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Prediction the best price for crops and spices using Machine Learning

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Abstract:

In the current scenario, many farmers and cultivators are unaware of the future prices of their crops and the export value of their spices in the market. Due to which a lot of these farmers and cultivators are not getting their rightful share of the profit margin while selling their produce. To solve this problem, this paper presents a solution i.e. the creation of a model which predicts the future price of crops and also estimates the export value of spices by applying Machine Learning Algorithm. This proposed system will help farmers and cultivators to know the future estimate their crops and export value of their spices, through which they can increase their productivity and profit margins.

Keywords — farmers, cultivators, crops, spices, predict, estimate, Machine Learning Algorithm.

I. INTRODUCTION

Farmers generally grow the crops that have been planted traditionally in their region and can suffer losses due to the lack of information of the possible value of the crop at the time of harvesting and selling. Without the prior knowledge about the future market value of the crops, farmers invest a lot of money in the cultivation of crops in their fields and if in case the market value of these crops fall below their expectations then these farmers will have to suffer huge financial losses. Every year

nearly 10,000 farmers commit suicide due to mounting debts, failure of their yields and failure in selling their crops at their minimum expected rate. After doing many research, it was found that the major reason behind farmers turning to such as drastic step is that the farmers were unable to repay the loans which they have to take for the purchase of seeds, equipment, fertilizers and other essential items for cultivation of crops as their produce does not fetch them the price they require not only to pay back the loans but also to make their living. To address this issue, this model has been proposed

which can help the farmer by giving them an estimate of crop prices in the future, using which the farmers can decide which is the best crop for them to cultivate in their farms.

India is famous around the world as the “Land of Spices”, however most of the spices produced in here come from the corporate or large-scale farmers and not from small- scale farmers, even though small-scale farmers represent majority of the percentage of farmers in India. These small- scale farmers lack knowledge about the economic benefits of cultivating spices due to which most them grow traditional crops where there are chances that the value of those crops getting critically low and these farmers suffering losses. Rest of the small percentage of these small-scale farmers who do grow spices, due to the lack of sufficient knowledge about the demand and value of their spices, sell their spices at wrong time and at cheaper rates than the actual value of those spices. Due to such issues these small-scale farmers miss out the financial benefits which they could have utilized to improve their financial conditions. To address this problem, the proposed system will help provide the farmers with the necessary financial information about the future value of spices, which will help them educate and realize the benefits of growing spices

II. RELATED WORK

In the past few decades, due to the high rate of development of Machine Learning concepts, its range of applications has increased to a huge extent so as to include even solutions to problems in the agriculture sector. Many systems and research papers have been proposed with possible solutions to tackle the problems in agriculture sector whoever most of these solutions have only been built theoretically without any practical application

In [1] Yongli Zhang et.al showed that price forecasting model can be created using Machine Learning concepts such as fuzzy information granulation, mind evolutionary algorithm(MEA) and support vector machine(SVM).

In [2] Fabrizio Balducci et.al through this study showed the way of managing heterogenous data in real world datasets and their implementation in practical tasks such as crop harvest forecasting to wrong or missing data reconstruction.

In [3] P.Priya et.al through the paper shows that previous year datasets containing the crop prices from past years cab be used in Machine Learning Models for prediction of future value of those crops.

In [4] S.Veenadhari et.al presents the results obtained through the study of a software tool named ‘Crop Advisor’ which had been developed as an user-friendly webpage for predicting the influence of climatic parameters on the crop yields.

In [5] R.K.Bhardwaj et.al proposed the detailed study of constraints as well as the challenges facing the production of spices in India and the various obstacles that are present in the development and expansion of the export of spices from the Indian Markets.

In the area of crop price prediction in particular, there has been no development in the country and majority of the price predictions that take place are done manually at centers such as agricultural institutes and colleges, APMC’s and other such facilities where the chances of getting faulty results are very high due to human error taking place.

III. OBJECTIVES

All paragraphs must be indented. Objective of this paper is to create a system that will provide the farmers with the future estimates of values for crops and spices, so that they can make better choices for themselves based on that information. The following objectives are accomplished through this paper:

- Providing the farmers with the future price estimates for crops (such as black gram, groundnut).
- Providing the farmers with the future estimate of spices (such as pepper, ginger).

- To increase the accuracy of crop price prediction systems and also to provide easy-to-use User Interface System.
- Try to sway the farmers to produce spices by presenting their economic benefits.

IV. METHODOLOGY

In this project, we are using different technologies to make our platform safe and secure with a good user experience. Price Prediction systems usually require a variety of techniques to give an accurate future value of a product on the basis of some past results or data. This paper presents a model that is based on the utilization of the concept of price prediction using Machine Learning. The model uses Machine Learning Algorithm to give the estimated crop prices and export value of spices by taking as input historical data set i.e., previous 5 year's information about the prices of crops like black gram, groundnut and prices of spices like ginger, pepper.

A. Linear Regression Algorithm:

The entire document should be in Times New Roman or Times font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes. Linear Regression is one of the most used and easily understandable algorithms used in Machine Learning. Linear Regression is a model where the relation between the input variables(x) and single output variable(y) is considered to be linear. In simple linear regression, single input is used so that statistics can be used to estimate the coefficients. To predict this coefficient requires the calculation of statistical properties from the data such as mean, standard deviation, correlation and covariance. Therefore, all of the data should be present in such a form that calculations can be easily performed on it.

Here are the steps that are followed when using linear regression algorithm:

- Step 1: Importing Libraries
- Step 2: Loading Datasets
- Step 3: Splitting into Independent and

Dependent variables.

Step 4: Splitting Data into training and testing Data.

Step 5: Choosing the Model.

Step 6: Fitting our Model.

Step 7: Predicting the output.

Step 8: Plot the graph.

B. Decision Tree

Decision Tree is a decision-making tool that uses a flowchart-like tree structure where all the possible results including outcomes, input costs and utility are placed at the node points. Decision Tree Algorithm comes under supervised learning algorithms. It works for both continuous output and categorical output. Decision Tree algorithm is very popular algorithm in Machine Learning.

C. Decision Tree Regression

No more than Decision Tree Regression observes features of an object and trains a model in the future to produce meaningful continuous output. Continuous output means that the result is not discrete i.e., it is not represented just by a known set of numbers or values.

V. SYSTEM DESIGN & IMPLEMENTATION

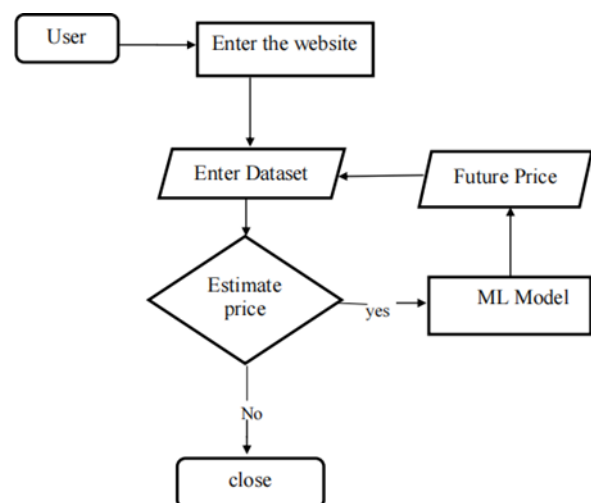


Fig 1 Flow Chart of Proposed System

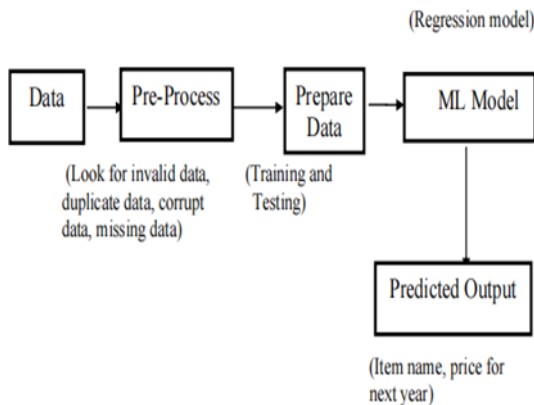


Fig 2 Proposed System

A. Data:

Figures The data required in this model is the input datasets which contain the price information of the crops like black gram, groundnut and spices like pepper, ginger from the previous 5 years. The datasets containing the price related information has to be in the .CSV file format as it is the standard format used in Machine Learning Applications. Inside the datasets the values are segregated using rows and columns along with empty values sometimes. These empty rows and columns can create anomalies in dataset and thus are removed by the next step of Pre-Processing in the model.

B. Pre-Process:

Pre-Processing is the step in which all the corrupt values are removed from the input dataset provided to the model. These corrupt or null values that are removed from the datasets are replaced by taking the mean or standard deviation of all the values in the datasets. If Pre-Processing step is not performed properly then the model will not be trained properly which will result in inaccurate output. Pre-Process step consumes about 50%-60% of time needed by the model during the processing of information.

C. ML Model:

After Pre-Processing, we get the prepared dataset which then has to be divided into two parts i.e.,

train data and test data. The train data is used in the ML Model for testing and evaluating the Model taken into consideration. Through this testing, the most suitable algorithm is selected which can give accurate results for the given input. The final output is predicted using the same test data which was obtained from the prepared dataset.

D. Predicted Output:

After the ML Model has processed the datasets, the output from the model will be generated. The result is provided in a .CSV file which will contain the future price estimation for crops and spices. This result can be stored later in Excel file for ease of use for the users.

VI. RESULTS

Fig. Through this system, farmers can get the future price estimates of crop and spices. After the implementation of the proposed system, accurate price estimations can be made based on the availability of the required input datasets. The predicted output will be the future estimate of the price of crops or spices over the range of next future year or next 12 months. The results that will be given by the system will be in the form of .CSV file format, which is the standard file format in Machine Learning. For ease of access and understanding, this result can be converted and stored in Excel sheets. For the proper understanding about the working of the proposed system, a working project which utilizes the concept of price prediction using Machine Learning is taken into consideration and its results have been analyzed for proving the effectiveness of the proposed concept.

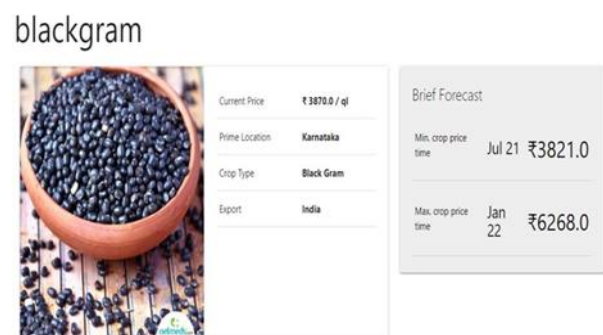


Fig 3 Resulting Future Estimates

Please The above screenshot Fig. 3 shows the result of a system built for the practical implementation of the concept of a price prediction model using Machine Learning Algorithm. The result gives the current price of the black gram crop, the prime location i.e., the area of cultivation of the crop, the type of crop taken into consideration and the export market i.e., the possible markets where the crop can be sold. The Brief Forecast is also given which contains two values. Here, Min. Crop Price contains the name of the month and the corresponding price estimate for the crop in which the estimated value of the crop will be at its lowest and Max Crop Price contains the name of the month and corresponding price estimate for the crop where the future value of the crop will be at its highest.

Forecast Trends

Month	Price (per Qtl.)	Change
Jun 21	₹5930.0	53.23% ▲
Jul 21	₹3821.0	-1.27% ▼
Aug 21	₹4409.0	13.93% ▲
Sep 21	₹5750.0	48.58% ▲
Oct 21	₹5828.0	50.59% ▲
Nov 21	₹5398.0	39.48% ▲
Dec 21	₹5706.0	47.44% ▲
Jan 22	₹6268.0	61.96% ▲
Feb 22	₹5203.0	34.44% ▲
Mar 22	₹5451.0	40.85% ▲

Fig. 4 Future Forecast Values

Figure In the above picture Fig. 4, the resulting future price forecast is shown for the crop black gram in the form of a table. The Forecast Table contains the price estimations of the crop for the duration of an entire year i.e., 12 months ranging from JUNE 2021 till JUNE 2022. The table displays the future predicted months.

The percentage of change in the value of the crop is taken with respect to the change in the crop price in the same month during the previous year.

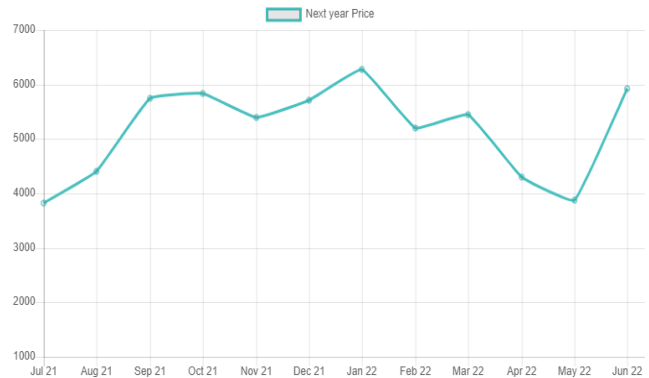


Fig. 5 Next Year Graph

Tables The above picture Fig. 5 represents a graph displaying the Next Year Predicted values. The graph plots the value of each of the month for which the price estimation for the crop has been made. In the graph, x-axis represents the month and year of the estimated values for the crop and y-axis contains the price value of the crop in per Quintal value. Through this graph the possible changes in the future value of a specific crop or spice can be shown to the farmer and the farmer can easily decide whether he should cultivate this crop or not.



Fig. 6 Previous Year Graph

Pag The above picture Fig. 6 shows the graph representing the previous year values. The graph plots the value for each of the month that was given as input to the system. In the graph, x-axis represents the month and year of the estimated values for the crop and y-axis contains the price

value of the crop in per Quintal value. Through this graph the changes in the past values can be compared with the graph displaying Next Year Predicted values to get accurate measure of the total possible changes in the value of the crop in the future.

VII. CONCLUSIONS

The version of this template is V2. Prediction of the future value of crops and spices can be achieved with the implementation of this system. The system will also give an accurate prediction of the percentage change in the value of any crop or spice taken into consideration. The application of the proposed system has been established by the creation of a model based on price prediction of crops and spices using Machine Learning Algorithm which will provide efficient and effective results which will benefit the farmers as well as agricultural sector. The model not only gives the estimated value but also represents the results using graphs, percentages making it easier to understand for the normal farmers, thus providing

them with an easily understandable and effective model.

ACKNOWLEDGMENT

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