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IOT Based Agriculture Monitoring System

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ABSTRACT: Agriculture and its allied sectors are undoubtedly the largest providers of livelihoods in rural India. The agriculture sector is also a significant contributor factor to the country's Gross Domestic Product (GDP). Blessing to the country is the overwhelming size of the agricultural sector. However, regrettable is the yield per hectare of crops in comparison to international standards. This is one of the possible causes for a higher suicide rate among marginal farmers in India. This paper proposes a viable and user-friendly yield prediction system for the farmers. The user provides the area & soil type as input. Machine learning algorithms allow choosing the most profitable crop list or predicting the crop yield for a user-selected crop. To predict the crop yield, selected Machine Learning algorithms such as SVM, are used. showed the best results with 95% accuracy. Additionally, the system also suggests the best time to use the fertilizers to boost up the yield

KEYWORDS: Gross Domestic Product, Yield Prediction System, Soil Type, Famers.

I. INTRODUCTION

In the world of developing technologies, the success of sharing information will help the agriculturists in realizing and developing their potential. The information sharing is that the valuable and timely information is being shared between agriculturists, either formally or informally. The willingness of information sharing refers to the open attitude among agriculturists. This open attitude determines the degree and scope of information sharing. Using web-technologies like html and css we build the web application, we create dataset by gathering data from multiple resources and place them in place which is used to predict the price of the crop and results are subjected to non-linear test later priorities are set and rankings are given to the list of crops [1]. Place information in our application and share that information to agriculturists whose data is collected and stored in the mysql server. We software to automatically send the updated information to the Agriculturists in the form of text message [2]. So that agriculturists no need to go to nearby towns and cities to know the updated information. We will be machine learning algorithms to predict the price of the crop for the next two months. For prediction purpose we will be using Support vector machine (SVM), Naïve Bayes's (NB) and K-Nearest Neighbour (KNN)[3] algorithms to predict the cost of the crop production. Further, a ranking process is applied for decision making in order to select the classifiers results.

Today, Agriculture gave birth to civilization. India is an agrarian country and its economy largely based upon crop productivity. Thus agriculture is that the backbone of all business in India. Now India stands in second rank in worldwide in farm production [4]. India is an agricultural country but remains using traditional ways of recommendations for agricultural purpose.

Problem Statement - Agriculture in India plays a predominant role in economy and employment. The common problem existing among the Indian farmers are they don't choose the right crop based on their soil requirements. Due to this they face a serious setback in productivity. This problem of the farmers has been addressed through machine learning based crop recommendation system.

Summary of our contribution - Data set collection from various sources. Data parsing and cleansing technique is applied to make the raw data into processing data. The data collected is subject to machine learning system along with run time analysis makes an efficient crop value updation system. Usage of Ensemble of classifiers makes the model more robust and efficient. Ranking technique used in the project helps us to make efficient decisions. Creating a web application for user registrations and collection of data. 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 model predicts the crop yield by studying factors such as rainfall, temperature, area, season, soil type etc.

II. REVIEW OF LITERATURE

Many approaches were applied to soil type in farming yield. Most of these approaches have used machine learning and data mining. The majority of related work focused on applying only one method of data mining to extract knowledge, and the others focused on comparing several strategies to predict soil type.

Manpreet Kaur proposed an approach to keep up nutrition levels in the soil in case of deficiency, fertilizers are added to soil. The standard issue existing among the Indian agriculturists choose approximate amount of fertilizers and add them manually [5]. Excess or deficient extension of fertilizers can harm the plants life and reduce the yield. This paper gives overview of various data mining frameworks used on cultivating soil dataset for fertilizer recommendation

J. Menf studied Agriculture is the most critical application area especially in the developing nations like India. Use of information technology in agriculture can change the situation of decision making and farmers can yield in better way [6]. This paper integrates the work of several authors in a single place so it is valuable for specialists to get data of current situation of data mining systems and applications in context to farming field

A. Kaloxylis et al., communicates the idea regarding the making of Agro Nutri an android application that helps in conveying the harvest particular fertilizer amount to be applied. The idea is to calculate the measure of NPK composts to be applied depend on the blanked proposal of the crop of interest. This application works depend on the product chosen by the farmer and that is taken as input, thus providing the farmers [7]. The future scope of the Agro Nutri is that GPRS can be included so that according to location nutrients are suggested.

Y. Rui studies Agriculture is a field that has been lacking from adaption of technologies and their advancements. Indian agriculturists should be up to the mark with the universal procedures. Machine learning is a native concept that can be applied to every field on all inputs and outputs. It has effectively settled its ability over ordinary calculations of software engineering and measurements [8]. Machine learning calculations have improved the exactness of artificial intelligence machines including sensor based frameworks utilized in accuracy farming. This paper has evaluated the different uses of machine learning in the farming area. It additionally gives a knowledge into the inconveniences looked by Indian farmers and how they can be resolved using these procedures.

Y. Wang, "A neural network adaptive control based on rapid learning method and its application" Advance in modelling and analysis will request more food from less land and water assets. This investigation evaluates the food production effects of four elective advancement situations from the Millennium Ecosystem Assessment and the Special Report on Emission Scenarios. partially and jointly considered are land and water supply impacts from population development, and specialized change, and forests and agriculture demand request shifts from population development and economic improvement. The income impacts on nourishment request are registered with dynamic flexibilities [9]. Worldwide farming area increments by up to 14% somewhere in the range of 2010 and 2030. Deforestation restrictions strongly impact the price of land and water resources but have little consequences for the global level of food production and food prices. While projected income changes have the highest partial impact on per capita food consumption levels, population growth leads to the highest increase in total food production. The impact of technical change is amplified or mitigated by adaptations of land management intensities.

Jignasha. M. Jethva, frameworks science creates information that enables analysts to consider complex issues or take educated farming choices. The rich history of this science represents the decent variety of frameworks and scales over which they work and have been contemplated. Demonstrating, a basic apparatus in agrarian frameworks science, has been expert by researchers from an extensive variety of controls, who have contributed ideas and instruments over six decades. As agrarian researchers currently consider the "people to come" models, information, and learning items expected to meet the inexorably mind boggling frameworks issues looked by society, it is vital to check out this history and its exercises to guarantee that we stay away from re-innovation and endeavor to think about all elements of related difficulties. To this end, we outline here the historical backdrop of rural frameworks demonstrating and distinguish exercises discovered that can help control the structure and advancement of up and coming age of farming framework apparatuses and techniques [10]. Various past occasions joined with generally innovative advancement in different fields have unequivocally added to the development of farming framework demonstrating, including improvement of process-based bio-physical models of yields and domesticated animals, factual models dependent on verifiable perceptions, and financial streamlining and reproduction models at family unit and local to worldwide

scales. Attributes of rural frameworks models have changed broadly relying upon the frameworks included, their scales, and the extensive variety of purposes that spurred their advancement and use by specialists in various controls. Late patterns in more extensive joint effort crosswise over establishments, crosswise over orders, and between people in general and private segments recommend that the stage is set for the significant advances in rural frameworks science that are required for the up and coming age of models, databases, learning items and choice emotionally.

Most of the previous research papers did not perform the feature engineering phase or build features from raw data while they relied on ready features provided either by telecom companies or published on the internet. In this paper, the feature engineering phase is taken into consideration to create our own features to be used in machine learning algorithms. We prepared the data using a big data and compared the results of three classification based machine learning algorithms.

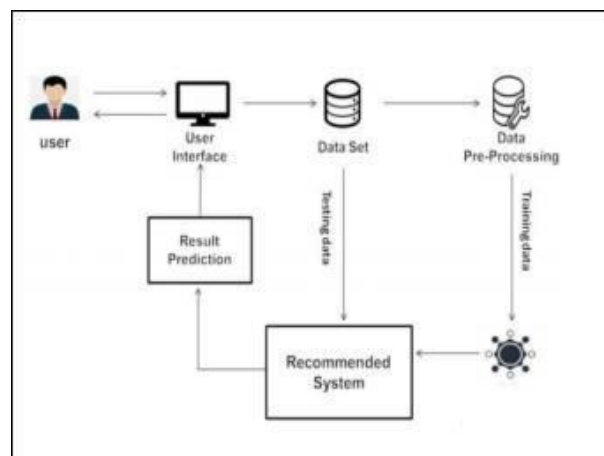
III. PROPOSED SYSTEM

This consists of various phase of the proposed model. It consists five phases namely

1. **Admin login,**
2. **Metadata,**
3. **Data pre-processing,**
4. **Crop Prediction Module**
5. **Crop Recommendation Module**

In proposed a model that addresses 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.

Fig 3.1 System Architecture



The proposed model provides crop selection based on economic and 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 model predicts the crop 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.

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 predicts the crop yield 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 proposed system uses recommender system to suggest the right time for using fertilizers.

Data pre-processing is one of the important techniques of data mining which helps to clean and filter the data [11].

Thus, removing the inconsistencies and converting raw data into a meaningful information which can be managed efficiently. It is important to remove null values or missing values in the data-set and to check the data-set for imbalanced class distributions, which has been one of the emerging problems of data mining. The problem of imbalanced data-set can be solved through re-sampling techniques.

Admin login

This is the first activity, Admin needs to provide a correct contact number and a password, which user enters while registering, in order to login into the webpage. If information provided by the admin matches with the data in the database table then user successfully login into the webpage else message of login failed is displayed and user need to re-enter correct information

Metadata

All the main data used in the data set are initialized with the number to use in the algorithm it is like initializing all the details. In this metadata, we are going to initialize all the crop names with the numbers. This data makes us use the data easily in the algorithm. Hear the metadata of all the crops is given with a particular number [12]. This number is not duplicated that is one number is given to one crop, the same number is not given to the other crop. This metadata consists of more than a hundred crops that grown all over India.

Data pre processing

Hear the raw data in the crop data is cleaned and the metadata is appending to it by removing the things, which are converted to the integer. So, the data is easy to train. Hear all the data. In this pre-processing, we first load the metadata into this and then this metadata will be attached to the data and replace the converted data with metadata. Then this data will be moved further and remove the unwanted data in the list and it will divide the data into the train and the test data [14].

Crop Prediction Module

The obtained result will be helpful for the farmers to know the Yield of the crop so, he can go for the better crop which gives high yield and also say them the efficient use of agriculture field. This way we can help the farmers to grow the crop which gives them better yield.

Crop Recommendation Module

In crop recommendation module, we have proposed a model that addresses these issues [13]. 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 crop fertilization.

IV. METHODOLOGY

The smart agriculture is an effective lever to Ensure the agro ecological transition for biodiversity and ecological processes to design efficient, sustainable and beneficial productivity; Integrate vegetal and animal phenotyping tools and methods to set up and improve new production systems adaptable to local complex environmental conditions; Connect farm animals for more sustainable and respectful production system by using sensors at the individual level; Evolve consulting agriculture services towards more personalized and targeted advice; based on the massive flows of contextualized data analyzed in nearly real time [14].

Precision agriculture seeks to optimize production processes by monitoring and analyzing environmental variables. For example, establishing farming actions on the crop requires analyzing variables such as temperature, ambient humidity, soil moisture, solar irradiance, an rainfall

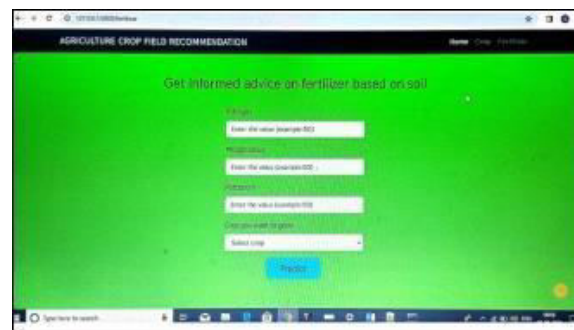


Fig 4.1 Get Inform that Advice on Fertilizer Based on Soil

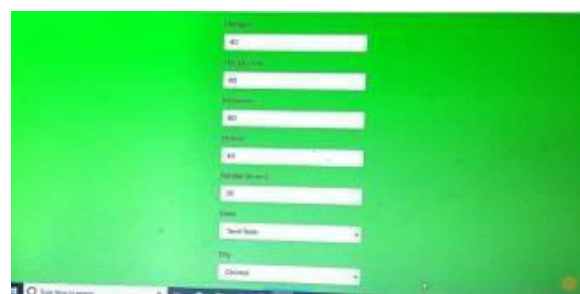


Fig 4.2 Get Inform that Advice on Crop Based on Soil

V. DISCUSSION

The importance of crop management was extensively examined in this research. Farmers require modern technology to help them raise their crops. Agriculturists can be notified about accurate crop predictions on a timely basis.

To examine agriculture parameters, many Machine Learning algorithms were applied.

A literature review examines some of the strategies used in many parts of agriculture [15]. Soft computing techniques, such as blooming neural networks, play an important role in delivering recommendations.

More tailored and appropriate advice can be offered to farmers based on parameters such as production and season, allowing them to produce a higher volume of product

VI. CONCLUSION AND FUTURE ENHANCEMENT

This open attitude determines the degree and scope of information sharing. Big data analysis technology can effectively improve the crop yield production is updatation. This project proposes a novel intelligent system for agricultural crop price prediction. The key idea is to use ensemble of classifiers for prediction. The usage of ensemble of classifiers paves a path way to make a better decision on predictions due to the usage of multiple classifiers. Further, a ranking process is applied for decision making in order to select the classifiers results. This system is used to predict the cost of the crop rate for further. The solution will benefit farmers to maximize productivity in agriculture, reduce soil degradation in cultivated fields, and reduce fertilizer use in crop production by recommending the right crop by considering various attributes. This would provide a comprehensive prediction on the basis of geographical, environmental and economic aspects.

At present we have limited our scope only to a crop recommendation system, but this in the future can be extended to other areas such as fertilizer recommendations, wherein a person can get the information of the fertilizer suitable for his crop. Another extended application of this could be plant disease classification using CNN and also giving a remedy to that disease. As agriculture is quite an unexplored area, the scope for such a type of project is tremendous. While we have made a working website for our model, in the future this can also be made into an app so that it is easier for the farmers to access. Both the website and the app can be made in regional languages so that people would be more comfortable using them

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