IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 8, May 2022
Impact Factor: 6.252

Prediction of Crop Yield Using Machine Learning Algorithm

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Abstract: *Crop yield production value updation has a positive practical significance for guiding agricultural production and for notifying the change in market rate of crop to the farmer. The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production. Different types of land condition. So, the quality of the crops is identified using ranking process. By this process the rate of the low quality and high-quality crop is also notified. 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 crop which is yielded for further.*

Keywords: Prediction of crop price, ranking of crops, present and future prediction of crop price, data representation.

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. 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.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 Baye's (NB) and K-Nearest Neighour(KNN) 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.

II. LITERATURE SURVEY

A. A Review on Data Mining Techniques for Fertilizer Recommendation

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 number of fertilizers and add them manually. 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.

B. A Survey on Data Mining Techniques in Agriculture

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. Data mining

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plays an important role in decision making on several aspects with agriculture field. It examines about role of data mining in the farming field and their related work by a few authors in related to agriculture domain.
It additionally talks about on various data mining applications in taking care of the several agriculture problems. 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.

C. AgroNutri Android Application

This paper communicates the idea regarding the making of AgroNutri 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 depends on the product chosen by the farmer and that is taken as input, thus providing the farmers. The future scope of the AgroNutri is that GPRS can be included so that according to location nutrients are suggested. Further this application would be incorporated as a piece of the accuracy agriculture wherein sensors can be utilized to discover the measure of NPK present in the dirt and that sum can be deducted from the suggestion and giving us the exact measure of supplements to be added.

D. Machine Learning: Applications in Indian Agriculture

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. 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.

E. Impacts of population growth, economic development, and technical change on global food production and consumption

Throughout the following decades humanity 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. 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.

F. Brief history of agricultural systems modelling

Rural 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. 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

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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 supportive networks. The exercises from history ought to be considered to help stay away from barricades and entanglements as the network builds up this up-and-coming age of horticultural frameworks models.

G. A Smart Agricultural Model by Integrating IoT, Mobile and Cloud-based Big Data Analytics

In the cultivating field, the system models play a significant role to the enhancement of the agro-normal and money related conditions. In the proportions of benefits of the field and farm examinations to give the information and to recognize fitting and fruitful organization practices. It can recognize the organization to arrive managers and transversely over reality as long as the required soil, the board, environment, and money related information. Decision Support Systems (DSSs) use to make the information for the vermin the board, develop the officials. These systems are not using the impelled strategies to process the data. Thusly, use the adroit system thoughts to take the decisions for the issue. It expects a crucial activity in the comprehension of agronomic results, and their use as decision sincerely steady systems for farmers is extending.

H. An Overview of Internet of Things and Data Analytics in Agriculture: Benefits and Challenges

A blueprint of IoT and DA in agriculture has been shown in this paper. A couple of zones related to the association of IoT in agribusiness have been discussed in detail. The investigation of composing exhibits that there are clusters of work advancing being produced of IoT development that can be used to increase operational efficiency and gainfulness of plant and creatures. The benefits of IoT and DA, and open troubles have been identified and inspected in this paper. IoT is depended upon to offer a couple of benefits to the agribusiness division. Regardless, there are up 'til now different issues to be steered to make it moderate for close to nothing and medium-scale farmers. The key issues are security and cost. It is typical that as contention increases in the cultivating part.

I. Circulation Mode Selection Based on Cost Analysis

If every farmer and each average production base will join their optimal conditions in making cooperatives, it will accomplish economies of scale. Furthermore, producers will have an all the more favourable position in the plans with downstream firms (shipper or retailer). Second, the main customers of wholesale market are not inhabitants nearby who buy small quantities products but lower distributors or retailers. More redesigned transportation mode respects intensive attempt of new agrarian things, which prompts bolster the movement of new chain joint logistics and strengthen resource utilize and made logistics advantage quality. Refresh everything considered agrarian things spread. By then, regard the examination of gigantic worth control of standard things and achieve the mind-blowing control to stream process.

J. Support Vector Machine-based Fuzzy Self-learning Control for Induction Machines

Using support vector machine (SVM) is to realize the self-learning of fuzzy inference system (FIS), based on a fast modified varying metric method (MDFP) and a support vector machine identifier (SVMI), a SVM-FIS self-learning controller for the three phase induction machine adjustable speed system has been designed. The proposed controller is not only of the advantages that FIS does not depend on the plant model, strong robustness, and adaptive self-learning ability, but also learning ability and generalization performance of SVM. The designed processes of SVM-FIS, MDFP, and SVMI algorithms have been described in details. Simulation results show the feasibility, correctness and effectiveness of the proposed control strategy, such as the excellent static and dynamic performances, and strong anti-interference ability.

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K. Machine Learning Facilitated Rice Prediction in Bangladesh

In this examination, self-organising map (SOM) was utilized to group the information relationship between the information factors. After that chi-square test strategy was utilized to set up the level of reliance between the related variable qualities. It was discovered that the day-by-day outrageous climate conditions, for example, most extreme and least fluctuation in temperature, precipitation, dampness and wind speed were the principal drivers of product development, yield and wine quality

L. Support Vector Machine-Based Classification Scheme of Maize Crop

This paper says about, advancement of a mechanized framework to distinguish and group weeds from the products would be of extraordinary help and we have proposed a set-up that decreases labour. We have considered pictures of maize edits as the informational index. Separating surface highlights of the picture and applying SVM (support vector machine) to arrange whether the given picture is a weed or a yield brought about a precision of 82%. In this way, picture preparing is a proficient method to group the given picture about whether it is a weed or a yield. A similar classifier can be connected to recognize number of harvests like groundnut, paddy from weeds. The proposed framework gives a chance to investigate more about element extraction methods. Further research and usage may incorporate building up a mechanized equipment framework which could help in removal of weeds in the fields.

M. With Machine Learning Algorithm for Estimating Winter Wheat Areas

We utilize different kernel functions in the CPPI models to depict the connection between fractional winter wheat area and MODIS EVI time series data. We tried three straight and non-direct kernel functions, including linear regression, artificial neural system, and support vector machine. The differences when utilizing various kernel functions are minor for areas with basic planting structure. For areas like DT where multiple crop types have comparative phenology cycles, ANN-CPPI is found to play out the best. The two crop types, to be specific winter wheat and rapeseed, can be separated well. These tests give elective answers for the uses of CPPI in mixed areas.

III. EXISITING SYSTEM

The computational and data demands of structural price forecasting generally far exceed than what is routinely available in developing countries. Consequently, researchers often rely on parsimonious representations of price processes for their forecasting needs. Contemporary parsimonious form of price forecasting relies heavily on time series modelling. In time series modelling, past observations of the same variable are collected and analyzed to develop a model describing the underlying relationship. During the past few decades, much effort has been devoted to the development and improvement of time series forecasting models. Time series modelling requires less onerous data input for regular and up-to date price forecasting. Hence there is a need for better classification which would be an ensemble or hybrid classification model.

IV. PROPOSED SYSTEM

In proposed system, the data analysis technology is used to update the crop yield rate change. The concept of this paper is to implement the crop selection method so that this method helps in solving many agriculture and farmers problems. This improves our Indian economy by maximizing the yield rate of crop production. Different types of land condition. So, the quality of the crops is identified using ranking process. By this process the rate of the low quality and high-quality crop is also intimated. 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 fertilizers for further. This project uses Ensemble of classifiers such as SVM, NAÏVE BAYES, KNN or hybrid classifier. In addition, this project uses Ranking technique.

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V. SYSTEM ARCHITECHTURE

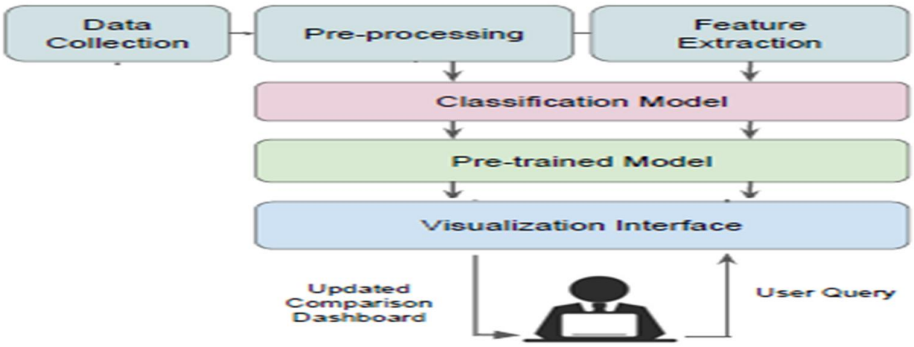

Figure 1: SYSTEM ARCHITECURE

VI. ALGORITHM USED

1. K-NEAREST NEIGHBOR (KNN) CLASSIFICATION METHOD

K-NN is a type of instance-based learning, or lazy learning, where the function is only approximated locally and all computation is deferred until classification. The k-NN algorithm is among the simplest of all machine learning algorithms. The neighbors are taken from a set of objects for which the class (for k-NN classification) or the object property value (for k-NN regression) is known.

STEP 1: BEGIN
STEP 2: Input: D = {(x1, c1), . . . , (xN , cN)}
STEP 3: x = (x1. . . xn) new instance to be classified
STEP 4: FOR each labelled instance (xi, ci) calculate d (xi, x)
STEP 5: Order d (xi , x) from lowest to highest, (i = 1. . . N)
STEP 6: Select the K nearest instances to x: Dkx
STEP 7: Assign to x the most frequent class in Dkx
STEP 8: END

2. NAIVE BAYES ALGORITHM

It is a classification technique based on Bayes' Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature. For example, a fruit may be considered to be an apple if it is red, round, and about 3 inches in diameter. How Naive Bayes algorithm works? Let's understand it using an example. Below I have a training data set of weather and corresponding target variable 'Play' (suggesting possibilities of playing). Now, we need to classify whether players will play or not based on weather condition. Let's follow the below steps to perform it.

STEP 1: Convert the data set into a frequency table
STEP 2: Create Likelihood table by finding the probabilities like Overcast probability = 0.29 and probability of playing is 0.64.
STEP 3: Now, use Naive Bayesian equation to calculate the posterior probability for each class. The class with the highest posterior probability is the outcome of prediction.

3. SVM (Support Vector Machine)

- For a dataset consisting of features set and labels set, an SVM classifier builds a model to predict classes for new examples.

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- It assigns new example/data points to one of the classes. If there are only 2 classes then it can be called as a Binary SVM Classifier.
- There are 2 kinds of SVM classifiers:
- Linear SVM Classifier
- Non-Linear SVM Classifier
- SVM Linear Classifier:
- In the linear classifier model, we assumed that training examples plotted in space. These data points are expected to be separated by an apparent gap. It predicts a straight hyperplane dividing 2 classes. The primary focus while drawing the hyperplane is on maximizing the distance from hyperplane to the nearest data point of either class. The drawn hyperplane called as a maximum-margin hyperplane.
- SVM Non-Linear Classifier:
- In the real world, our dataset is generally dispersed up to some extent. To solve this problem separation of data into different classes on the basis of a straight linear hyperplane can't be considered a good choice. For this Vapnik suggested creating Non-Linear Classifiers by applying the kernel trick to maximum-margin hyperplanes. In Non-Linear SVM Classification, data points plotted in a higher dimensional space.

VI. CONCLUSION

This open attitude determines the degree and scope of information sharing. Big data analysis technology can effectively improve the crop yield production is updation. 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.

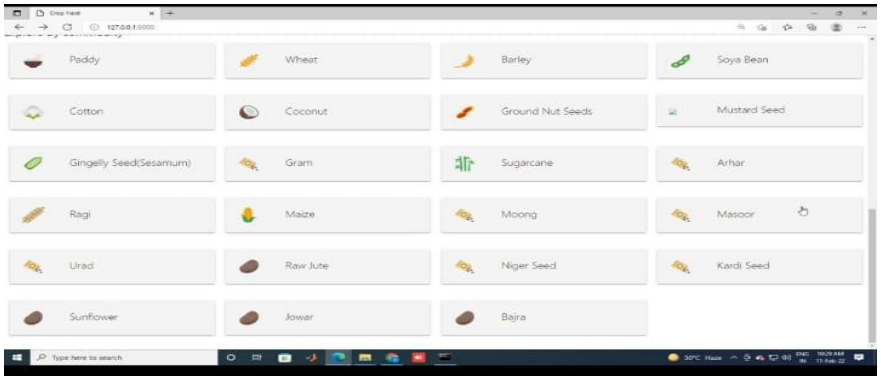

Figure 2: HOME PAGE

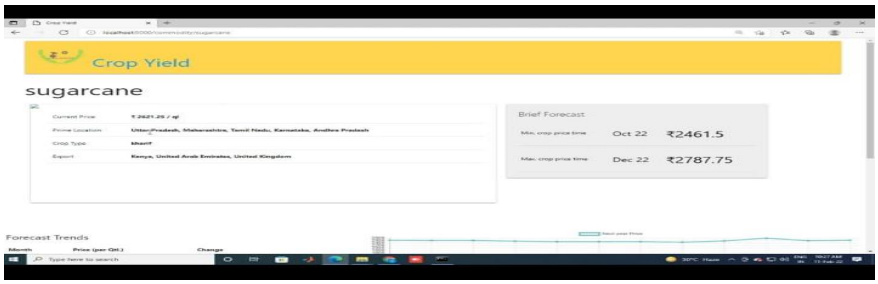

Figure 3: CROP DETAIL PAGE

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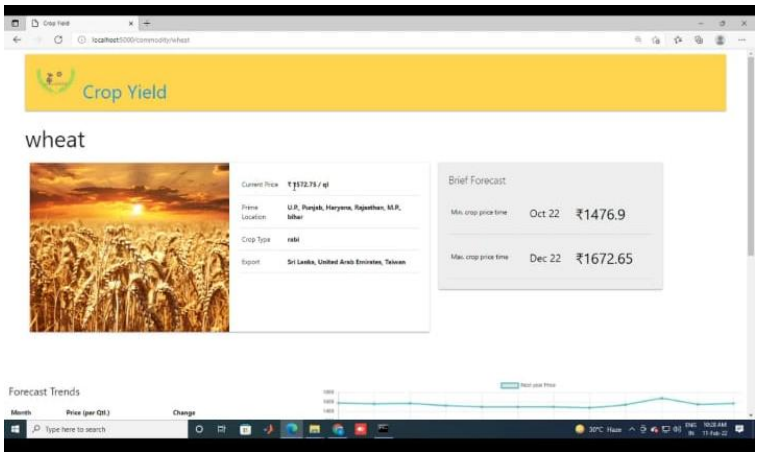

Figure 4: CROP DETAIL PAGE

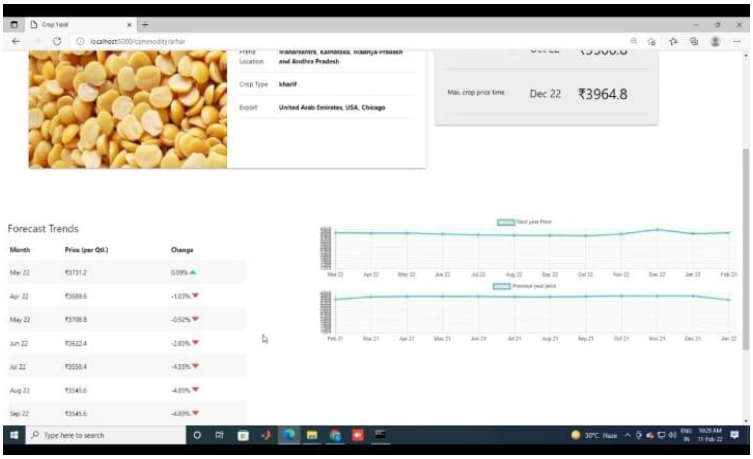

Figure 5: CROP PRICE WITH GRAPH

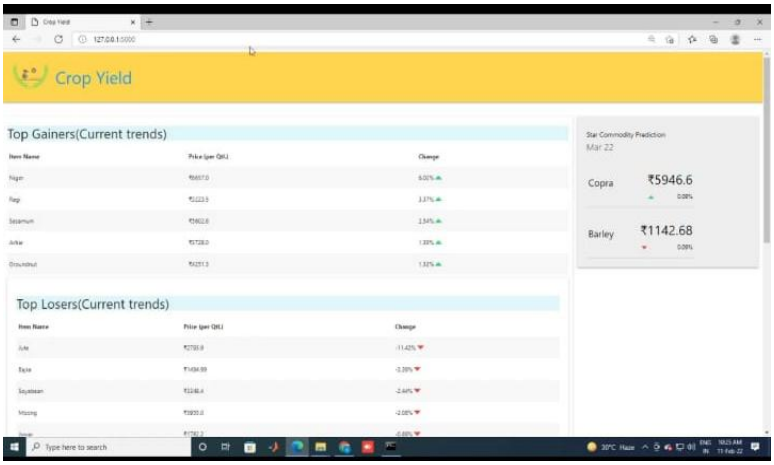

Figure 6: CROP PRICE RANK

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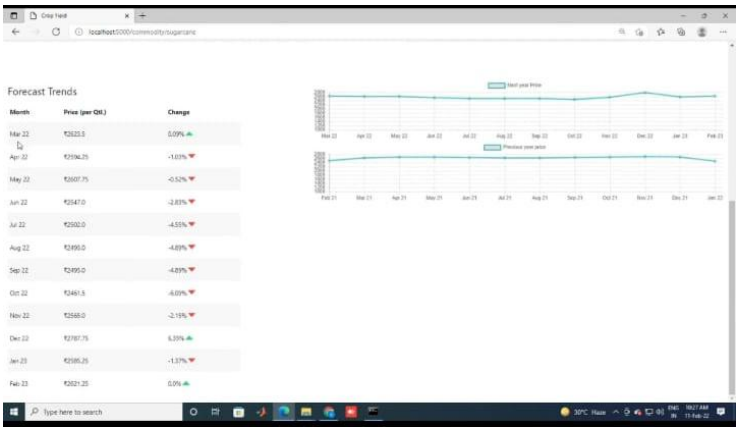

Figure 7: GRAPHIC REPRESENTATION OF CROPS WITH PRICE

ACKNOWLEDGMENT

We Would like to thank all our faculties, friends and family members who have directly and indirectly helped in easy completion of our project. Special thanks to P.V. Hemavathy Professor, Department of Information Technology, Prince Shri Venkateshwara Padmavathy Engineering college, Chennai, Tamil Nadu, India for guiding us in completing this project successful.

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