iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH
IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: V Month of publication: May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51710

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Crop Price Prediction

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Abstract: In developing nations like India, where more than 33% of the population is in need, ensuring food profitability is a major problem. Estimates of crop yields for a given season are indisputably regarded as making a substantial contribution to investigating food accounting data and yield deficits. There is no structure in place to advise farmers on the best crops to cultivate, which would help with cost estimation. So, in this paper, we make an effort to forecast crop prices that a farmer can get from his field by looking at trends in historical data. For our analysis, we are taking a few crops like wheat, ragi, bajra, and barley. We are using a variety of information, including rainfall, previous crop yields, etc. We have implemented supervised machine learning algorithms (Decision Tree) to analyze and predict data.
Keywords: Food profitability, Cost estimation, Supervised machine learning.

I. INTRODUCTION

The most important sector of the Indian economy is agriculture. Five-hundredths of the workforce in India is employed in the agriculture industry, which contributes 18% of the country's GDP. Despite being the demographically largest economic sector and playing a significant role in India's overall socio-economic fabric, recent research has revealed a slight reduction in the economic contribution made by agriculture to Asian nations.

An understandable cause for the agriculture sector's inadequate contribution to the country's gross domestic product is that Asian nations also suffer from a lack of government and farmer-led crop planning. One of the most important metrics for assessing the state of an economy is the gross domestic product. This cost variation is specifically caused by a lack of prior design. As a result, there is variability in crop production and even crop value within the market. It will result in the crops being exceedingly expensive, which will be a problem for the consumer, once the price increases, and Farmers will suffer from investment losses as the value declines.

A major problem in agriculture is the prediction of crop prices. Each farmer is interested in learning what price he can expect. In the past, farmers' prior knowledge of a particular crop was taken into account when predicting cropprices. In Indian agriculture, information is abundant. We have developed the ml model to predict crop prices which will eventually help farmers to grow crops.

II. LITERATURE SURVEY

To demonstrate the importance of this work, a survey wasdone on different research papers to understand different textsummarizationtechniques.Afewofthemarediscussedhere.

Ashwini Darekar [1] has described that the goal of the current research is to forecast cotton prices in significant Producing states of India. The study required time series data on the monthly cost of Cotton data, which was obtained from the AGMARKNET website between January 2006 and December 2016 in order to anticipate prices for the Kharif 2017-18 harvest months. To forecast cotton price trends, the ARIMA model was used. The programming software was used to estimate the model parameters. By computing several metrics of the model's quality, including AIC, SBC, and MAPE, the performance of the model was evaluated. In the Kharif season, the cotton crop is harvested from December toJanuary. The prediction indicates that during the Kharif harvesting season in 2017–18, market prices for cotton will be governed in the range of 4,600–4,900 per quintal (medium staple cotton).

Manpreet Kaur[2] concentrated on the problem of price prediction of crops today; price prediction has grown to be a major issue in agriculture that can only be resolved using the information at hand. Data mining techniques can be utilized to overcome this challenge. This work is centered on the discovery of suitable data models that aid in achieving high accuracy and generality for price prediction. Various Data Mining approaches were examined on various datasets to solve this challenge.

Kantanantha.N [3] the cash price is anticipated in this model as the sum of the nearby Settlement futures price and the expected commodity base. Using a functional model-based method, the author predicts the one-year commodities basis as a blend of historical basis data.In both forecasting models, the author estimates approximate prediction confidence intervals that are further integrated in a decision-planning model. The author appliedMethods to corn yield and price forecasting for Hancock County in Illinois. Forecasting results are more accurate in comparison to predictions basedon existing methods.

The methods introduced in this paper generally applyto other locations in the US and other crop types.

Girish K.[4] has proved the superiority of ANN over linear model methods in this study using monthly wholesale price series of soybean and Rapeseed-mustard. When compared to linear models, empirical data shows that ANN models can capture a substantial number of directions of monthly price change. It has also been observed that combining linear and non linear models leads to more accurate forecasts than the performances of these models independently, where the data Show a non linear pattern. The present study has aimed at developing a User-friendly ANN based decision support system by integrating linear and non linear forecasting methodologies.

Y.-H.Peng[5]has developed a crop price forecasting service based on the market prices published by the Council of Agriculture. Thedevelopedservicewasintegratedintothesmartagri-managementplatform, providing an interface for historical price retrieval and future price forecast .The author covers daily updated prices for 15 markets and over 100 distinct crops, and four price forecasting algorithms are available: ARIMA, PLS, ANN, and RSMPLS. According to our experiment for price forecasting, the recommended algorithms arePLS and ANN. For future study, the author recommends considering more features other than historical prices ,such as the climate, location of the market and plantingarea.

P. S. Vijayabaskar[6]has worked to construct a model for testing soilfertility. It also suggests the crop which has to be planted depending onthe value obtained from the sensor. The authors proposed model alsoprovides regional-wise information about the crop in the form of a graph.In that model, farmers can chat, share and get ideas from the expert by registering on their application.Theproposedsystemalsosuggestsfertilizerwhichhastobeaddedtothesoilinordertoincreasecropproductivity. The author believes that it helps the farmer to analyze thefertilityoftheiryardandplantthebettercroptoincreasetheirproductivityandprofit.

S. K. Khatri [7] hasprovided to helpthefarmersforexpecting a better amount for their crops and for predicting the best pricefor the crops. This system will allow farmers to make better decisions forbidding the better prices for their crops in the market. The author of this work primarily focuses on suggesting a decision-making support model for the forecasting of prices for agricultural commodities. The author also covers data mining approaches in agriculture that will assist farmers in forecasting agricultural commodities prices. The objective of the author was tobuildasystemthatprovidesefficientandeffectivepricepredictionfeatures. The aim of the author was to propose a new framework and develop a system to make some advances toward more efficient priceprediction.

Q.Chen[8] takesFuzhoucabbageasanexample,andWaveletAnalysis(WA)isusedtoreducethenoiseofthecabbagedata.Anagricultural products price forecasting model using LSTM, WA, and fine-tuned batch normalization is presented by the author. According to theauthor wavelet analysis helps filter out factors other than market factors that affect farm prices. The author’s main contribution to work in thispaper is described as getting the output of a time series at a time. A shortage of the author’s mode list hatit was only based on historical price data to forecast. So, the author advises a comprehensive consideration ofa variety of factors to predict the price of agricultural products to further increase the accuracy of the prediction. The author has normalized thedata with fine-tune normalization. Finally, the normalized data were fedinto Long Short-Term Memory(LSTM)model for prediction.

G.Hegde[9] has done the survey to get the details about there search already done and has developed a framework for their mode lthatpredictsandrecommendstheyieldsaswellasprices.Buttheauthorsaysthatinmostcasesonlyspecificattributeswereconsideredlikesoil,t emperature,historicprice,etc.Theauthorsuggestsalsoconsideringother social factors like government policies, festivals, holidays, etc. Theauthor’s prediction analysis for farmers is not only for crop growing butalso has implemented a crop recommendation system. The goal of theauthorwastostudyandidentifytheprosandconsofdifferentmodels.

I.A.Jayaraj [10] has proposed a novel approach for time-series prediction that leverages the capabilities of crop price prediction and crop yield prediction of specific crops to find important information about market pricing and crop yields.The prices of chosen key crops were examined in this paper for time-series prediction using meta-learning. The meta-learning with self-organizing capability learns a meta-network observing additional information from a specialized support set.Moreover, the author’s proposed method deals with task-oriented loss.It compares the present optimal output of the optimization function with the target-specific information, which is interesting. The experimental results reveal that the existing crop price prediction techniques perform significantly better in terms of prediction accuracy and cross-correlation entropy.

K.P.Parmar[11] makesyieldpredictionsusedtobedonebytakinginto account the farmer's knowledge of the land and crop. Machine learning approaches, which use algorithms that are trained using training data, extract precision and previously unknown patterns or information from huge volumes of data.Asaresult,author’sforecastsforfuturecropoutputweretoassistfarmersinmakingthemostsuitable choice for their crops. Multiple attribute selection methodologies and Machine Learning approaches for crop prediction are described in depth in this work. Towards the conclusion of the session, the future direction fagricultural production prediction systems has been suggested.

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Volume 11 Issue V May 2023- Available at www.ijraset.com

K. Priyadharshini[12] assists thefarmers to select whether the specific crop is suitable for certain seasons and crop price values. Prediction techniques like linear regression, SVM,KNN method, and decision tree of machine learning were used by the author. Based on auxiliary information, thisresearch provides a novel method for delivering adequate support vectors for an SVM classification. This optimized approach is applied to a real-time agricultural application situation in which precision categorization is used, which enhances production management. The proposed SVM method gives good accuracy than theexistingsystem.Theauthorconcludesthatthismethodcanbeimplemented in several government sectors like APMC, Kissan call center,etc., by which the government and farmers can get information on the future crop yield and the market price.

III. EXISTING SYSTEM

The current method of predicting agricultural crop price uses linear regression algorithm, which predicts the crop prices only based on the previous datasets such as gathering information from multiple sources, analyzing the information, and then formulating projections. This may not be accurate andcan be error-prone as it predicts the prices considering single factor. But in the proposed system with the use of algorithms like decision tree, the suggested system seeks to automate this process and produce precise predictions by overcoming the flaws in the existing system with better accuracy as it predicts the crop prices using several factors like previous prices, weather, location, soil type. The Flask framework for web programming and HTML for front-end development will be used to build the system.

IV. PROPOSED SYSTEM

The proposed system uses Decision Tree regression techniques to predict crop values using trained data from certified datasets.Users of the proposed system will be able to choose a crop as an input, and the forecast will be based on a number of variables, including the type of crop, the weather, the state of the soil, etc. Farmers and other stakeholders will be able to access and analyze the predictions with ease because to the user-friendly and straightforward user interface. Overall, the proposed approach will simplify the process of crop price forecasting and give stakeholders in the agricultural sector more precise and timely forecasts. An effective crop price forecasting systems can provide possibilities for customers that can satisfy customers in more contexts. Eventually, the results are displayed in the form of a web applicationso that poor farmers can reach them easily.

V. METHODOLOGY

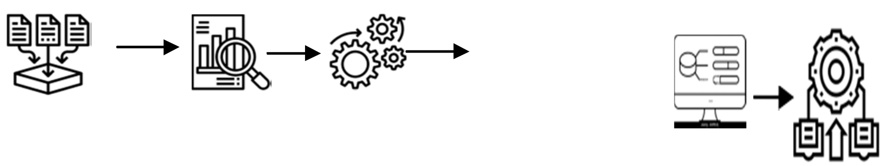

Figure 1

Figure1 explains about the methodology as follows:

Data Collection	Data Preprocessing	Feature Extraction	Model Selection	Model Training

1) *Data Collection:* The first step in the crop price prediction is to gather relevant data from various sources such as government reports, weather forecasts, and market trends. The data collected should be as comprehensive as possible and cover a wide range of factors that can impact crop prices.
2) *Data Preprocessing:* The data collected needs to be processed to remove any inconsistencies or errors. This step involves data cleaning, normalization, and transformation.
3) *Feature Extraction:* The next step is to extract relevant features from the preprocessed data. Feature extraction involves selecting the most relevant data points that can impact crop prices.
4) *Model Selection:* The next step in the crop price prediction flowchart is to select an appropriate model for the prediction task. Different models can be used for this purpose, including linear regression, time-series analysis, machine learning algorithms, and neural networks.

5) *Model Training:* Once the model is selected, it needs to be trained using historical data. The training process involves feeding the model with the preprocessed data and adjusting the model parameters to optimize its performance.After the model is trained, it needs to be tested on new data to evaluate its accuracy and performance. This step helps to validate the model and ensure that it can make accurate predictions.Finally, the trained model can be used to predict crop prices based on the features extracted from the new data. These predictions can be used by farmers, traders, and policymakers to make informed decisions about crop production, pricing, and marketing.

VI. IMPLEMENTATION

The diagram above depicts the flow and how it accurately predicts crop prices. Users would be able to obtain prices for their chosen crops. Crop data is acquired from the government website, dga.gov.in, and then cleaned, normalized, and transformed. The preprocessed data is then used to train a model that categorizes the price of each crop. Crop price forecasting gives essential information to farmers, dealers, policymakers, and other agricultural stakeholders.

As illustrated in Figure 2, users must register on the websiteby supplying their credentials (email and password) in order to create an account. An email is also sent to the provided email address to confirm the registration. After creating an account, the user can access the system. For storing the login credentials,We used the Firebase database. To guarantee that the user's credentials are valid, the system checks them. The user is directed to the crop selection screen after a successful login. In which the user can choose the crop for which they wish to predictthe price. The system preprocesses the data by cleaning, normalizing, andtransforming it before applyinga model toestimate theprice ofthe chosen crop based on the preprocessed data.The user is subsequently shown the expected costs.The system returns to the screen where the user selects the crop if they wish to continue predicting crop prices;otherwise, they can log out.

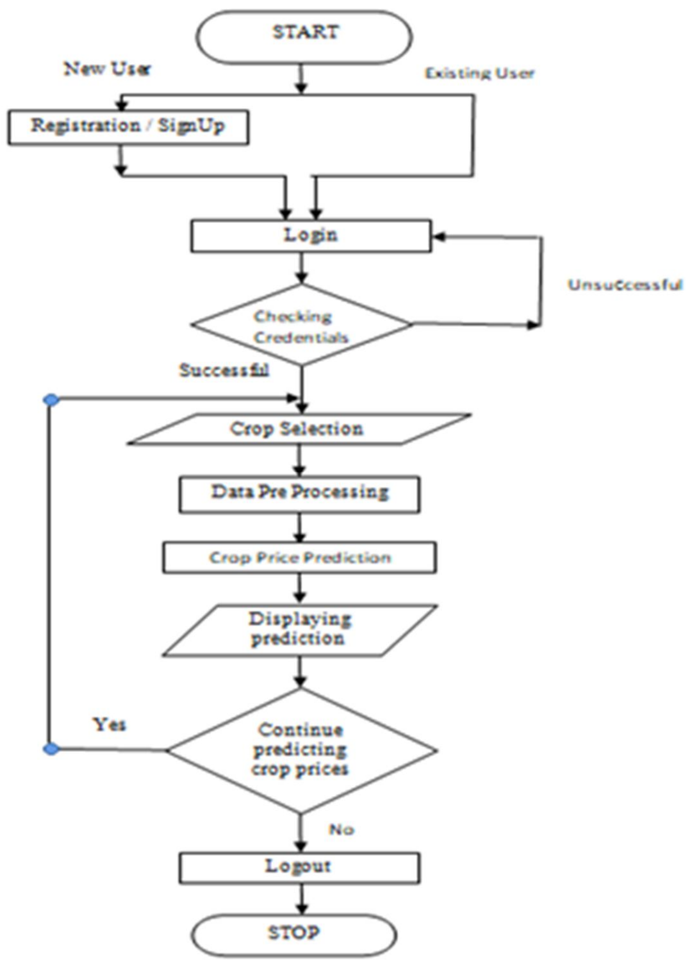

Figure2

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
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VII. RESULTS

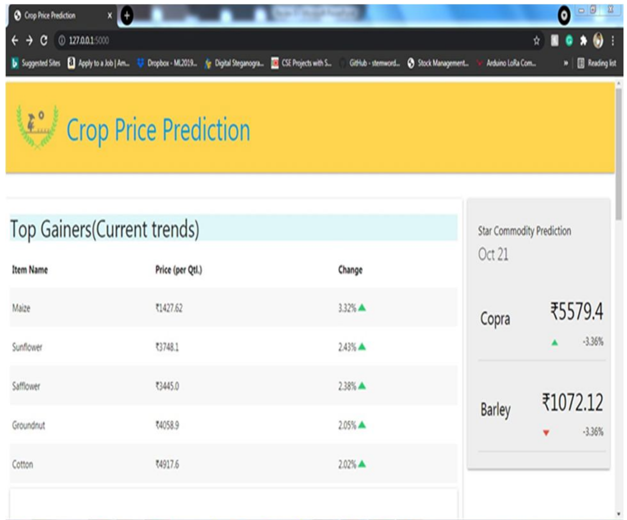

Figure 3: Top Gainers

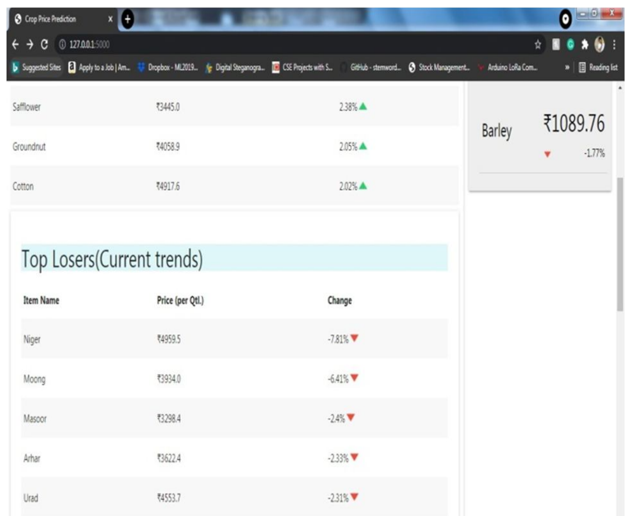

Figure 4: Top Losers

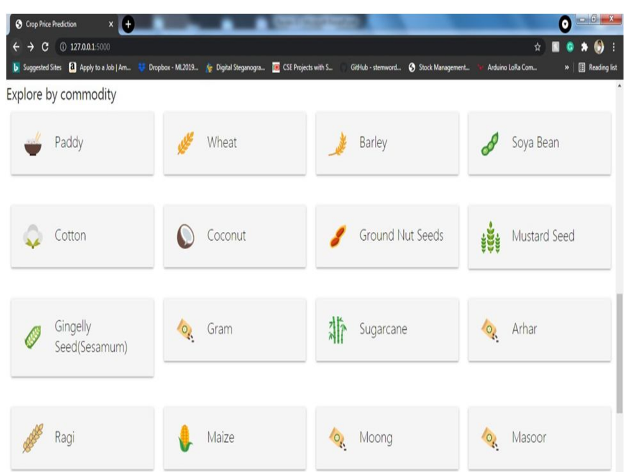

Figure 5: List of Commodities

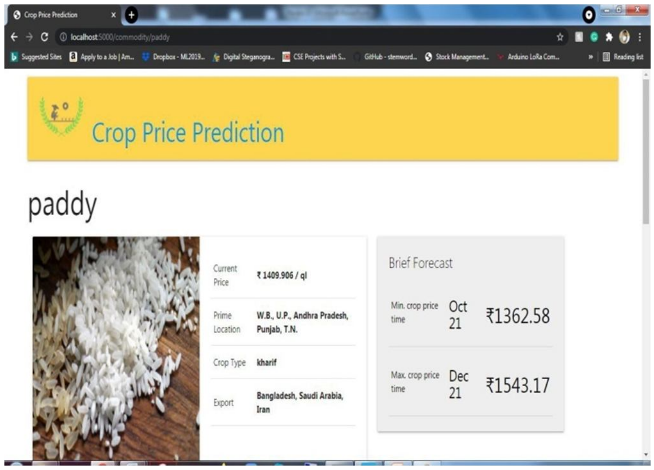

Figure 6: Predicted Price

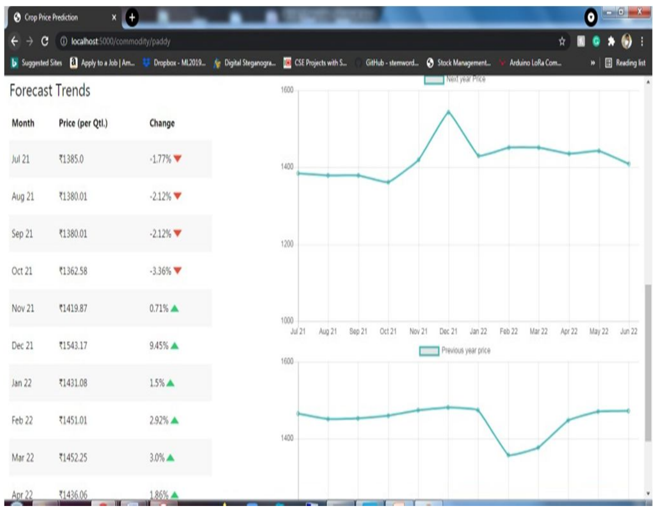

Figure 7: Forecast Trends

VIII. CONCLUSION

To overcome the challenge of predicting crop prices, we have developed a machine learning model that utilizes historical crop prices as well as month and rainfall data to make more accurate predictions for future months. Despite the difficulty of predicting crop prices, we believe that our model will help to improve accuracy and provide valuable insights for farmers and others in the industry.

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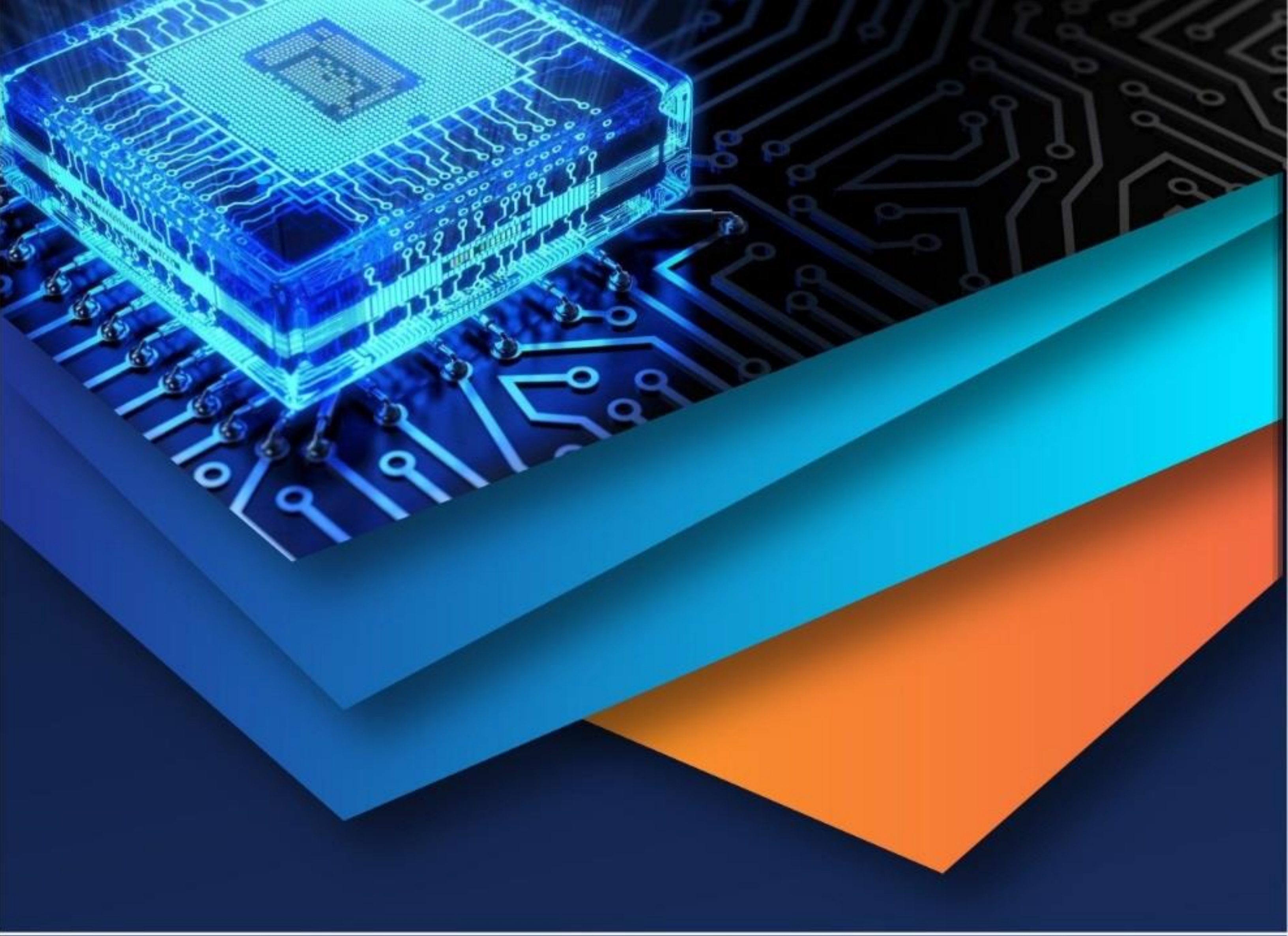

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