IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

RAITHA SAATHI (An AI/ML-based application for market price and demand prediction)

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Abstract:
Crop price prediction is important for farmers as it helps in making intelligent decisions about agricultural production, and trade. With accurate price forecasting, farmers can optimize their planting decisions, determine the time for harvest, and plan their sales strategy to get the best prices for their crops. The importance of crop price prediction has grown in recent years, as climate change and other factors have made agricultural markets increasingly volatile, making accurate price forecasting more critical than ever. As a result, there is a growing need for sophisticated models that can analyze large amounts of data to provide accurate predictions of future crop prices. Farmers are no longer looking to use analytics to get data they need to realize actionable insights and take informed decisions. Most of the farmers in other countries are started to migrate to automated farming. Estimating and evaluating crop prices prior to cultivating a particular crop can lead to informed decision-making, reducing losses and effectively managing risks of price fluctuations. When the price falls, farmers face immense losses. We used the Random Forest Algorithm to analyze the previous data and predict the price for the latest data and estimate the price

1.Introduction:

Crop price prediction is the process of forecasting the future prices of agricultural commodities. Achieving profits with limited land resources is the goal of agriculture. Earlier farming predictions were based on a farmer's past experience in a particular field of crops. With changing conditions, there is a pressing need for agricultural practices to advance and keep pace with the evolving landscape. This process involves analyzing historical data, current market conditions, and various economic and environmental factors that can affect crop yields and prices. The accurate prediction of crop prices is essential for the proper functioning of agricultural markets, as it allows farmers to make informed decisions. Productivity can be improved by understanding and predicting crop prices through this application.

2.Impacts:

The impacts on farmers without crop price prediction can be significant. Some of the potential results are outlined below:

Price volatility: Farmers are often unable to predict the market demand for their crops and how it will impact the price of their products. This unpredictability can lead to price volatility, which can impact the farmer's profitability and financial stability.

Overproduction or underproduction: Without knowledge of the market demand and prices, farmers may produce too much or too little of a particular crop, which can result in either unsold produce or a loss of revenue due to low prices.

Risk of financial losses: Farmers who are unable to predict crop prices are at risk of experiencing financial losses. This can occur if the cost of production is higher than the price at which the crop can be sold.

Reduced access to credit: Financial institutions may be hesitant to provide loans to farmers who are unable to predict crop prices. This can limit a farmer's ability to invest in their farm and improve their crop yields.

Lack of planning: Farmers who are unable to predict crop prices are unable to plan for the future. This can lead to missed opportunities for diversification, crop rotation, and strategic planning that can improve the long-term profitability of their farm.

Overall, the lack of crop price prediction can have significant impacts on the financial stability and profitability of farmers, which can in turn impact the agricultural industry as a whole.

3. Methodology:

Data Collection: The initial stage involves gathering data pertaining to several factors influencing crop prices, including historical prices, weather conditions, soil information, and economic indicators.

Data Pre-processing: Subsequently, the collected data undergoes pre-processing to eliminate any missing or irrelevant data, standardize the information, and convert categorical variables into numerical formats.

Feature Selection: Following pre-processing, the subsequent phase involves selecting the pertinent features that possess the most pronounced influence on crop prices. Various techniques like correlation analysis, PCA, and mutual information can be employed for this purpose.

Train-Test Split: The dataset is then split into training and testing datasets. The training dataset is used to train the Random Forest model, while the testing dataset is used to evaluate the model's performance.

Model Training: The Random Forest model is trained using the training dataset. The algorithm builds multiple decision trees using random subsets of the data and combines them to make a final prediction.

Model Evaluation: The performance of the model is evaluated using the testing dataset. The evaluation metrics used may include mean squared error, mean absolute error, or R-squared.

Hyperparameter Tuning: In order to enhance the model's performance, it is necessary to fine-tune the algorithm's hyperparameters. This process entails adjusting variables such as the number of decision trees, the number of features utilized in each decision tree, and the depth of the decision trees.

Prediction: Once the model has been trained and evaluated, it becomes capable of forecasting forthcoming crop prices. This involves inputting new data, such as current weather conditions and economic indicators, and employing the trained model to generate predictions.

Model Interpretation: Lastly, the model can be interpreted to comprehend the influence of different features on crop prices. Techniques like feature importance analysis and partial dependence plots can be utilized for this purpose.

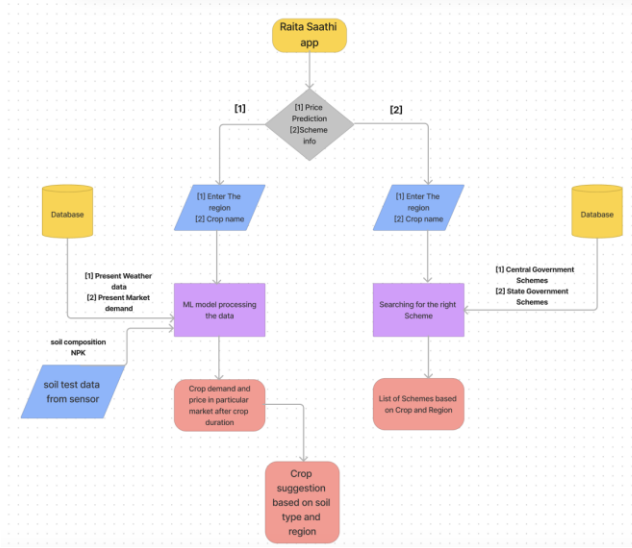

Fig. Raitha Saathi App

4.Conclusion:

The suggested system Raitha Saathi Application using the Random Forest algorithm is a powerful machine learning technique that can be used for crop price prediction. This algorithm builds multiple decision trees using random subsets of the data and a random subset of the features and combines their predictions to make a final prediction. Random Forest is an effective method for reducing overfitting and handling both categorical and numerical data, making it well-suited for crop price prediction. By collecting and pre-processing data, selecting relevant features, training and tuning the model, and evaluating its performance, we can build an accurate and reliable model that can be used to predict future crop prices. The use of the Random Forest algorithm in crop price prediction can help farmers, traders, and policymakers make informed decisions and plan for the future, ultimately leading to a more efficient and sustainable agricultural industry.

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