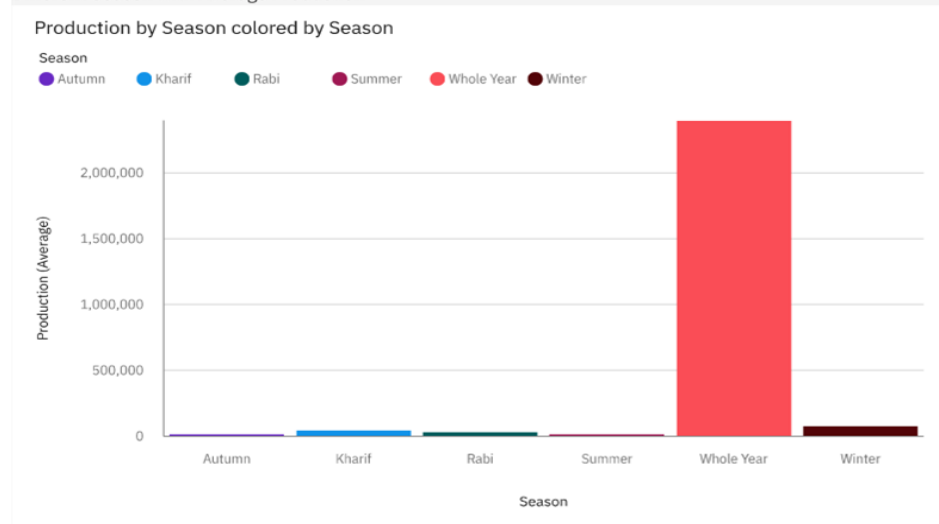
height: 100%;

position: relative;

}
```

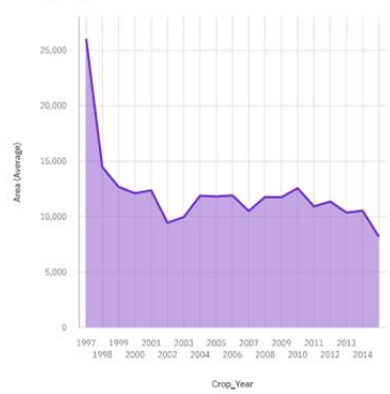
Data Visualization Charts

Different Season with Average Production

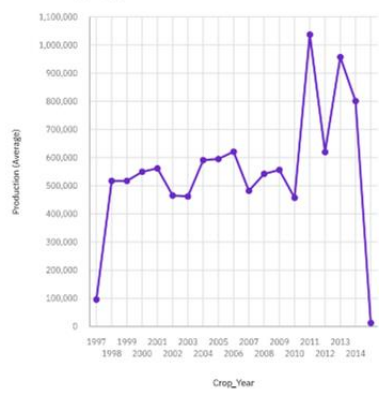


Vith Years Usage of Area And Production

Area by Crop_Year

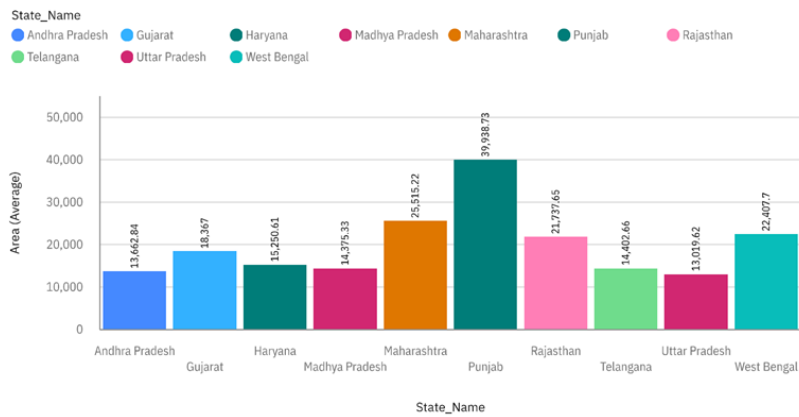


Production by Crop_Year



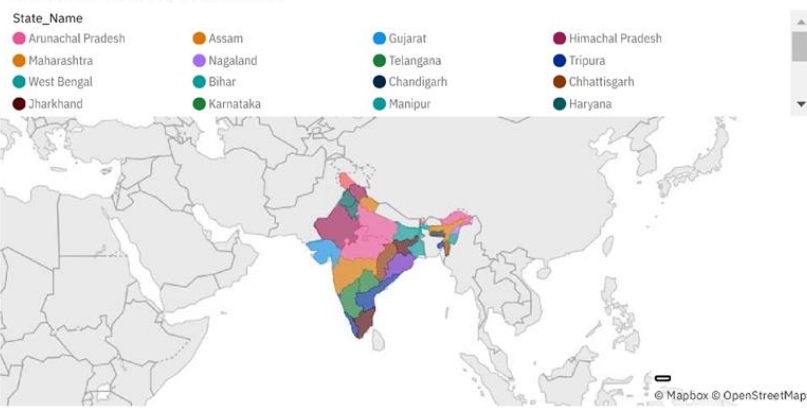
Top 10 States with most area

Area by State_Name colored by State_Name



States with crop production

State_Name for State_Name regions



Table

Crop	State_Name
Apple	Tamil Nadu
Arcanut (Processed)	Karnataka
Areca nut	Andaman and Nicobar Islands
	Andhra Pradesh
	Assam
	Goa
	Karnataka
	Kerala
	Meghalaya
	Puducherry
	Tamil Nadu
	West Bengal
	Andaman and Nicobar Islands

Crop	Season
Apple	Whole Year
Arcanut (Processed)	Whole Year
Areca nut	Kharif
	Rabi
	Whole Year
Arhar/Tur	Autumn
	Kharif
	Rabi
	Summer
	Whole Year
	Winter

Dashboard

