Estimate the Crop Yield using Data Analytics

TEAM ID:PNT2022TMID03196

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1. ABSTRACT

Analytics is the understanding of data patterns to support performance enhancement and decision-making. Agriculture In order to analyse certain key visualisations and create a dashboard, data analytics in agricultural yield is helpful. By looking at these, we may learn the majority of the insights about crop output in India. We can comprehend the data in our organisation and make wise decisions by integrating reporting, modelling, analysis, exploration, dashboards, stories, and event management with IBM Cognos Analytics. By presenting critical insights and analyses about our data on one or more pages or screens, a dashboard enables us to keep track of events or actions at a glance. In this project, we use a dashboard to view, analyse, and extract the majority of the findings.

2. INTRODUCTION

Agriculture is the cornerstone of the Indian economy. The majority of Indian farmers are not harvesting the expected amount of crops for various reasons. Weather has a great impact on agricultural yields. Precipitation also affects rice production. Farmers in these situations inevitably need immediate support in predicting future crop productivity and need to perform analytics to help farmers maximize crop yields for their crops. Yield forecasting is an important topic in agriculture. Every farmer wants to know what yields they can expect. Previously, a farmer's experience with a particular crop was taken into account when predicting yield. The amount of data in Indian agriculture is enormous. Once data is transformed into information, it can be used for a variety of purposes. A comprehensive web-based business intelligence package from IBM is called Cognos Business Intelligence. Provides various tools for analysis, scorecards, reports, and event and data tracking. The software consists of many parts designed to meet the various information needs of an organization. Examples: IBM Cognos Framework Manager, IBM CognosCube Designer and IBM Cognos Transformer are all part of IBM Cognos. Cognos Analysis Studio enables business users to quickly get answers to their business-related questions.

You may design pixel-perfect reports for your company using reporting studio.

3. LITERATURE SURVEY

Today, we face a great need for a new green revolution to meet the food needs of our growing population. With dwindling arable land available globally and dwindling arable water resources, it is almost impossible to report higher yields. It is an approach believed to play an important role and positive impact on increasing crop yields by creating optimal conditions and reducing yield gaps, crop damage and waste. To this end, the current work provides an overview of various advances, design models, software tools and algorithms applied to forecast evaluation and crop yield estimation. India is essentially an agriculture-based country with approximately 70% of the national economy directly or indirectly related to agricultural crops. The major crop, accounting for the highest proportion (60-70%) of arable land on Indian soils, is rice, especially in central and southern India. Rice cultivation plays an important role in India's food security, contributing more than 40% of he total yield. Yield increases in rice cultivation are highly dependent on water availability and climatic conditions. For example, low rainfall and extreme temperatures can significantly reduce rice yields. Developing better strategies for predicting yield efficiency in different climatic conditions will help us understand the role of various key factors influencing rice yield. Big data analysis methods for forecasting and estimating rice yield should help farmers understand the optimal state of the essential elements of rice yield and achieve higher yields.

a. Crop Yield Prediction Using Machine Learning

A research group investigated the utilization of various information mining methods which will foresee rice crop yield for the data collected from the state of Maharashtra, India. A total of 27 regions of Maharashtra were selected for the assessment and the data was collected related to the principle rice crop yield influencing parameters such as different atmospheric conditions and various harvest parameters i.e Precipitation rate, minimum, average, maximum and most extreme temperature, reference trim cultivable area, evapotranspiration, and yield for the season between June to November referred as Kharif, for the years 1998 to 2002 from the open source, Indian Administration records. WEKA a Java based dialect programming for less challenging assistance with information data sets, assigning design outcomes tool was applied for dataset processing and the overall methodology of the study includes, (1) pre-processing of dataset (2) Building the prediction model utilizing WEKA and (3) Analyzing the outcomes. Cross validation study is carried out to scrutinize how a predictable information mining method will execute on an ambiguous dataset. Study applied 10-fold higher cross validation study design to assess the data subsets for screening and testing. The information identified and collected was randomly distributed into 10 sections, one data section was used for testing and all other data sections were used for preparatory information. The study reports that the method used helps in accurately estimating rice yields in Maharashtra, India. Accurately quantifying rice productivity under different climatic conditions helps farmers understand the optimal conditions for increasing rice yields.

Agriculture is one of the most important sources of income and livelihood in India. A variety of seasonal, economic and biological factors affect crop production, but unpredictable changes in these factors cause great losses to farmers. These risks can be measured when appropriate mathematical and statistical model design is applied to soil, weather and yield data. With the advent of data mining, harvest yields can be predicted by deriving useful insights from this agricultural data. This helps farmers decide which crops they want to plant next year and bring in the most profit. There are various systems that use various data mining technologies to manipulate data and generate insights to help farmers make decisions. Data mining systems and algorithms in use today focused on crops and predicted or predicted arbitrary parameters such as yield and price. The study provides an overview of different algorithms used for crop yield prediction. This is a study used to predict yields and prices of major crops in Tamil Nadu based on historical data. Farmers can access data and projected yields through a web application. This helps farmers decide which crops they want to grow next year. Additionally, the web application provides a forum for farmers to sell their products without middlemen, helping farmers get the maximum price for their products.

b. Crop Yield Prediction Using Data Mining Techniques

India is a country where agriculture and agricultural industry are the main resources of the economy. She is also one of the countries that has been hit by large-scale natural disasters such as droughts and floods, which have damaged crops, caused huge economic losses to farmers, and brought economic stability to the country. Pre-harvest forecasting of yields helps farmers and government agencies make appropriate plans for storage, marketing, lowest support prices, imports and exports, and more. Predicting yield in advance requires systematic investigation of large amounts of data from different variables such as soil quality, pH, and amounts of essential elements (N, P, K). Since crop forecasting deals with large databases, this forecasting system is a perfect candidate to apply data mining techniques and is very useful in gaining knowledge to achieve higher yields. The success of crop yield prediction systems is highly dependent on how accurately traits are extracted and how well classifiers are used. This study summarizes the results of different algorithms used for crop yield prediction by different authors, along with their accuracy and recommendations.

Weeds and pests were the major crop damaging biotic agents and the farmers are need to be well informed in accessing the various data mining technologies to acquire a knowledge on applications of effective weed and pest control strategies and managing techniques to reduce crop damage. Collection of data related to the various weeds and pest, modeling of the data to prepare for the mining, selection of appropriate methodology, interpretation and sharing the information become the major challenges in weed and pest control to protect the crop damage. A study was conducted to evaluate the major challenges and noteworthy opportunities and applications of of Big Data in controlling the weed and pest damage and hence to achieve higher crop yield. Study reported that the form of the data collected, type of the assessment method and tools applied are the major influencing factors in understanding the role of crop damaging agents such as weed and pest, which provides the knowledge on using improved crop management strategies and crop yield prediction. Big Data cargo space and questioning incurs intense challenges, in respect to allocate the data across numerous technologies, and also continuously evolving data from diverse sources. Semantic techniques play an important role in the evaluation when the selected data comes from various sources. This pre-identifies factors that hold potential agricultural significance and builds relationships between data elements in terms of meaning and entities. This study presents a Dutch success story that used information from big data analysis using numerical algorithms to control crop damage and reported higher yields. This study concluded that the benefits and applications of big data analytics for weed and pest control are enormous, especially for invasive, parasitic and herbicide-tolerant weeds. also introduced the need to work with data scientists to implement methods that benefit agricultural practices.

Data mining plays a central role in decision-making on a variety of issues related to agricultural practices. The goal of data mining techniques is to extract knowledge from accessible datasets and transform it into an understandable format for critical applications in agricultural processes. Climate can have a significant impact on crop productivity, so crop management in a particular agricultural area depends on the local climatic conditions. Real-time weather data can help achieve better crop management. By effectively utilizing the obtained agricultural information and communication know-how, it is possible to automate the search for useful data for acquiring knowledge. This could make it easier to collect data directly from electronic sources and transfer it to secure electronic systems.

Document and reduce manual tasks. Automation strategies reduce overall production costs, thus improving crop yields and market prices. We also mentioned how data mining can help us analyze and predict useful patterns from vast amounts of dynamically changing climate data. In the field of agricultural biotechnology, scientists and engineers work together to design fuzzy logic for optimizing crop yields, artificial neural networks in validation studies, genetic algorithm design to access model fit, and decision making. It supports vector machines for assessing trees, as well as soil, climatic conditions, and water resource availability related to crop growth and pest control in agriculture. This study summarizes the application of data mining techniques. H. Neural networks, support vector machines, big data analysis and soft computing in agricultural field evaluation based on weather conditions.

c. Crop yield prediction using Big Data Analytics

In India, crop yields are seasonal and primarily influenced by single crop biological and economic causes. Reporting on progressive agricultural yields in all seasons is a huge and useful task for any country in assessing forecasts and estimates of total yields. A common problem around the world today is that farmers are stressed to achieve higher yields due to the impact of unpredictable climate change and a drastic reduction in global water resources. A study was conducted to collect data on global climate change and available water resources. This can be used to facilitate advanced and new approaches such as big data analytics to obtain information on previous outcomes for crop yield forecasting and estimation. Research imports that crop yields can be increased and improved by selecting and using the most desirable crops according to current conditions.

The accurate prediction of crop yield certainly benefits the farmers in choosing the right method to reduce the crop damage and gets best prices for their crops. A research group conducted a work with an objective of accurate prediction of crop yield through big data analytics to assess various crop yield influencing factors such as Area under Cultivation (AUC) interims of hectors, Annual Rainfall (AR) rates and Food Price Index (FPI) and to develop relationship among these parameters. Regression Analysis (RA) methodology was applied to examine the selected factors and their impact on crop prediction and final yield. RA methodology is a multivariable investigation practice which can categorize the factors in to groups such as explanatory and response variables and helps to assess their interaction to obtain a resolution. All the selected factors of the present study design known as AR, AUC and FPI were measured for a period of 10 years between the years 1990-2000. A novel method called Linear Regression (LR) is applied to analyze the relationship between explanatory variables (AR, AUC, FPI) and the crop yield considered as response variable. Study reported that the R^2 value for the studied factors clearly indicate that crop yield is principally depends on AR. Study also reported that the other two factors (AUC and FPI) screened were also found to have significant impact after the AR. Study shall be continued to analyze the impact of for other substantial factors like Minimum Support Price (MSP), Cost Price Index (CPI), Wholesale Price Index (WPI) etc. and their relationship on the yields of different crops .

Crop yield gaps, measured as difference between expected yields based on the potency and actual farm yield received. In order to achieve the higher crop yield, farmers must need to tackle the influencing factors such as influence of change in climate conditions on the prospects of crop yields, and change in the usage of agricultural land to assess and ultimately reduce the crop yield gaps. Several researchers reported the applications of bio simulation models to estimate the crop yield gaps in the last decade. The impact of the crop yield gaps assessment studies conducted through bio simulation based methodologies were negatively influenced by quality and resolution of climate and soil data, as well as unscientifically expectations about crop yield prediction systems and crop yield assessment modeling designs calibration method. An explicit rationale model which can effectively applied at various levels of the availability of quality information for identifying data sources to analyze crop yield and measuring yield gaps at definite geographical locations and works based on the rise in titer approach. The model is highly helpful in retrieving the useful data from the available, poor quality, less rigorous data sources or if the data is not available. A case study was discussed on the application of selected model design to quantify the yield gaps of maize crop in the state of Nebraska (USA), and also at the different geographical locations representing the nations Argentina and Kenya at national scale level. Different geographical locations such as Nebraska (USA), Argentina and Kenya were identified to symbolize the distinct scenarios of Agri based data availability and the quality for the selected variables assessed to predict and estimate the crop yield gaps. The definitive aspiration of the planned method is to afford transparent, easily accessible, reproducible and technically sound and strong guidelines for predicting the yield gaps. The proposed guidelines were also relevant for understanding and to simulate the influence of change in climate conditions and usage of cultivable land changes from national to global scales. As indicated, the better understanding of data importance and usefulness for analyzing crop yield and estimating yield gaps as illustrated can help in identifying the data gaps in the crop yield and allow focusing on the various efforts taken at the global level to address the most critical issue .

Analyzing the yields of crop is necessary to update the policies to ensure food security. A research group conducted a study with the aim in suggesting a novel data mining method to predict the yields of crop depends on agricultural big data analytics methodologies, which were progressively contrast with conventional data mining methodologies in the process of handling data and modeling designs. Study suggested that the method employed should be user friendly, work based on progressive big-data responsive processing structure, supposed to utilize the existing agricultural based significant datasets and would still be used with the larger volumes of data growing at enormous rates. Nearest neighbors modeling is one such novel data mining technique which works on the results collected based on data processing structures form the farmers and suggest a well unbiased result on the base of accuracy and prediction time in advance. Study further discussed a case study on the assessment of actual crop dataset (numerical examples on) in China from 1995-2014. Study reported that the novel model employed has publicized an improved performance and was found to be progressive in reporting prediction accuracy percentage of the compared methodologies with conventional designs [7].

Simulation models based on field experiment are valuable technologies for studying and understanding crop yield gaps, but one of the critical challenge remain with these methods is scaling up of these approach to assess the data collated between different time intervals from the broader geographical regions. Satellite retrieved data have frequently been revealed to present data sets that, by itself or in grouping with other information and model designs, can precisely determine the yields of crop in agricultural lands. The yield maps developed shall provide an unique opportunity to overcome both spatial and temporal based scaling up challenges and thus improve the ideology of crop yield gaps prediction. A review was conducted to discuss the applications of remote sensing technology to determine the impact and causes of yield gaps. Even though the example discussed by the research group demonstrates the usefulness of remote sensing in the prediction of yield gaps, but also many areas of possible application with respect to the crop yield assessment, prediction and improvement remain unexplored. Study proposed two less complicated, easily assessable methods to determine and quantify the yield gaps between various agricultural fields. First method works closely with the constructive maps representing the average crop yields, it can be used directly to accesses specific crop yield influencing factors for further studies whereas the second method use the remote sensing technology to retrieve the data for providing the useful information regarding the crop yield prediction and estimation .

In coming decades, two most significant and important factors found to influence crop yield is, increase in the global population and economy, which greatly demands the higher and sustainable agricultural based crop yields. The capacities of food production at global level is going to be very limited due to the less availability of cultivable land, water resources, difficulties in maintaining the sustainable crop production levels, effects of changes in the global climatic conditions and also by various biophysical parameters which influence the crop yield. The farmers need to be educated on the application of scientifically proven methods to quantify the crop yield capacities and same need to be informed to higher authorities to maintain transparency in sharing the actual information, intern helps in making the policy based, research oriented, development and investment related decisions that aim to influence future crop yield. Crop production abilities and yield gaps can be assessed and measured by comparing the possible yields at normal conditions with respect to the crop production under, respectively, irrigated and rain fed conditions by keeping the crop yield levels limited by the less availability of the water as benchmarks. Yield gaps can be defined as the difference between the expected crop yields with respect to the actual crop yield and accurate, spatially unambiguous awareness and information about the yield gaps is necessary to achieve sustainable amplification of agricultural yields. Keeping an aim of discussing the impact of the various methods practiced in measuring the yield gaps with a spotlight on the local-to-global importance of outcomes, a research group carried out a survey on the various methods applied to estimate yield gaps. Study reported few standard operation methods, employed in quantifying the crop yield potential on the data collected from the farmers of western Kenya, Nebraska (USA) and Victoria (Australia). Study recommended for the use of accurate and recent yield data assessed through calibrated crop model designs and further up scaling validated methods in the prediction of crop yield gaps The bottom-up application of this global protocol allows verification of estimated yield gaps with on-farm data and experiments .

d. M. A. Jayaram and Netra Marad, "Fuzzy interference Systems for Crop Prediction", Journal of Intelligent Systems, 2012, 21(4), pp.363-372[1]. Prediction of crop yield is significant in order to accurately meet market requirements and proper administration of agricultural activities directed towards enhancement in yield. Several parameters such as weather, pests, biophysical and morphological features merit their consideration while determining the yield. However, these parameters are uncertain in their nature, thus making the determined amount of yield to be approximate. It is exactly here that the fuzzy logic comes into play. This paper elaborates an attempt to develop fuzzy inference systems for crop yield prediction. Physio morphological features of Sorghum were considered. A huge database (around 1000 records) of physio morphological features such as days of 50 percent? powering, dead heart percentage, plant height, panicle length, panicle weight and number of primaries and the corresponding yield were considered for the development of the model. In order to? nd out the sensitivity of parameters, one-to-one, two-to-one and three-to-one combinations of input and output were considered. The results have clearly shown that panicle length contributes forth yield as the lone parameter with almost one-to-one matching between predicted yield and actual value while panicle length and panicle weight in combination seemed to play a decisive role in contributing for the yield with the prediction accuracy rejected by very low RMS value.

P. Vindya "Agricultural Analysis for Next Generation High Tech Farming in Data Mining" , Anna University, Trichy, Tamil Nādu, India, 5 May 2015. Recent developments in Information Technology for agriculture field have become an interesting research area to predict the crop yield.

4. IDEATION AND PROPOSED SOLUTION

System design is defined as the application of system theory in the creation of projects. A system design defines the architecture, data flows, use cases, classes, flows, and activity diagrams of a project's development.

IBM Cognos Analytics

A **suite** of business intelligence tools called IBM Cognos Analytics is offered both **on-premises** and in the cloud. **It focuses** on descriptive **analytics using** dashboards, expert **reports,** and self-service data exploration to help users understand the information in **their** data. In this study, we **used IBM Cognos Data Analytics to analyze** yield **data.**

Following are important features of IBM Cognos:

1. Get Connected - Connect your data effortlessly Import data from CSV files and spreadsheets. Connect to cloud or on-premises data sources, including SQL databases, Google BigQuery, Amazon, Redshift, and more.
2. Prepare your data – Prepare and connect data automatically Save time cleaning your data with AI-assisted data preparation. Clean and prep data from multiple sources,

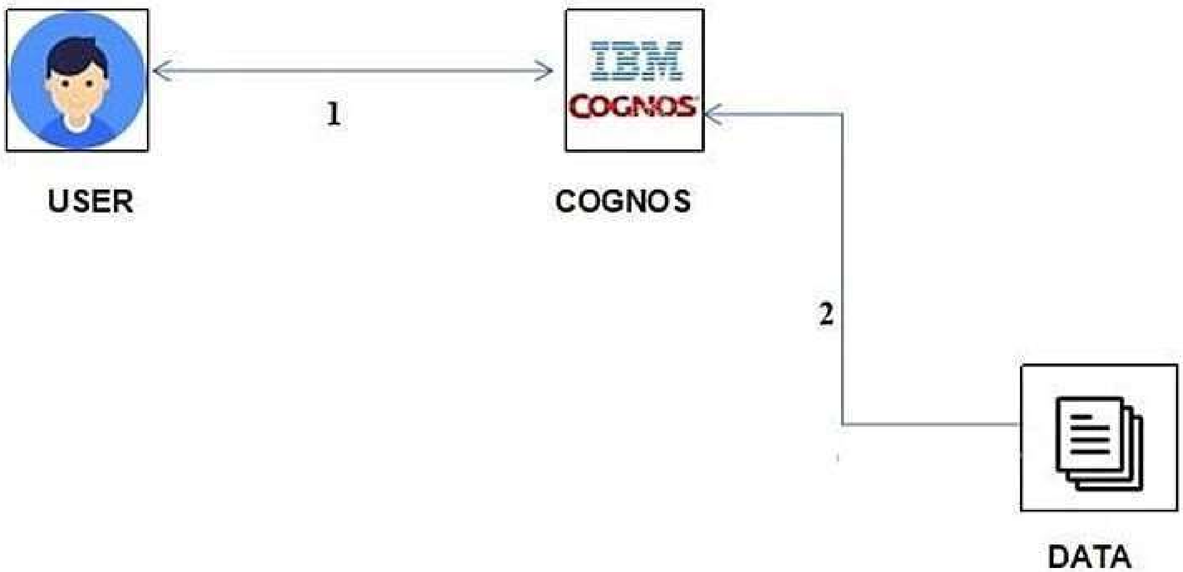
add calculated fields, join data, and create new tables.

3. Build visualizations - Create dynamic dashboards easily Quickly create compelling, interactive dashboards. Drag and drop data to create auto- generated visualizations, drill down for more detail, and share using email or Slack.
4. Identify Patterns – Uncover hidden patterns Ask the AI assistant a question in plain language, and see the answer in visualization. Use time series modelling to predict seasonal trends.
5. Generate Personalised Reports – Create and deliver personalized reports Keep your stakeholders up-to-date, automatically. Create and share dynamic personalized, multi-page reports in the formats your stakeholders want.
6. Gain Insights - Make confident data decisions Get deeper insights without a data science background. Validate what you know, identify what you don't with statistically accurate time-series forecasting and pinpoint patterns to consider.
7. Stay Connected – Go Mobile Stay connected on the go with the new mobile app. Access data and get alerts right from your phone.

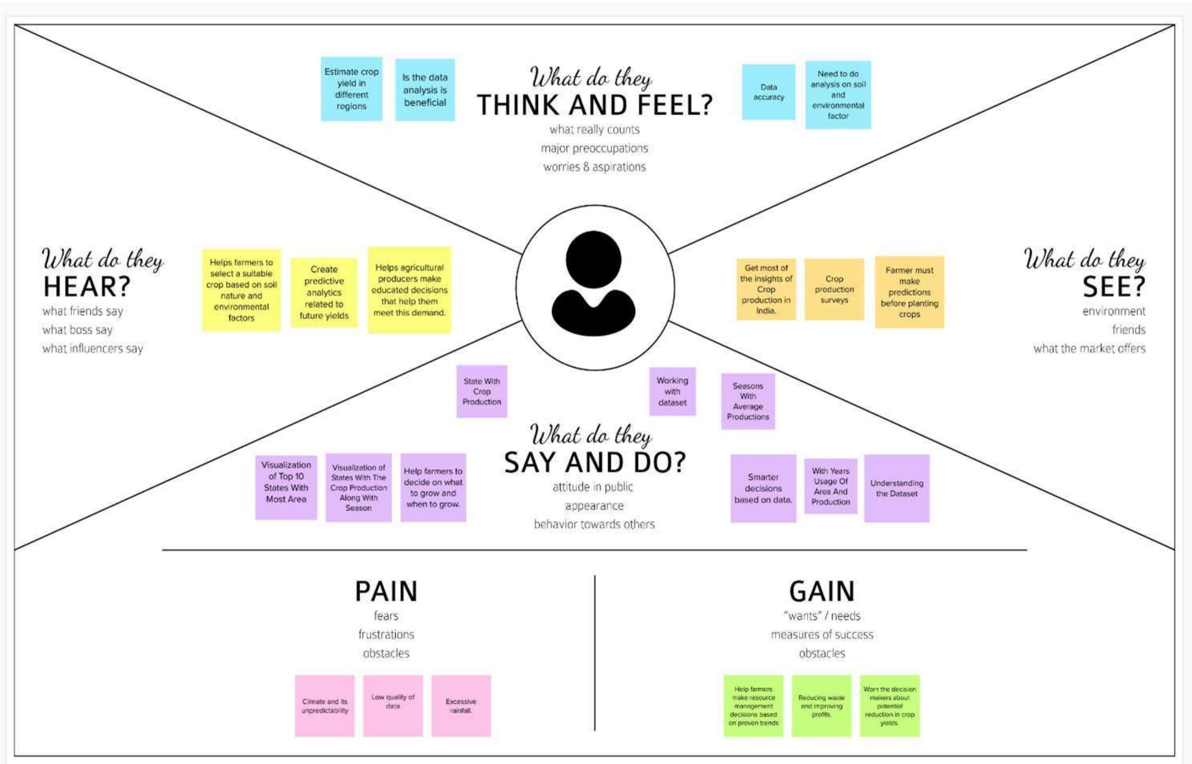
B. System Architecture

India is one of the top countries in agricultural production and therefore one of the most important sources of income. As part of this project, we will analyze some key visualizations and create dashboards, then use this information to understand the majority of crop yields in India.

Technical Architecture:



EMPATHY MAP



Estimate crop yield in different regions
Is the data analysis is beneficial
What do they
THINK AND FEEL?
what really counts
major preoccupations
worries & aspirations
Data accuracy
Need to do analysis on soil and environmental factor
What do they
HEAR?
what friends say
what boss say
what influencers say
Helps farmers to select a suitable crop based on soil nature and environmental factors
Create predictive analytics related to future yields
Helps agricultural producers make educated decisions that help them meet this demand.
Get most of the insights of Crop production in India.
Crop production surveys
Farmer must make predictions before planting crops
What do they
SEE?
environment
friends
what the market offers
State With Crop Production
Working with dataset
Seasons With Average Productions
What do they
SAY AND DO?
attitude in public
appearance
behavior towards others
Visualization of Top 10 States With Most Area
Visualization of States With The Crop Production Along With Season
Help farmers to decide on what to grow and when to grow.
Smarter decisions based on data.
With Years Usage Of Area And Production
Understanding the Dataset
PAIN
fears
frustrations
obstacles
Climate and its unpredictability
Low quality of data
Excessive rainfall.
GAIN
"wants" / needs
measures of success
obstacles
Help farmers make resource management decisions based on proven trends
Reducing waste and improving profits.
Warn the decision makers about potential reduction in crop yields

5 . REQUIREMENT ANALYSIS

IBM Cognos Analytics

A collection of business intelligence tools called IBM Cognos Analytics is offered both onpremises and in the cloud. The main emphasis is on descriptive analytics, which uses dashboards, expert reporting, and self-service data exploration to help users understand the information in your data. In this study, we analysed the crop yield data using IBM cognos data analytics.

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IBM® Cognos® Analytics integrates reporting, modeling, analysis, dashboards, stories, and event management so that you can understand your organization data, and make effective business decisions.

After the software is installed and configured, administrators set up security and manage data sources. You can get started yourself by uploading local files and applying visualizations in dashboards or stories. For enterprise-level data, modelers are next in the workflow. After data modules and packages are available, report authors can then create reports for business users and analysts. Administrators maintain the system on an ongoing basis.

Whether you're an analyst, report author, data modeler, or an administrator, you start by signing in to the Welcome portal from your desktop or mobile device. There are coach marks in the user interface to help you discover what's where.

6. PROJECT DESIGN

PROJECT FLOW

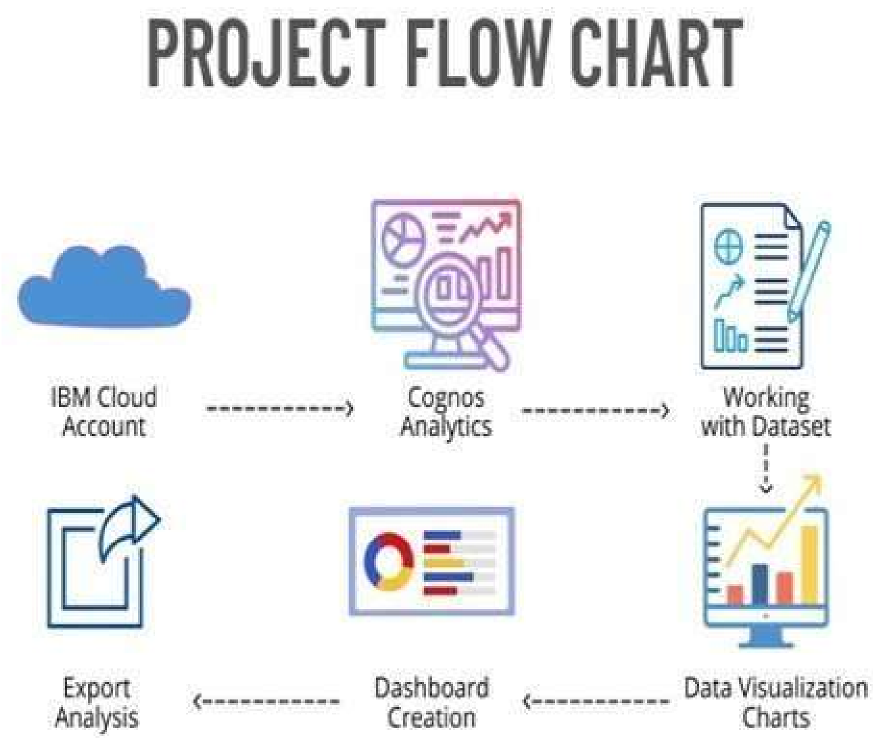
1. Users create multiple analysis graphs/charts.
2. Using the analyzed chart creation of the Dashboard is done.
3. Saving and Visualizing the final dashboard in the IBM Cognos Analytics.
4. To accomplish this, we have to complete all the activities and tasks listed below
5. IBM Cloud Account
6. Login to Cognos Analytics
7. Working with the Dataset
8. Understand the Dataset
9. Loading the Dataset
10. Data visualization charts
11. Seasons with average productions
12. With years usage of Area and Production
13. Top 10 States with most area

14. State with crop production

15. States with the crop production along with season (Text Table)

16. Dashboard Creation

17. Export the Analytics



SOLUTION REQUIREMENTS

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Sub-Task)
1	**User Registration**	Registration through Whatsapp Registration through Gmail Registration through Mail Registration through Agri-Consultancy modes.
2	**User Confirmation**	Confirmation via Email Confirmation via OTP through SMS. Confirmation via physical Letter.
3	**User Profile**	User Details Farm Details

4	**Required Data**	The past crop yield data and data of the Farmer to analyze their yield.
5	**Analysis**	Clean , Analyze the data by means of set of past data of the multiple users which is farmers.
6	**Estimation**	Creating the perfect data module, visuals using IBM Cognos to increase the estimation of the crop yield

Non **Functional Requirements:**

FR No.	**Non-Functional Requirement**	**Description**
1	**Usability**	The data report is created according to the past data yield. By considering these recommendation the sowing of crops will be decided.
2	**Security**	IBM Cognos have a high-secure user information.
3	**Reliability**	The interactive data visuals of the dashboard can make easy to understand by the farmers.

6. PROJECT PLANNING AND SCHEDULING

SPRINT PLANNING AND ESTIMATION

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

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

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

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

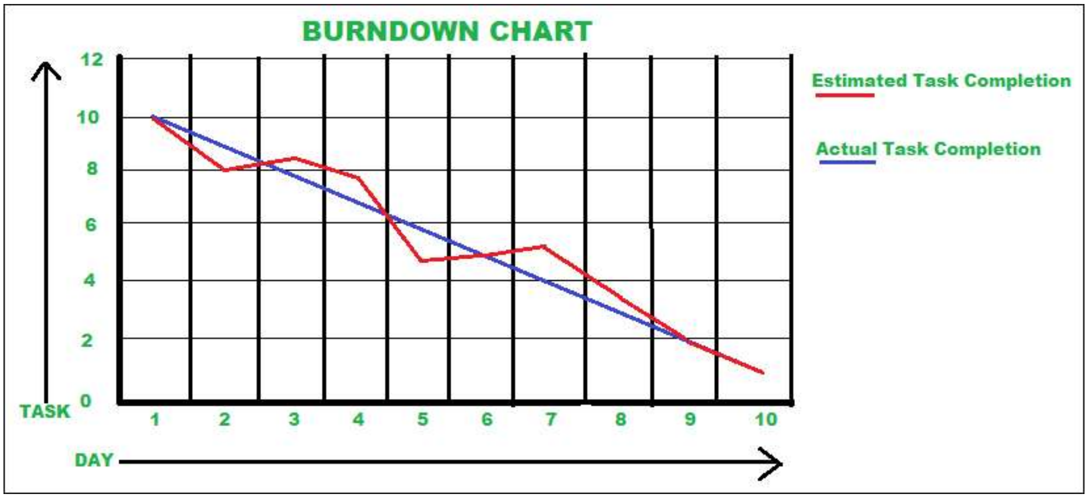
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as Planned End D
Sprint-1	20	15 Days	01 Sept 2022	16 Sept 2022	20
Sprint-2	20	15 Days	17 Sept 2022	02 Oct 2022	20
Sprint-3	20	15 Days	03 Oct 2022	17 Oct 2022	20
Sprint-4	20	20 Days	18 Oct 2022	08 Nov 2022	20

Velocity:

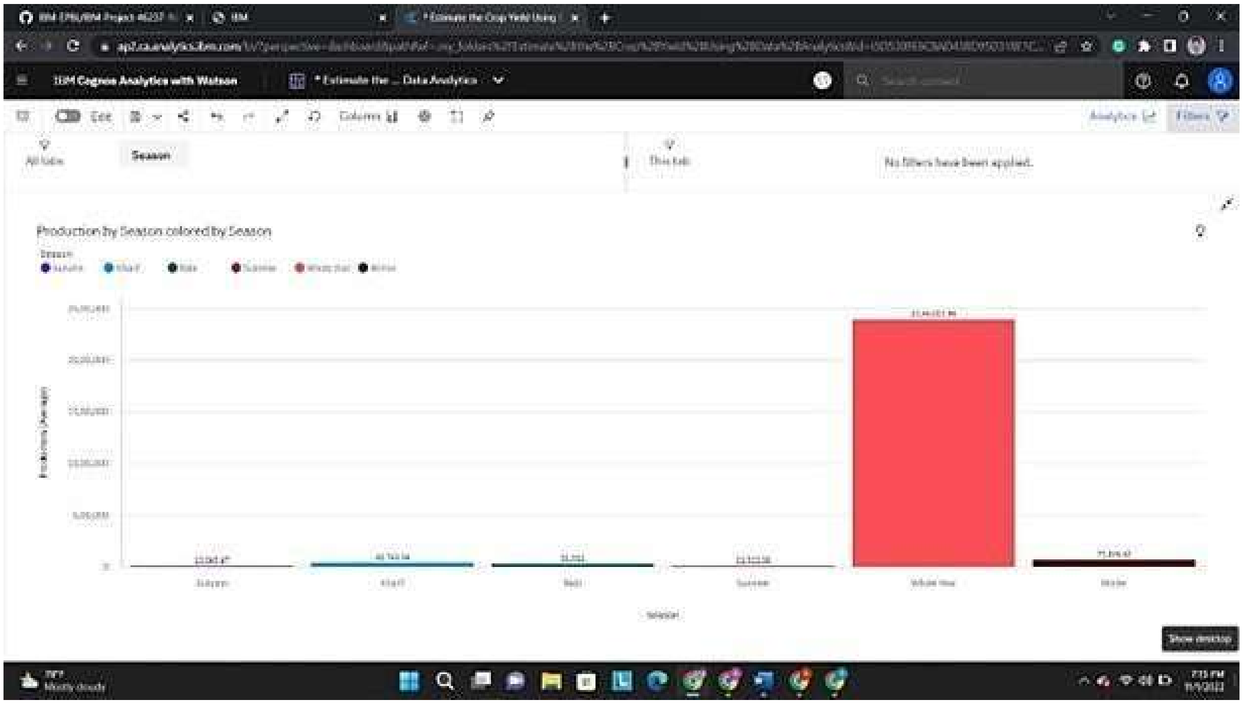
We have a 24-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

AV = Sprint Duration / Velocity = 24 / 20 = 1.2

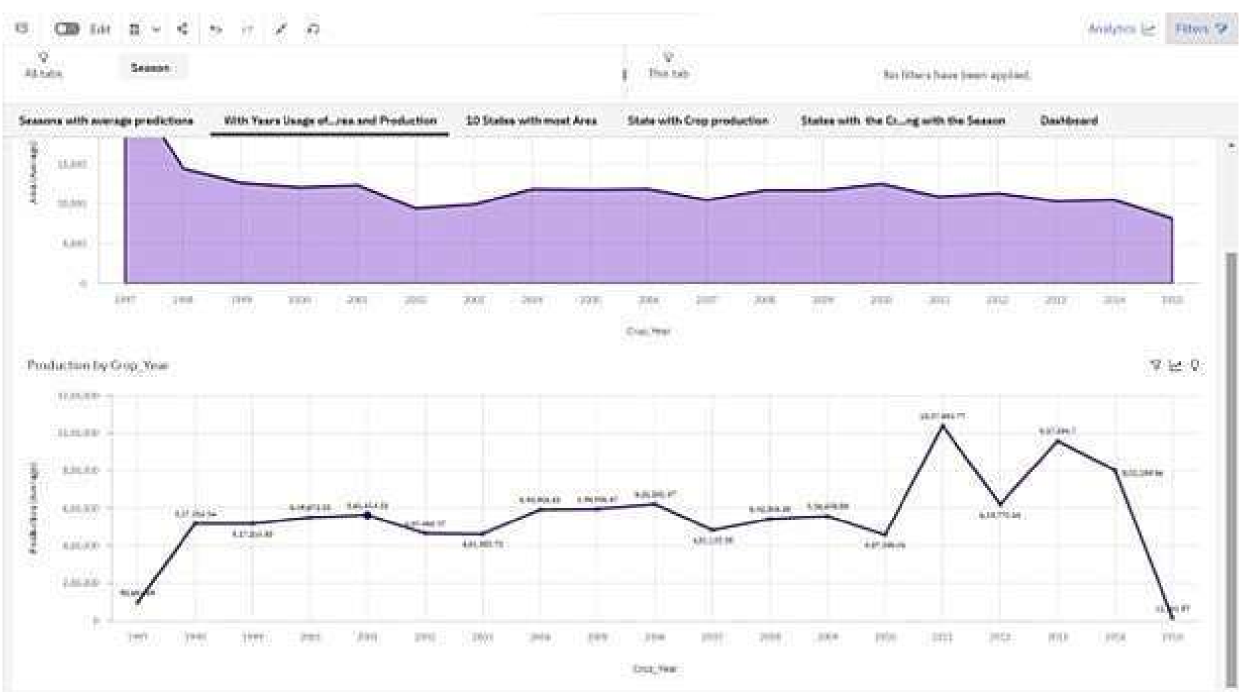
Burndown Chart: A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

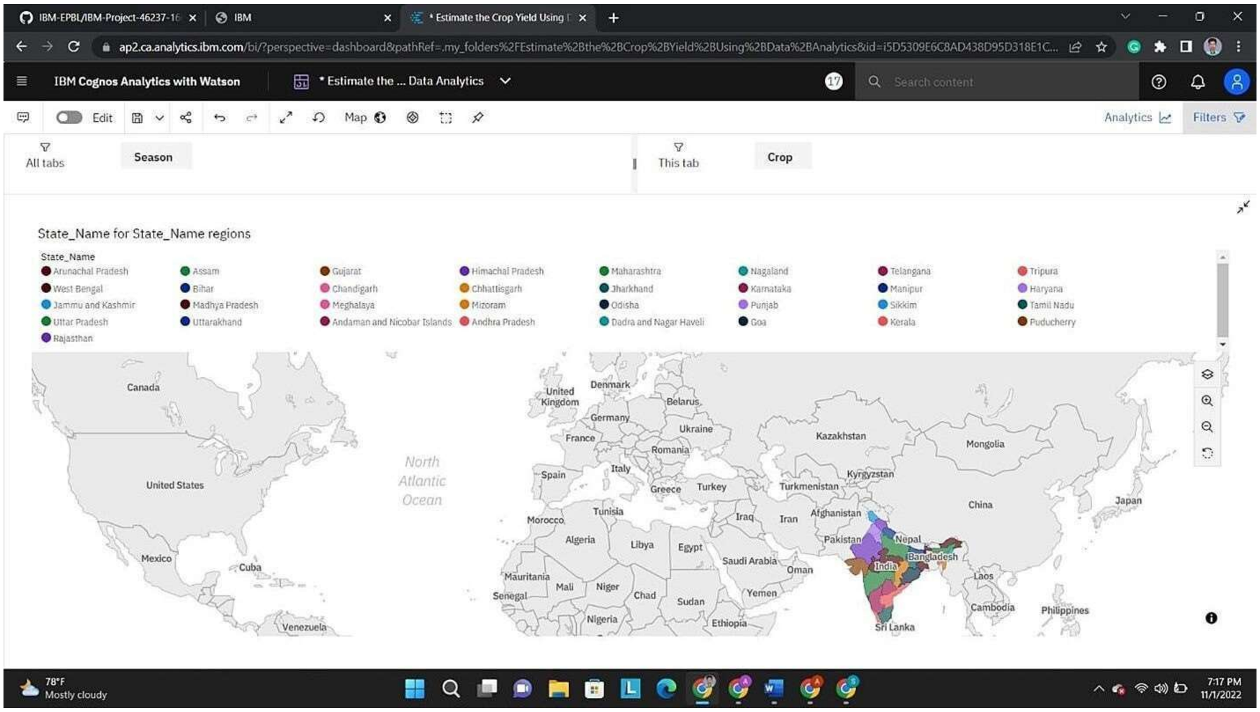


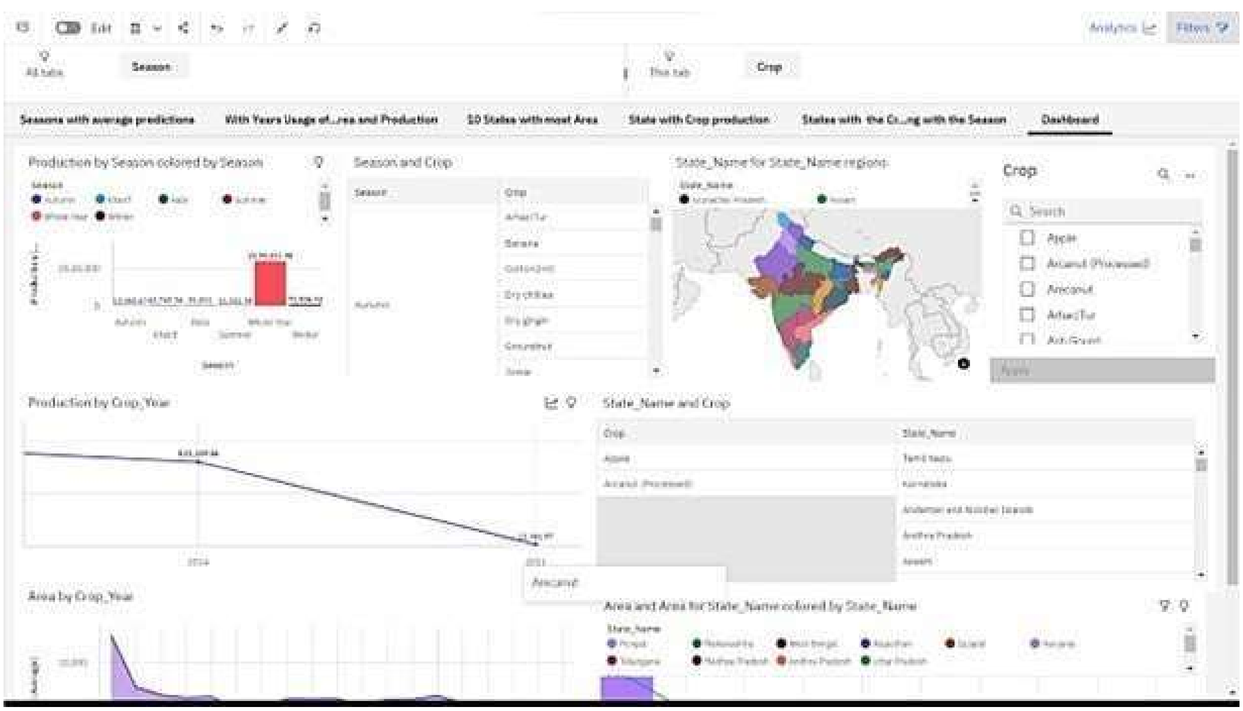
7 .RESULTS

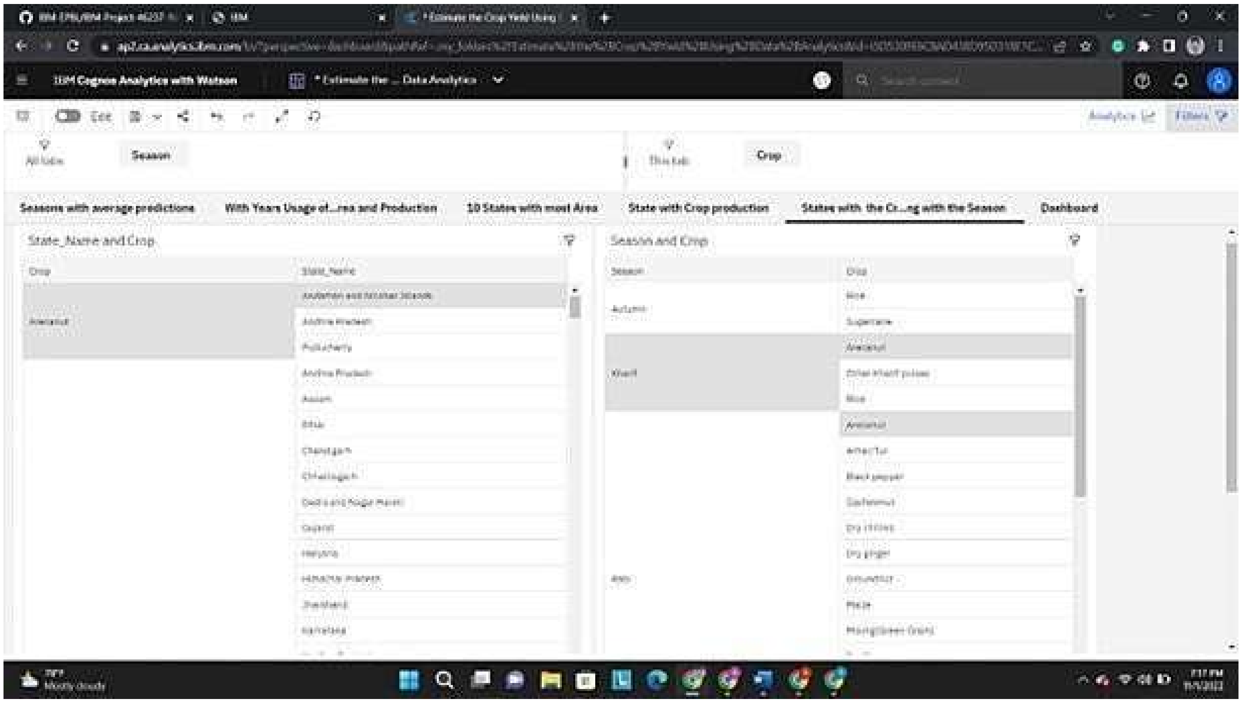

IBM Cognos Analytics with Watson
Season
No filters have been applied.
Production by Season colored by Season
Show desktop


Edit
Analytics
Filters
All tabs
Season
This tab
No filters have been applied.
Seasons with average predictions
With Years Usage of...rea and Production
10 States with most Area
State with Crop production
States with the Cr...ng with the Season
Dashboard
Area by Crop_Year
Crop_Year
Production by Crop_Year


Edit
Analytics
Filters
All tabs
Season
This tab
No filters have been applied.
Seasons with average predictions
With Years Usage of...rea and Production
10 States with most Area
State with Crop production
States with the Cr...ng with the Season
Dashboard
Crop_Year
Production by Crop_Year
Crop_Year







8. CONCLUSION

The introduction of technology has slightly increased agricultural productivity. New ideas such as digital farming, smart farming and precision farming are made possible by innovation. The analysis of agricultural productivity and the discovery of hidden patterns using seasonal and crop yield datasets have been reported in the literature. I have used IBM Cognos to observe and analyze different crops, regions and products grown in different states and districts.

9. APPENDIX

Github Link :https://github.com/IBM-EPBL/SI-GuidedProject-24441- 1665231904