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# Crop Price Prediction Using Machine Learning Algorithms

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**ABSTRACT:** India is an agriculture-based country, nearly 70% of households are farm-dependent, with farmer contributing his life to India's economy. They face major problem when the crop is not worth the price and when unaware of marketing price regarding crop in particular cluster. This model involves prediction of crop price and recommending best place near to the farmer, to sell his produce for a good profit. The process of forecasting crop price is really challenging, since it involves many parameters. Price prediction can be done by using different algorithms like SVR, Multi Linear Regression, Decision Tree Regressor, Random Forest Regressor, among which Random Forest Regressor was analysed to have a good accuracy with minimal error.

**KEYWORDS:** Price Prediction, Random Forest Regressor, Support Vector Regressor (SVR), Multi Linear Regression.

## I. INTRODUCTION

Farmers are the backbone of our nation. The history of agriculture in India dates to the Indus Valley Civilization and some parts of Southern India, where it was found to be practiced even by the Harappans. Agriculture is a vast sector of the Indian economy and has a vital role to play in the country's economic development by providing food, raw materials and employment to a large proportion of population, capital for its own development and surpluses for the national economic development. This is the largest unorganized sector of the economy accounting for more than 90% share in total unorganized labour force. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth, yet, having nearly 50% of the population dependent on it for livelihood.

Agricultural sector has an important role to play in developing Indian economy, but the problems faced by farmers involves not receiving the average profit for the crops grown. So, with the help of random forest regressor algorithm and machine learning techniques crop price prediction can be done. The worth of the crop increases when it is healthy. The ideal conditions to harvest basic quality crop is soil, rich nutrient contents and climate condition co-operation. In India, there are several ways to increase the economic growth of agriculture.

India's agriculture composes of many crops, with the foremost food staples being rice and wheat. Indian farmers also grow pulses, potatoes, sugarcane, oilseeds, and non-food items like cotton, rubber, jute, coffee and tea are just a few to name. Despite the massive size of the field of agriculture, the yields per hectare of crops in India are significantly low compared to the international standards. The unfavourable distribution of rainfall, improper water management system, inefficiencies in harvesting, transportation and the lack of storage of government- subsidized crops are just a few issues that the farmers of the country face.

Suicide among farmers has been rising in India for the last 20 years. Nearly 3,00,000 farmers have ended their lives by ingesting pesticides or by hanging themselves due to loss they get from crop price. The suicide rate among Indian farmers had increased by 47%, according to a 2011 census in a country where agriculture remains the largest employment sector. The primary objective is to provide a forecast of the crop prices much before the crops are ready to be harvested, thus helping farmers get the desired price for his crop.

## II. DATA SOURCE

Data comprises of information collected and processed by the observations. The detail of data collection is different for different sector of study depending on the required statistics. Clustering the real time data of crop price with the known resource such as websites maintained by the Agricultural Department, Government of India, farmers get information for crop prices. These important sources include the authentic data of crop price for variety of crops such as fruits, vegetables and the cereals along with the everyday variation in crop price. This can be done by fetching the updated data with respect to each of the crops for the time period of at least few months. This information is essential to predict the crop price which will be a direct solution for the farmer to know beforehand where the crop price will be maximum thereby gaining a profit as per expectations.

## III. LITERATURE SURVEY

The paper titled [1] “CROP PRICE PREDICTION SYSTEM USING MACHINE LEARNING ALGORITHMS” states that, price prediction in agricultural field is very essential for the real data to predict the crop price of next rotation. Data needs to analysed, cleaned and undergo exploratory data analysis (EDA) to understand parameters in data and different data mining techniques were used to build a precise model for price prediction. ML algorithms such as Linear Regression, Decision Trees, XGBoost and Neural Networks were used for price prediction, among which XGBoost gave good performance.

The paper titled [2] “AGRICULTURAL GROWTH AND PRODUCTIVITY IN KARNATAKA:A DISTRICT LEVEL ANALYSIS” states that Karnataka agriculture experiences fluctuating climatic conditions traversing from dry zone to high rainfall regions. Upon analysis of secondary data published by Government of Karnataka in various profiles, it is estimated that most of the districts in Northern Karnataka are prone to drought and crop failures as a result of which this region is characterised as backward regions while Southern parts are developed regions. Shimoga, Davangere, Chickmagalur and Kodagu have emerged to have higher economic growth thus implying agriculture holds the key in accelerating overall development of the district economies. Thus to conclude, an attempt has been made to map agriculturally developed and backward districts considering median per capita district income and median agricultural share in GDDP.

The paper titled [3] “ROBUST REGRESSION MODEL FOR PREDICTION OF SOYBEAN CROP PRICE BASED ON VARIOUS FACTORS” revolves around the idea of implementation of a regression model to predict prices in USA for which factors like temperature, precipitation, crop yield, import and export quality and many such factors were taken into consideration. Various correlation among the available data was visualized and was further concluded that economic factors don't play a crucial role in the prediction while temperature is one such parameter that is impactful in prediction of the Soybean prices in US alone.

The paper titled [4] “SVM REGRESSION AND SONN BASED APPROACH FOR SEASONAL CROP PRICE PREDICTION” states the reason why the producer receives the lowest price in the entire process of marketing of agriculture. Lack of knowledge in marketing doesn't allow farmer to take dynamic decision. This model is equipped to make sustainable profit based on analysis of market using SONN (Self organized neural network) and support vector regression (SVR). SONN is used to segregate existing market price data into categories based on the harvest season while on the other hand SVR algorithm learns the relationship between the crop prices and the underlying market conditions thereby bringing to light the crop trading patterns. There is usage of current neural network techniques to increase gains, awareness and performance stability at minimal costs.

The paper titled [5] “FOECASTING VEGETABLE PRICE USING TIME SERIES DATA” states that vegetable price changes fast and is unstable making it hard to predict the prices. Neural network has self-adaptability, self-study and high fault tolerance as a result of which it is best suitable for prediction. The steps included are capturing raw data, normalising, creating neural network structure, training the dataset and building model for prediction. This survey also makes use of Back Propagation Neural Network technique where upon analysis of the error, the data is sent to the multi-layer neural network to get the prediction of commodity price on a weekly basis. This paper considers the performance of three main algorithms namely Back Propagation Neural Network concepts, Neural Network Model Based on Genetic Algorithm and Radial Basis Function Neural Network, but among all Genetic Algorithm Neural network was found to be the best in terms of accuracy and error.

The paper titled [6] “STOCK CLOSING PRICE PREDICTION USING MACHINE LEARNING TECHNIQUES” speaks about the challenges faced in predicting the stock prices which is influenced by various factors. With advancements in



technology and availability of resources easily, the efficiency of prediction can be improved by a large scale. In this work, Artificial Neural Network and Random Forest techniques have been used while the evaluation of the model is based on minimal values of RMSE and MAPE.

The paper titled [7] “A MACHINE LEARNING MODEL FOR STOCK MARKET PREDICTION “, proposes a model to predict the future stock prices in order to maximize the investor’s gain. The algorithms used are Particle Swarm Optimization (PSO) and Least Square Support vector machine (LS-SVM), a refurbished version of traditional SVM which analyses the data, recognizes patterns, and the results are used for analytical purposes. This model was further applied and evaluated on several financials datasets and analysed with artificial neural network with Levenberg-Marquardt (LM) algorithm. The entire study is carried out on indicators like relative strength index, money flow index and many more impactful attributes.

The paper entitled [8] "CROP PRICE PREDICTION AND FORECASTING SYSTEM USING SUPERVISED MACHINE LEARNING ALGORITHMS" objective is to analyse the demand of the crops well in advance. The study aims at choosing a specific crop for a user selected area thus helping the farmer make smart choices while also suggesting the grade of the crops based on the nutrient content in that area. Decision Tree Regressor is used to predict the price of a crop based on the dataset collected. Since regression is based on grouping categorical data together in these kinds of scenarios, it is expected to perform well.

The paper entitled [9] “CROP PRICE FORECASTING SYSTEM USING SUPERVISED MACHINE LEARNING ALGORITHMS” speaks about a project consisting of the Administrator and the Agricultural Department. The admin here is said to maintain the entire system while the Department is said to provide data to the user which mainly consists of the crop prices and profit prediction. The survey carried out reveals that there were farmers who had deprived knowledge of the crop breeds, the sowing condition of seeds and the raising costs. In order to help such farmers, the team used Naive Bayes algorithm to predict the future prices of the crop well in advance to help farmers plan for the risks that they are taking and K-Nearest Neighbour (KNN) algorithm to predict the profits which the famer would gain.

The paper entitled [10] “EXTREME TEMPERATURES AND CROP YIELDS IN KARNATAKA, INDIA” carries out a study on how extreme temperature conditions play a significant role in yield of various chief crops in the state of Karnataka. The proposed model was developed for taluk-level based data and study was carried out on the principal crops like rice, sorghum (jowar), finger millet (ragi), and pigeon pea. On further examination, an inversely linear relationship between yield and extreme degree days (EDD) was obtained and thus concluded that EDD has a more powerful impact on the crops while the extreme heat experienced by the state of Karnataka facilitates the effect of climate change.

#### IV. SUMMARY AND CONCLUSION

The machine learning algorithm of Random Forest Regressor gave us the best results with an accuracy of over 92% when compared to Linear Regression, Decision Tree Regressor and Support Vector Regressor (SVR) with the same being summarized by a graph shown below.

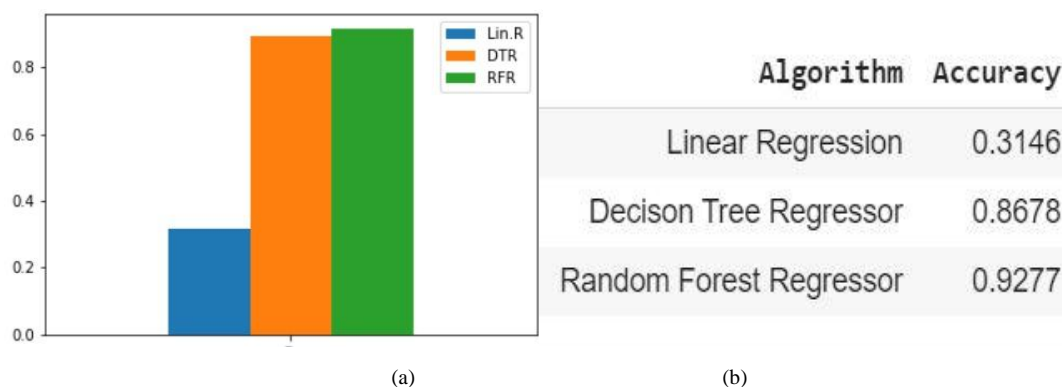


Fig.1 Comparison of Accuracies of Various Algorithms (a) Bar Graph Representation (b) Tabular Representation

The primary objective of authoring this survey is to help our beloved farmers who deliberately work hard day-in and day-out to feed the entire nation in spite of the injustice they faces when it comes to sell their harvest at a lower price. Crop price prediction is an exigent task due to consistently varying price values which are dependent on several

limitations but is essential in recognizing the price of crop in advance to have an estimation whether the decided crop will bear the fruitful rewards or not.

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