



CROP PLANTATION SUGGESTION AND YIELD FORECASTING SYSTEM

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ABSTRACT

India is an agriculture-based economy with 18% of its total Gross Domestic Product (GDP) coming from different agricultural products. In this research latest technologies like data science and machine learning algorithms are applied to understand different factors contributing to a profitable crop in India. The proposed idea is to provide better yield and productivity to farmers using user-friendly simple web application. This research provides a crop recommendation system with a prime motive of creating the economic welfare for farmers. Multiple factors such as cost of planting, cost of harvesting, rainfall, crop demand, cost of seed, cost of fertilizer, and yield of the crop are considered to generate a more accurate prediction of whether a crop will be profitable or not. Machine learning algorithms allow choosing the most profitable crop list or predicting the crop yield for a user-selected crop. Machine Learning algorithms such as Support Vector Machine, Naïve Bayes, Random Forest (RF), Multivariate Linear Regression, and K-Nearest Neighbor are experimented to find out better crop suggestion list. Random Forest showed the best results with good accuracy compared to other algorithms. The enhanced hybrid combination of Random Forest and Principal Component Analysis algorithms helps to list out the most appropriate crop suggestions with more accuracy. The proposed deep LSTM model works directly on the raw datasets without the need to extract any hand-crafted features or perform dimensionality reduction

KEY WORDS: Agriculture, Machine Learning, Crop planning, farmer

CHAPTER 1

INTRODUCTION

OVERVIEW

Agriculture is the authority of India. Only one-third of cropped parts is only inundated in India, in spite of large areas. Since the agriculture data occurred every day the capacity of data has been enlarged rapidly mostly in the last five years. Farmers, researchers, government, and agricultural scientists are still searching and extracting fresh techniques for farming to increase the better production. At present new methods are present in agriculture are used by a very few farmers. For predicting future trends of agriculture processes “data mining” can be used. The process of examining data by summarizing from a different perspective and converting it into beneficial information in large datasets is called Data mining. Data mining has no restriction for analysing the type of data. In large data sets, data mining is the computational process for discovering new patterns. Data mining provides a major advantage in agriculture for disease detection, problem prediction, and for optimizing pesticides. In recent technologies, agriculture-related activities provide a lot of information. Hence data mining techniques in agriculture are used for pattern reorganization and disease detection. Data of agriculture in data mining can be presented in form of data marts. Crop production reliable and timely requirements for various decisions for marketing, pricing, storage distribution, and import-export.

The yield of agriculture primarily depends on diseases, pests, climatic conditions, planning of different crops for harvesting productivity is the result. So these predictions are very useful for agriculture domains. Data mining techniques are used for pre-harvest forecasting. For example by applying the data mining techniques government can fully benefit from data about farmers buying patterns and also gain a superior understanding of their land to protect them in order to gain more profit on the farmer’s part. Data mining is also called knowledge discovery database (KDD). Modern agriculture has to cope with several challenges, including the increasing call for food, as a consequence of the global explosion of the earth’s population, climate changes, natural resources depletion, alteration of dietary choices, as well as safety and health concerns. As a means of addressing the above issues, and placing pressure on

the agricultural sector, there exists an urgent necessity for optimizing the effectiveness of agricultural practices by, simultaneously, lessening the environmental burden. In particular, these two essentials have driven the transformation of agriculture into precision agriculture. This modernization of farming has a great potential to assure sustainability, maximal productivity, and a safe environment. In general, smart farming is based on four key pillars in order to deal with the increasing needs; (a) optimal natural resources' management, (b) conservation of the ecosystem, (c) development of adequate services, and (d) utilization of modern technologies.

An essential prerequisite of modern agriculture is, definitely, the adoption of Information and Communication Technology (ICT), which is promoted by policymakers around the world. ICT can indicatively include farm management information systems, humidity and soil sensors, accelerometers, wireless sensor networks, cameras, drones, low-cost satellites, online services, and automated guided vehicles.

The large volume of data, which is produced by digital technologies and is usually referred to as “big data”, needs large storage capabilities in addition to editing, analysis and interpreting. The latter has a considerable potential to add value to society, the environment, and decision-makers. To that end, Machine Learning (ML) has emerged, which is a subset of artificial intelligence, by taking advantage of the exponential computational power capacity growth. There are plethora of applications of ML in agriculture.

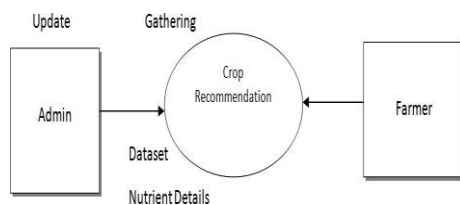


FIGURE NO 1 BASIC IDEA SETUP

CHAPTER 2

SYSTEM ANALYSIS

EXISTING SYSTEM

The biggest challenge in agriculture is to increase farm production and offer it to the end-user with the best possible price and quality. In the Existing system, few Machine Learning algorithms have been applied in the agriculture sector for crop cultivation suggestions. In the existing system crop plantation suggestion was predicted using Support Vector Machine (SVM), Apriori, K-Nearest Neighbour (KNN), and Naive Bayes (NB) algorithms. The authors emphasized a modular and reusable workflow to support different crops and countries with small configuration changes. The workflow can be used to run repeatable experiments using standard input data to obtain reproducible results. The baseline will motivate the use of machine learning in large-scale crop yield forecasting. Crop suitability models can indicate the best locations to grow different crops and, in doing so, support efficient use of land to leave space for, or share space with nature. This extended model was used to predict the harvest date in the ongoing season, and it provides the capability for assessing the performance of cover crops as a basis for improved cover crop management. Many pieces of research are tried out to improve good accuracy in agricultural planning. The goal of the project is to get as much as possible better accuracy. There are so many classification methods that are also used to give a good proportion of crop yield. Machine learning techniques are used to improve the accuracy of crop yield data. There is so many methods of crop selection applied to improve crop production accuracy in past years.

DISADVANTAGES

The main challenge faced in the agriculture sector is the lack of knowledge about the changing variations in climate. Each crop has its own suitable climatic features. This can be handled with the help of precise farming techniques. One shortcoming that can be identified in all these existing works was concentrated on a single parameter (either weather or soil) for predicting the suitability of crop



growth. Despite many solutions that have been recently proposed, there are still open challenges in creating a user-friendly application with respect to crop recommendations.

PROPOSED SYSTEM

The proposed system is the “Crop Plantation Suggestion and Yield Forecasting System”. A system would help to minimize the difficulties faced by farmers in choosing a crop and maximize the yield. The proposed model provides crop selection based on environmental conditions, and benefits to maximize the crop yield. The proposed Random Forest algorithm predicts the crop plantation suggestion and the LSTM model predicts crop yield. The model also recommends the most profitable crop and suggests the right time to use the fertilizers. The system also helps to determine the best time to use fertilizers. For getting high accuracy the Random Forest algorithm is used which gives accuracy which predicate by model and actual outcome of predication in the dataset. In the random forest which crates the decision tree from a sample of data and trees give the prediction from each family and select the best solution by voting which gives better accuracy for the model. It gives optimum results for the system. Random forest is a basically supervised learning algorithm that is used for both classifications as well as regression. The random forest algorithm creates decision trees on different data samples and then predict the data from each subset and then by voting gives better the solution for the system. Random Forest used the bagging method to train the data. Basically, the bagging method is a mixture of studying different models and increasing the final result of the system

ADVANTAGES OF THE PROPOSED SYSTEM

It predicts the crop plantation suggestion and yield prediction for the data sets of the given region. Integrating agriculture and ML will contribute to more enhancements in the agriculture sector by increasing the yields and optimizing the resources involved.

The data from previous years are the key elements in forecasting current performance.

The methods in the proposed system include increasing the yield of crops, real- time analysis of crops, selecting efficient parameters, making smarter decisions, and getting better yield.

It can perform both regression and classification tasks. A random forest produces good predictions that can be understood easily.

It can handle large datasets efficiently. The random forest algorithm provides a higher level of accuracy in predicting outcomes than the decision tree algorithm.

CHAPTER 3

METHODOLOGY

PROBLEM DEFINITION

The common problem existing among the Indian farmers are they don't choose the right crop based on their soil and weather requirements. Due to this they face a serious setback in productivity. This problem of the farmers has been addressed through precision agriculture. Precision agriculture is a modern farming technique that uses research data of soil characteristics, soil types, crop yield data collection and suggests the farmers the right crop based on their site-specific parameters. This reduces the wrong choice on a crop and increase in productivity. Through our work, this problem is solved by proposing a recommendation system through an ensemble model with majority voting technique using Random tree as learners to recommend a crop for the site specific parameters with high accuracy and efficiency

ABOUT THE PROJECT

A system is developed to assist farmer people that automatically get recommendation of crop products. The biggest challenge in agriculture is to increase farm production and offer it to the end-user with the best possible price and quality. In the Existing system, few Machine Learning algorithms have been applied in the agriculture sector for crop cultivation suggestion. In the existing system crop plantation



suggestion was predicted using Support Vector Machine (SVM), Apriori, K-Nearest Neighbour (KNN) and Naive Bayes (NB) algorithms.

The main challenge faced in agriculture sector is the lack of knowledge about the changing variations in climate. Each crop has its own suitable climatic features. This can be handled with the help of precise farming techniques. The precision farming not only maintains the productivity of crops but also increases the yield rate of production. One shortcoming that identified in all these existing works was concentrated on a single parameter (either weather or soil) for predicting the suitability of crop growth. Despite many solutions that have been recently proposed, there are still open challenges in creating a user-friendly application with respect to crop recommendation.

The main objective is to obtain a better variety of crops that can be grown over the season. The proposed system would help to minimize the difficulties faced by farmers in choosing a crop and maximize the yield.

The proposed model resolves the existing issues. The novelty of the proposed system is to guide the farmers to maximize the crop yield as well as suggest the most profitable crop for the specific region. The proposed model provides crop selection based on environmental conditions, and benefit to maximize the crop yield that will subsequently help to meet the increasing demand for the country's food supplies.

The proposed Random Forest algorithm predicts the crop plantation suggestion and LSTM model predicts yield by studying factors such as rainfall, temperature, area, season, soil type etc. The system also helps to determine the best time to use fertilizers. The user provides an area under cultivation and soil type as inputs. According to the requirement, the model predicts the crop yield for a specific crop. The model also recommends the most profitable crop and suggests the right time to use the fertilizers.

MODULE DESCRIPTION

The project creates a website “**Crop Plantation Suggestion and Yield Forecasting System**” for processing the information involving best suitable crops to plant and crop yield period. This project contains the following modules.

Collection of Dataset

The datasets have been obtained from the Kaggle website. The data set has 10000+ instance or data that have taken from the past historic data. The dataset consists of parameters like Nitrogen(N), Phosphorous(P), Potassium(K), PH value of soil, Humidity, Temperature, Rainfall, etc.. This dataset includes 80+ different crops like Bitter Gourd, Radish, Plums, Garlic, Turmeric, Mango, Smallmillets, AshGourd, Samai, Cashewnut, Potato, Other Kharif pulses, Onion, Ragi, Pear, Water Melon, Lab-Lab, Soybean, Cardamom, Yam, etc., in the Comma Separated Value (CSV) format. The Administrator of this project has uploaded the dataset files into the database server.

Pre-Processing(Null Removable)

For the successful application pre-processing is required. The data which is acquired from different resources are sometimes in raw form. It may contain some incomplete, redundant, or inconsistent data. Therefore in this step, such missing value data should be filtered. Replacing with Mean this strategy can be applied to a feature which has numeric data. It can calculate the mean of the feature and replace it with the missing values.

Crop Recommendation using Random Forest (RF) algorithm

Random Forest is a Machine Learning algorithm. At training situation multitude decision trees are made and the output will be divided based on number of classes i.e., classification, prediction. The number of trees is proportional to accuracy in prediction. The dataset includes factors like rainfall, perception, temperature and production. These factors in dataset are used for training. It have applied Random Forest in our model as, loading dataset, creating random forest trees, fitting our data for crop recommendation.

Crop Yield prediction using Artificial Intelligence Architecture model

Artificial Intelligence(AI) can be used in crop yield prediction using deep neural networks in order to assure food security by guiding the farmers, planning food storage and transport, and by helping policymakers focus on the most vulnerable communities. The predicted crop yield is based on the input variables such as plantation details and location details. We decided to use the Deep Learning architecture from this project which is a LSTM. Based on this model prediction of crop yield quantity approximately in specific period and location.

Performance Evaluation

Based on the crop yield recommendation and forecasting values, the cultivation agriculture land location is tracked with help of google map.

DATA FLOW DIAGRAM

Environmental Model

The Environmental model defines the interfaces between the system and the environment. Building an environmental model is the first and the most important part of building complete model of user requirements. The critical aspect of environmental model is to identify the events occurring in the environment to which the system must respond. It also defines the boundary between the system and the environment.

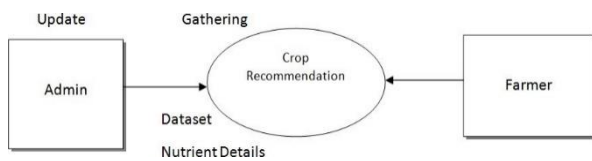


FIGURE NO. 2 Environmental Model-Level 0

BEHAVIOURAL MODEL:

A dataflow diagram is a pictorial representation of the working of the system. It is a tool that depicts the flow of data through a system and the work processing performed by that system. This takes an important role in the system analysis part to know the present level of existing system and what modification is to be done to overcome the problem occurring in the system. It is the starting point of the

Design phase that functionally decomposed the requirement.

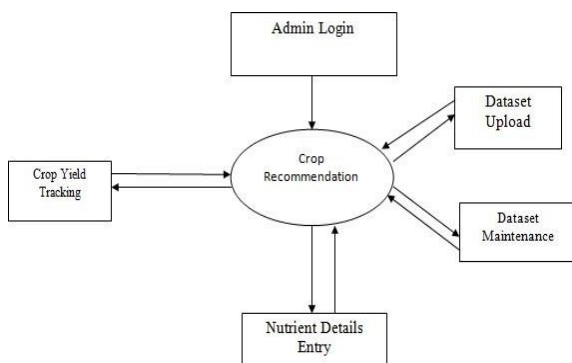


FIGURE NO. 3 Behavioural Model- Level1

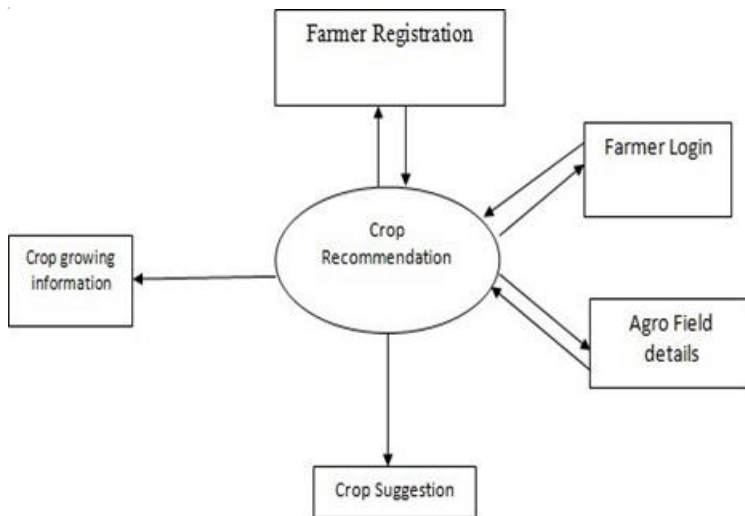


FIGURE NO. 4 Behavioural Model- Level2

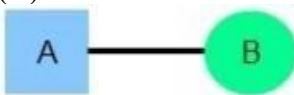
5.4.3.ENTITY RELATIONSHIP

Entity- Relationship Diagram

a graphical representation of entities and their relationships to each other, typically used in computing in regard to the organization of data within databases or information systems. An entity is a piece of data- an object or concept about which data is stored. A relationship is how the data is shared between entities. There are three types of relationships between entities:

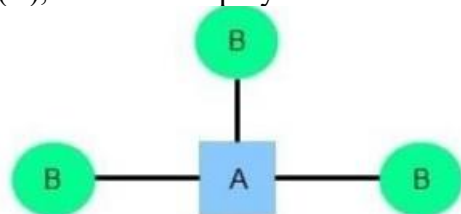
One-to-One

One instance of an entity (A) is associated with one other instance of another entity (B). For example, in a database of employees, each employee name (A) is associated with only one social security number (B).



One-to-Many

One instance of an entity (A) is associated with zero, one or many instances of another entity (B), but for one instance of entity B there is only one instance of entity A. For example, for a company with all employees working in one building, the building name (A) is associated with many different employees (B), but those employees all share the same singular association with entity A.



Many-to-Many

One instance of an entity (A) is associated with one, zero or many instances of another entity (B), and one instance of entity (B) is associated with one, zero or many instances of entity A. For example, for a company in which all of its employees work on multiple projects, each instance of an employee (A) is associated with many instances of a project (B), and at the same time, each instance of a project(B) has multiple employees(A) associated with it.

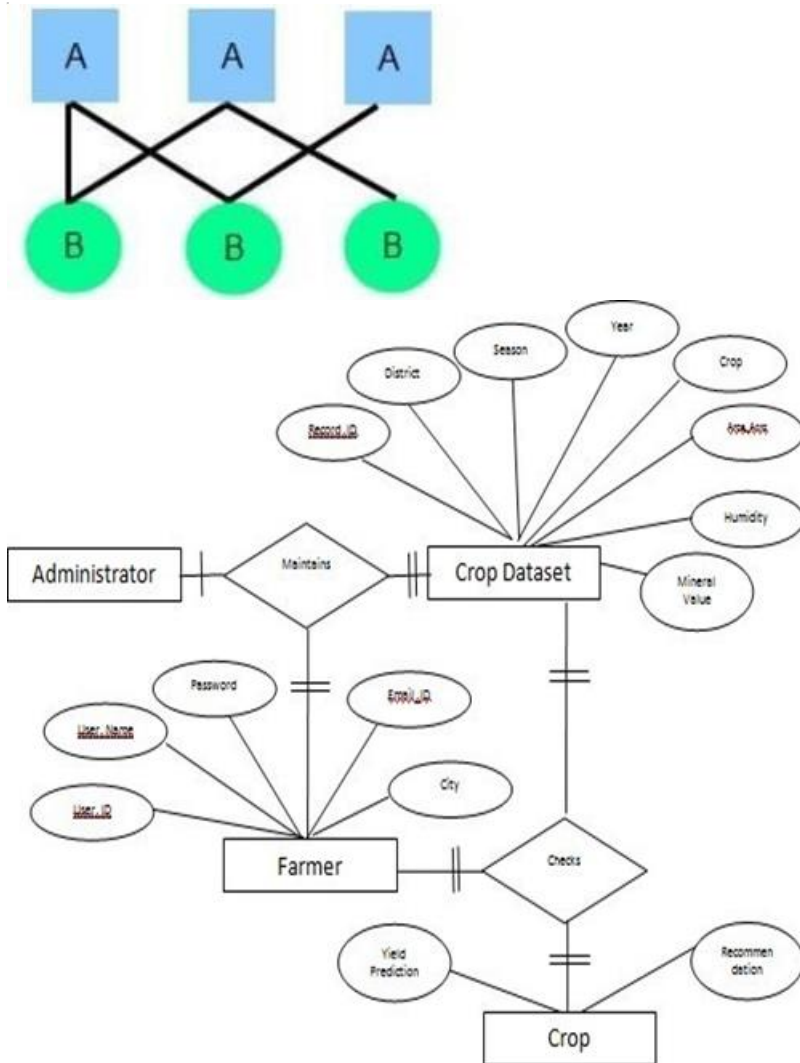


FIGURE NO. 5 Entity Relationship Diagram
USE-CASE DIAGRAM

A use case diagram in the Unified Modelling Language (UML) is a type of behavioural diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. The roles of the actors in the system can be depicted.

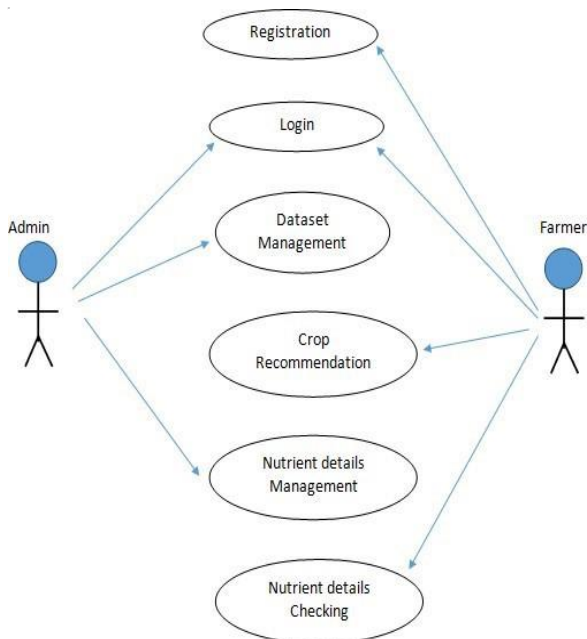


FIGURE NO. 6 Use case Diagram FLOWCHART

A flowchart is a type of diagram that represents a workflow or process. A flowchart can also be defined as a diagrammatic representation of an algorithm, a step-by-step approach to solving a task. The flowchart shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows.

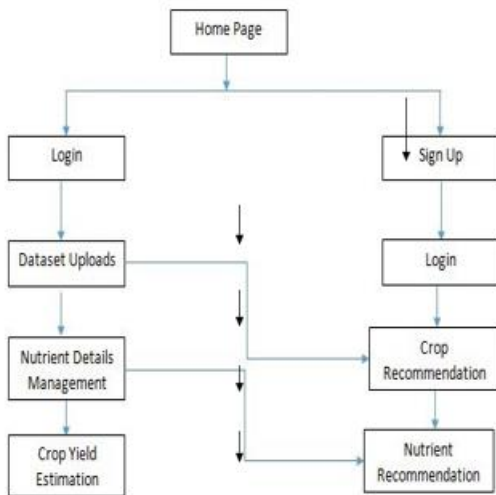


FIGURE NO. 7 Flow Chart SYSTEM ARCHITECTURE DIAGRAM

A system architecture or systems architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and presentation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

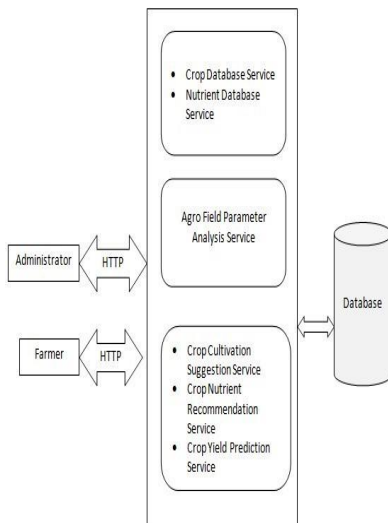


FIGURE NO. 8 System Architecture Diagram

DESIGN PROCESS

System design is a “how to” approach to creation of a new system. System design goes through 2 phases. Logical design reviews the present physical system, prepares input and output specifications, makes edit security and control specifications Physical design maps out the details of the physical system, plans, system implementation, device a test and implementation plan.

INPUT DESIGN

Input design is the process of connecting the user-originated inputs into a computer to used formats. The goal of the input design is to make data entry Logical and free from errors. Errors are in the input database controlled by input design.

OUTPUT DESIGN

The output form of the system is either by screen or by hard copies. Output design aims at communicating the results of the processing of the users. The reports are generated to suit the needs of the users. The reports have to be generated with appropriate levels. In our project outputs are generated by asp as html pages.

CODE DESIGN

The main purpose of code design is to simplify the coding and to achieve better performance and quality with free of errors. To reduce the server load, the project is designed in a way that most of the Validation of fields is done as client- side validation, which will be more effective.

DATABASE DESIGN

The database design involves creation of tables that are represented in physical database as stored files. They have their own existence. Each table Constitute of rows and columns where each row can be viewed as record that consists of related information and column can be viewed as field of data of same type.

DEVELOPMENT APPROACH

TOP DOWN APPROACH

The importance of new system is that it is user friendly and a better interface with user’s working on it. It can overcome the problems of manual system and the security problem. The main module that is overall software is divided into five modules that are under the control of the main control module tests are conducted as each component is integrated

ALGORITHM

Algorithm used in E-commerce based online shopping for visually impaired persons using Speech Recognition are:

- Deep Learning



- Representation Learning
- Unsupervised Learning
- Clustering
- K-means

DEEP LEARNING

The speech recognition can be carried out using Deep Learning Algorithm. In order to search any product, they must provide the voice input to the system. This voice input is in a form of acoustic waves. The system should recognize this input acoustic voice signal and converts this signal i.e. speech input signal into character string using Deep Learning Algorithm. Deep Learning algorithm has to process the acoustic waves to transform into character string for further operation.

REPRESENTATION LEARNING

Representation Learning is one of the most effective techniques to streamline feature extraction and knowledge building in deep learning models. Representation learning is learning representations of input data typically by transforming it or extracting features from it (by some means), that makes it easier to perform a task like classification or prediction.

UNSUPERVISED LEARNING

The system explores the data and can draw inferences from datasets to describe hidden structures from unlabelled data but not always figures out the right output.

CLUSTER

To provide more flexibility and compatibility are clustering a data and this clustering data can be carried out using K-mean Algorithm. Clustering is a method of finding groups of similar objects in a dataset.

K-MEANS

The K-Mean algorithm uses an iterative method to give results. The input to the algorithm is a number of clusters 'K' and a dataset. K-Means Clustering is an unsupervised learning algorithm that aims to group the observations in a given dataset into clusters.

CHAPTER 4

SYSTEM TESTING

TESTING AND METHODOLOGIES

System testing is the state of implementation, which is aimed at ensuring that the system works accurately and efficiently as expected before live operation, commences. It certifies that the whole set of programs hangs together System testing requires a test plan that consists of several key activities and steps for run the program, string, system and user acceptance testing. The implementation of a new design package is important in adopting a successful new system.

The testing phase is the development phase that validates the code against the functional specifications. To fulfil this objective a series of tests such as the unit test, integration test, validation and system test were planned and executed.

UNIT TESTING

Here each program is tested individually so any error apply unit is debugged. The sample data are given for the unit testing. The unit test results are recorded for further references. During unit testing the functions of the program unit validation and the limitations are tested.

The four categories of test that a programmer will typically perform on a program unit

- Functional test
- Performance test
- Stress test
- Structure test

Functional test involves exercising the code with nominal input values for which the expected results are known as well as boundary values and special values. Performance testing determines the amount of execution time spent in various parts of unit program through put and response time and device



utilization by the program. A variation of stress testing called sensitivity testing in some situations a very small range of data contained in the bounds of valid data may cause extreme and even erroneous processing or profound performance degradation. Structured testing is concerned with exercising the internal logic of a program and traversing paths. Functional testing, stress testing performance testing is referred as “black box” testing and structure testing is referred as “white box” testing.

VALIDATION TESTING

Software validation is achieved through a series of test that demonstrates the conformity and requirements. Thus, the proposed system under consideration has to be tested by validation and found to be working satisfactorily. For example, in customer enters phone number field should contain number otherwise it produces an error message similarly in all the forms the fields are validated.

OUTPUT TESTING

Asking the user about the format required by them tests the output generated by the system under consideration. It can be done in two ways, one on screen and another on printer format. The output format on the screen is found to be correct as the format designed and system test.

SYSTEM TESTING

In the system testing the whole system is tested for interface between each module and program units are tested and recorded. This testing is done with sample data. The securities, communication between interfaces are tested.

System testing is actually a series of different tests whose primary purpose is to fully exercise the computer-based system although each test has a different purpose all work to verify that all system elements properly integrated and perform allocate function.

TESTING RESULTS

All the tests should be traceable to customer requirements the focus of testing will shift progressively from programs Exhaustive testing is not possible. To be more effective testing should be which has probability of finding errors.

The following are the attributes of good test

- A good test has a probability of finding errors
- A good test should be “best of breeds”
- A good test to neither simple nor too complex

QUALITY ASSURANCE

Quality assurance consists of the auditing and reporting functions of management. The goal of quality assurance is to provide management with the data entries necessary to be informed about the product quality thereby gaining the goal of insight and confidence that the product quality is meeting.

Quality assurance thus becomes an important component of the development process, It's included in the industry standard (IEEE 1993) On the development process quality assurance process is integrated into a linear development cycle through validation and verification performed at crucial system development steps.

GENERIC RISKS

Risk identification is the systematic attempt to specify threats to the project plan (estimates the schedule resource overloading etc.). By identifying know and predictable risk the first step is to avoiding them. When possible and controlling them when necessary there are two types of risks

- Generic Risk
- Product specific risk

Generic risks are potential threats to every software project. Only those with a clear understanding of technology can identify product specific risk. The people and the environment that is specific to the project at a hand and to identify the product specific risk and the project the plan and the software statement of scope are examined and answer to the following question is developed. It identifies a potential budgetary, schedule, and personnel like staffing, organizing, resources, customer requirement, problems and their impact on a software project



SECURITY TECHNOLOGIES AND POLICIES

Any system developed should be secured & protected against possible hazards. Security measures are provided to prevent unauthorized access to database at various levels. Password protection & simple procedures to change the unauthorized access are provided to the users.

CHAPTER 5

IMPLEMENTATION DETAILS

Implementation is the stage in the project where the theoretical design is turned into a working system. The most crucial stage is achieving a successful new system and giving a user confidence in at the new system will work efficiently and effectively in the implementation stage. The stage consists of

- Testing a developed program with sample data
- Detection and correction of error
- Creating whether the system meets a user requirement
- Making necessary changes as desired by users.
- Training user personal

IMPLEMENTATION PROCEDURES

The implementation phase is less creative than system design. A system design may be dropped at any time prior to implementation, although it becomes more difficult when it goes to the design phase. The final report of the implementation phase includes procedural flowcharts, record layouts, and a workable plan for implementing the candidate system design into an operational design.

USER TRAINING

It is designed to prepare the users for testing & converting the system. There is several ways to trail the users they are:

- User manual
- Help screens
- Training demonstrations.

User Manual:

The summary of important functions about the system & software can be provide a document to the user. User training is designed to prepare the user for testing and convening system.

The summary of important functions about the system and the software can be provided as a document to the user,

- Open http page
- Type the filename with URL Default .asp x in the address bar
- Default.aspx is opened existing user the type the username and password
- Click the submit button
- This features now available in every software package, especially when it is used with a menu. The user selects the “Help” option from the menu. The systems are success the necessary description or information for user references.

Training Demonstration:

Another user training element is a training demonstration. Live demonstration with personal contact is extremely effective for training users.

OPERATIONAL DOCUMENTATION

Documentation means of communication; it establishes the design and performance criteria of the project. Documentation is descriptive information that portrays the use and/ or operation of the system. The user will have to enter the user name and password if it is valid, he participates in auction. Otherwise if it is new user he needs to register.

Documentation Tools:

Document production & desktop publishing tool support nearly every aspect of software developers. Most software development organizations spend a substantial amount of time developing documents,



and in many cases the documentation process itself is quite inefficient. It is not use unusual for a software development effort on documentation. For this reason, Documentation tools provide an important opportunity to improve productivity.

Document Restructuring:

Creating document is far time consuming. If the system works, In some cases, this is the correct approach. It is not possible to recreate document for hundreds of computer programs. Documentation must be updated, but have limited resources. It may not be necessary to fully re-document an application. Rather, those portions of the system that are currently undergoing change are fully documented. The system is business critical and must be fully re-documented. Even in this case, an intelligent approach is to pare documentation to an essential minimum.

SYSTEM MAINTENANCE

Maintenance is actually implementation of the review plan as important as it is programmers and analyst is to perform or identify with him or herself with the maintenance. There are psychologically personality and professional reasons for this. Analyst and programmers spend fair more time maintaining programmer then they do writing them Maintenances account for 50-80% of total system development. Maintenance is expensive. One way to reduce the maintenance costs are through maintenance management and software modification audits. Types of maintenance are

- Perfective maintenance 2.
- Preventive maintenance

Perfective Maintenance:

Changes made to the system to add features or to improve the performance. In future any more features can be added and it can easily adopt the changes.

Preventive Maintenance:

Changes made to the system to avoid future problems. Any changes can be made in the future and our project can adopt the changes.

CHAPTER 6

CONCLUSION

The new system usually provided for a smooth transition from the old system to the new system and help users cope with normal start-up problems. Thus, the implementation phase delivers the “**Crop Plantation Suggestion and Yield Forecasting System**” into operation. The delivery of the implementation phase is the operating system that will enter the operation and support stage of the life cycle. The web portal is built for the Farmers which would help them to get assistance regarding crop cultivation strategies, primarily for the services of recommendation and information of crop yielding using Random Forest Algorithm. To this end, it has effectively proposed and implemented an intelligent crop recommendation system, which can be easily used by farmers all over Tamil Nadu. This system would help the farmers in making an informed decision about which crop to grow depending on some parameters like Season, Crop, Area-In-Acre, Production, Temperature, Moisture, Rain Fall, and minerals like Carbon, Oxygen, Hydrogen, Nitrogen, Phosphorus, Potassium, Calcium, Sulphur, Magnesium, Iron, Chlorine, Copper, etc. By using this application farmers can increase the productivity of the country and produce profit out of such a technique. In this manner, the farmers can plant the right crop to increase their yield and the overall profitability of the country. It has forecasted the various crop’s yielding quantity using deep learning technique’s LSTM model.

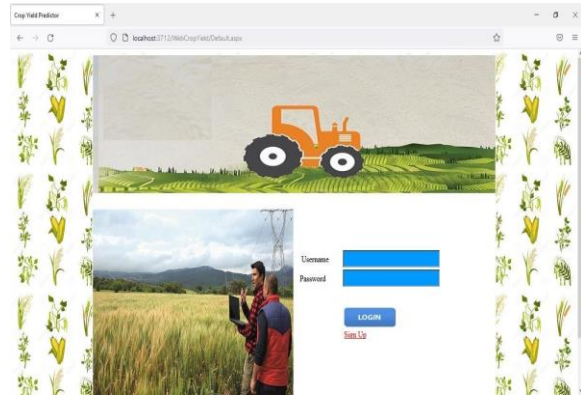
FUTURE WORK

The future work will be focused on updating the datasets from time to time to produce accurate predictions, and the processes can be automated. Another functionality to be implemented is to provide the correct type of fertilizer for the given crop and location. To implement this thorough study of available fertilizers and their relationship with soil and climate needs to be done. An analysis of available statistical data needs to be done. The manual method of entering data inputs can be replaced

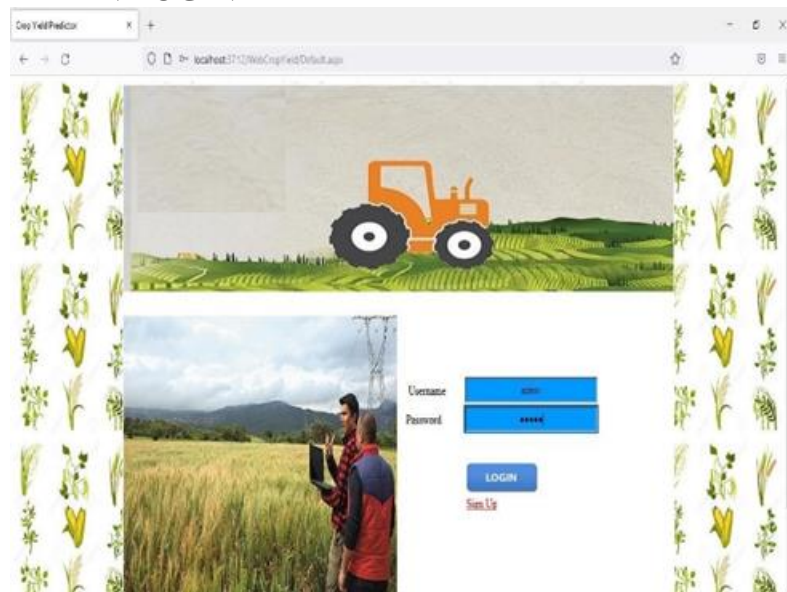


by the use of hardware, IoT, and sensors to feed input data to the cloud system. The website can be rendered to the app to ease user experience.

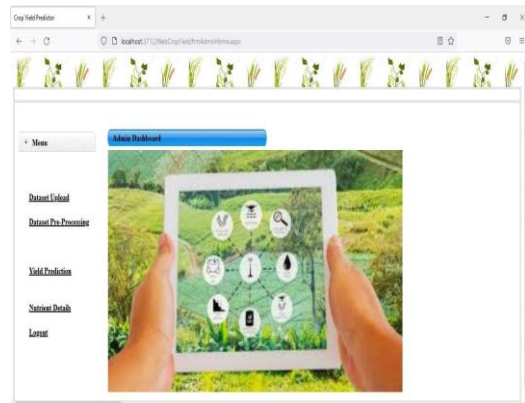
CHAPTER 7 SCREENSHOTS HOME PAGE



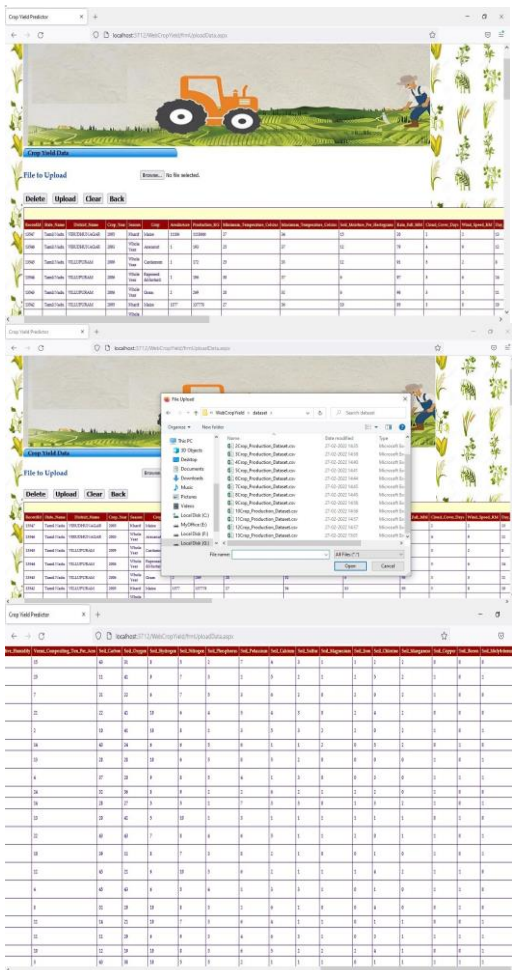
ADMIN LOGIN



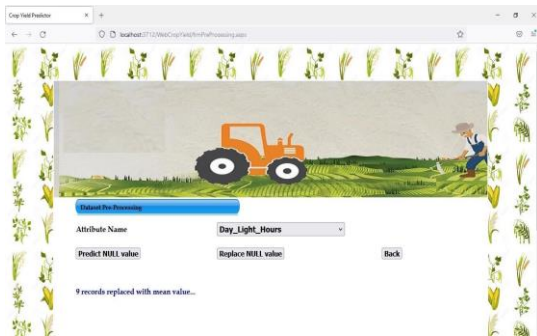
ADMIN DASHBOARD PAGE



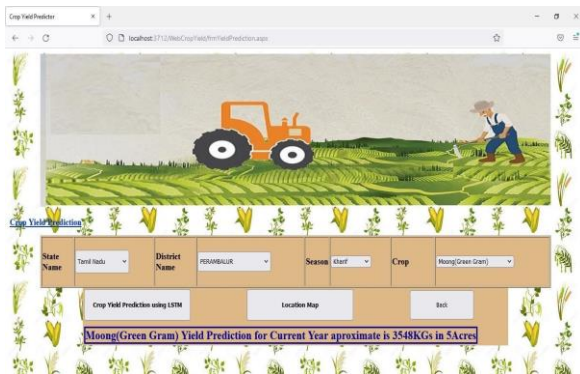
DATA UPLOAD PAGE



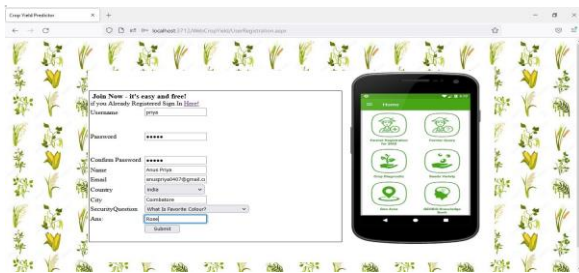
DATASET PRE-PROCESSING PAGE



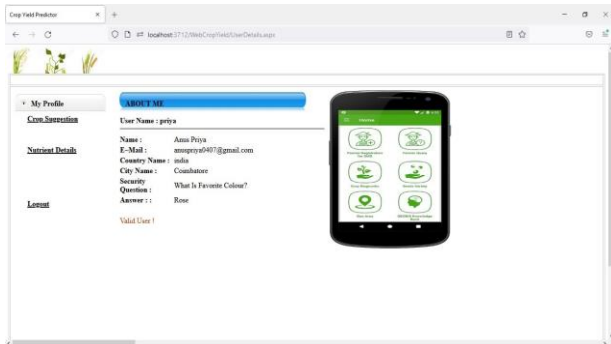
CROP YIELD PREDICTION PAGE



FARMER REGISTRATION PAGE



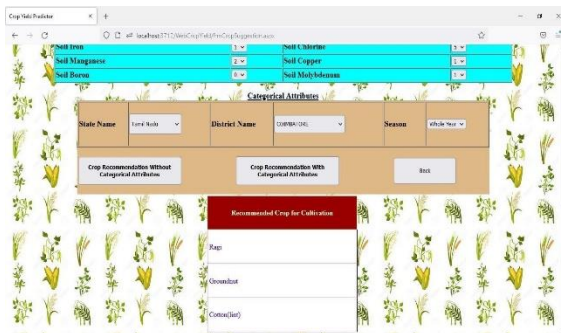
FARMER DASHBOARD PAGE



CROP SUGGESTION PAGE



RESULTS: CROP RECOMMENDATION WITHOUT CATEGORICAL ATTRIBUTES



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