Agricultural Crop Recommendation Based on Productivity and Season

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***Abstract*: As we know the fact that, India is the second largest population country in the world and majority of people in India have agriculture as their occupation. Farmers are growing same crops repeatedly without trying new verity of crops and they are applying fertilizers in random quantity without knowing the deficient content and quantity. So, this is directly affecting on crop yield and also causes the soil acidification and damages the top layer. So, we have designed the system using machine learning algorithms for betterment of farmers. Our system will suggest the best suitable crop for particular land based on content and weather parameters. And also, the system provides information about the required content and quantity of fertilizers, required seeds for cultivation. Hence by utilizing our system farmers can cultivate a new variety of crop, may increase in profit margin and can avoid soil pollution**

***Keywords*: Precision Agriculture, Machine learning, Crop prediction, Naive Bayes, Supervised Learning, Effective farming**

INTRODUCTION

Agriculture is one of the important occupation practiced in India. It is the broadest economic sector and plays a most important role in the overall development of the country. More than 60% of the land in the country is used for agriculture in order to suffice the needs of 1.3 billion people Thus adopting new agriculture technologies is very important. This will be leads the farmers of our country towards profit [1]. Prior crop prediction and yield prediction was performed on the basis of farmers experience on a particular location. They will prefer the prior or neighborhood or more trend crop in the surrounding region only for their land and they dont have enough of knowledge about soil nutrients content such as nitrogen, phosphorus, potassium in the land. Being this as the current situation without the rotation of the crop and apply an inadequate amount of nutrients to soil it leads to reduce in the yield and soil pollution (soil acidification) and damages the top layer. Considering all these problems takes into the account we designed the system using a machine learning for betterment of the farmer. Machine learning(ML) is a game changer for agriculture sector. Machine learning is the part of artificial intelligence, has emerged together with bigdata technologies and high-performance computing to create new opportunities for data intensive science in the multi-disciplinary agri- technology domain. In the Agriculture field machine learning for instance is not a mysterious trick or magic, it is a set of well define model that collect specific data and apply specific algorithms to achieve expected results

LITURATURE SURVEY

Author: Usha Devi, Sheela Selvakumari Findings: Agriculture is a field that is regarded to be one of the most important and frequently practised jobs in India, and it has played a significant part in our country's development. Around 60% of the country's total land is utilised for agricultural production in order to support the needs of 1.2 billion people, hence growing crop production is considered an important element of agriculture. Machine learning can be a difficult approach to achieving a practical and real-world solution to crop productivity issues. Typically, if we own a piece of land, we must have a fundamental understanding of the kind of crops that should be planted in that location. Agriculture is dependent on the presence of several soil qualities. Crop production is a difficult task since it requires consideration of a variety of parameters such as temperature, soil type, humidity, and so on. If it's simple to locate the crop to be grown before seeding it, it'll be much easier for farmers and other stakeholders to make informed decisions regarding storage and business. The proposed project will aid in the resolution of agricultural issues by monitoring agricultural areas based on soil qualities and advising farmers on the most appropriate crop, consequently advising them on how to considerably boost production and decrease loss. This study is described as a recommendation system that employs several machine learning approaches to suggest appropriate crops based on input soil factors.

Author: Saeed Khaki and Lizhi Wang Findings: Crop yield is a highly complex trait determined by multiple factors such as genotype, environment, and their interactions. Accurate yield prediction requires fundamental understanding of the functional relationship between yield and these interactive factors, and to reveal such relationship requires both comprehensive datasets and powerful algorithms. In the 2018 Syngenta Crop Challenge, Syngenta released several large datasets that recorded the genotype and yield performances of 2,267 maize hybrids planted in 2,247 locations between 2008 and 2016 and asked participants to predict the yield performance in 2017. As one of the winning teams, we designed a deep neural network (DNN) approach that took advantage of state-of-the-art modeling and solution techniques. Our model was found to have a superior prediction accuracy, with a root-mean-square-error (RMSE) being 12% of the average yield and 50% of the standard deviation for the validation dataset using predicted weather data. With perfect weather data, the RMSE would be reduced to 11% of the average yield and 46% of the standard deviation. We also performed feature selection based on the trained DNN model, which successfully decreased the dimension of the input space without significant drop in the prediction accuracy.

Author: N. L. Chourasiya, P. Modi, Sudesh Pawar Findings: In Indian history, agriculture has been the backbone of the economy. This agricultural activity stay undeveloped thanks to various factors. Most of the activities area unit through with an absence of recent technology. Currently, seed classification is completed supported information of person. the aim of this study is to look at

the prediction of crops which will offer high yield within the given location considering the climate and soil parameters. The current seed classification analysis is inefficient and has no validation mechanism. during this analysis, we've created an attempt to gift a prophetic model to predict seed sowing for farmers mistreatment machine learning algorithmic program which ends up in high crop production. For the event, this analysis machine learning algorithmic program is employed to be told from information which might be wont to build predictions, to create real-world like simulations, for pattern recognitions and classifications of the input file. a man-made neural network is employed for modeling advanced relationships between inputs and outputs or to search out patterns in information. The objective of this thesis is to grasp the machine learning algorithmic rule mistreatment neural networks and constructing model that predicts seed categories supported machine learning technique. The model is experimented mistreatment seed dataset and so seed categories area unit foreseen mistreatment the developed model.

Author: Thomasvan Klompenburg, Ayalew Kassahun, Cagatay Catal Findings: Machine learning is an important decision support tool for crop yield prediction, including supporting decisions on what crops to grow and what to do during the growing season of the crops. Several machine learning algorithms have been applied to support crop yield prediction research. In this study, we performed a Systematic Literature Review (SLR) to extract and synthesize the algorithms and features that have been used in crop yield prediction studies. Based on our search criteria, we retrieved 567 relevant studies from six electronic databases, of which we have selected 50 studies for further analysis using inclusion and exclusion criteria. We investigated these selected studies carefully, analyzed the methods and features used, and provided suggestions for further research. According to our analysis, the most used features are temperature, rainfall, and soil type, and the most applied algorithm is Artificial Neural Networks in these models. After this observation based on the analysis of machine learning-based 50 papers, we performed an additional search in electronic databases to identify deep learning-based studies, reached 30 deep learning-based papers, and extracted the applied deep learning algorithms. According to this additional analysis, Convolutional Neural Networks (CNN) is the most widely used deep learning algorithm in these studies, and the other widely used deep learning algorithms are Long-Short Term Memory (LSTM) and Deep Neural Networks (DNN)

AIM & OBJECTIVES

1. To use machine learning techniques to predict crop yield
2. To provide easy to use User Interface. 3. To increase the accuracy of crop yield prediction. analyse different climatic parameters (cloud cover, rainfall, temperature)
4. Collect the weather data, crop yield data, soil type data and the rainfall data and merge these datasets in a structured form and clean the data. Data Cleaning is done to remove inaccurate, incomplete and unreasonable data that increases the quality of the data and hence the overall productivity.
5. Perform Exploratory Data Analysis (EDA) that helps in analyzing the complete dataset and summarizing the main characteristics. It is used to discover patterns, spot anomalies and to get graphical representations of various attributes. Most importantly, it tells us the importance of each attribute, the dependence of each attribute on the class attribute and other crucial information.
6. Divide the analysed crop data into training and testing sets and train the model using the training data to predict the crop yield for given inputs.
7. Compare various Algorithms by passing the analysed dataset through them and calculating the error rate and accuracy for each. Choose the algorithm with the highest accuracy and lowest error rate.

MOTIVATION

Crop yield prediction is an important agricultural problem. Every farmer always tries to know how much yield will be produced and whether it meets their expectations. In the past, yield prediction was calculated by analyzing a farmer's previous experience on a particular crop. The Agricultural yield is primarily dependent on weather conditions pests and planning of harvest operation. Accurate information about the history of crop yield is an important thing for making decisions related to agricultural risk management.

SYSTEM ARCHITECTURE

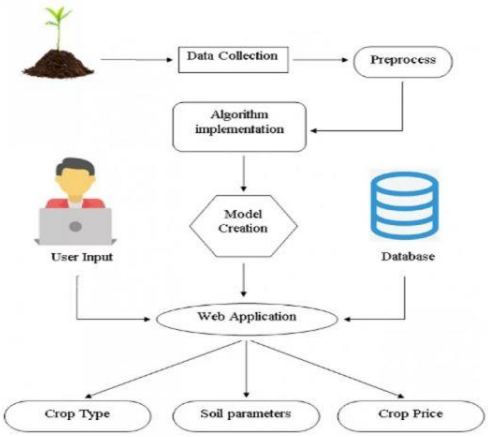

Fig -1: System Architecture Diagram

APPLICATION:

• FARMING
• Research

FUNCTIONAL & NON-FUNCTIONAL REQUIREMENTS

Functional requirements: may involve calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements; these are captured in use cases.

Nonfunctional Requirements: (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.

Functional requirements

- Registration
- User Login
- Creation of database: Users Mandatory Information

Design Constraints:

1. Database
2. Operating System
3. Web-Based Non-functional Requirements

Security:

1. User Identification
2. Login ID
3. Modification

Performance Requirement:

1. Response Time
2. Capacity
3. User Interface
4. Maintainability
5. Availability

SYSTEM REQUIREMENTS

Hardware Requirements

• AMD/Intel i3 Processor or above Processor
• 4GB RAM for application development • 80 GB or above Hard Disk

Software Requirements

• Windows 7 or above
• Vscode, Xamp • Python

CONCLUSION

This system is proposed to deal with the increasing rate of farmer suicides and to help them to grow financially stronger. The Crop Recommender system helps the farmers to predict the yield of a given crop and also helps them to decide which crop to grow. Moreover, it also tells the user the right time to use the fertiliser. Appropriate datasets were collected, studied and trained using machine learning tools. The system tracks the user‘s location and fetches needed information from the backend based on the location. Thus, the user needs to provide limited information like the soil type and area.

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