iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** V **Month of publication:** May 2022

DOI: https://doi.org/10.22214/ijraset.2022.43054

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue V May 2022- Available at www.ijraset.com

Smart Health Card Using Neural Networks

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Abstract: ***The Infection Prediction Framework is built on predictive displaying. The framework examines the client's side effects as well as their present and clinical history. System also determines the severity of infection and recommends treatment based on severity of the condition. It recommends a healthy diet and appropriate physical activity for the client. Expecting infection at a later stage becomes a considerable task. The Convolutional neural Network (CNN) model is used to anticipate such anomalies, as it can precisely identify information related to infection expectation from unstructured clinical health records. However, assuming that CNN uses a completely coupled network structure, it consumes a lot of memory. In addition, an increase in the number of layers might lead to an increase in the model's intricacy examination. The prediction of infection at an early stage becomes a critical task. This prediction can help people understand their potential stage of disease and take action accordingly as soon as possible. Prediction cannot be 100% correct as it is a probability statistic and cannot be always right. However, it can possibly be helpful in very serious situations and can lives.***

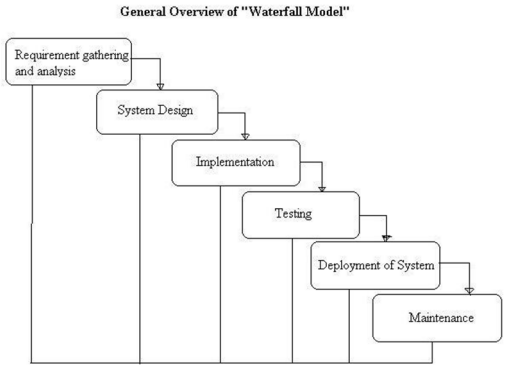
Keywords: ***Infection Prediction, Health Card, CNN (Convolutional Neural Networks), Smart disease prediction***

I. INTRODUCTION

The Infection Prediction Framework is built on predictive displaying. The framework examines the client's side effects as well as their present and clinical history. System also determines the severity of infection and recommends treatment based on severity of the condition. It recommends a healthy diet and appropriate physical activity for the client. Expecting infection at a later stage becomes a considerable task. The Convolutional neural Network (CNN) model is used to anticipate such anomalies, as it can precisely identify information related to infection expectation from unstructured clinical health records. However, assuming that CNN uses a completely coupled network structure, it consumes a lot of memory. In addition, an increase in the number of layers might lead to an increase in the model's intricacy examination. The prediction of infection at an early stage becomes a critical task.

With the rapid development of the internet, electronic medical information has become popular with many cities around the world, such as electronic medical records (EMR) to replace traditional paper medical records, online appointments,
and online reports, thus accumulated large-scale of healthcare data. Healthcare big data covers a wide range of areas, and any data that is directly or indirectly related to healthcare falls into this category. We could dig the latent relations of diseases as the e-commercial product recommendation did, thus those the most possible diseases that the patient may have could be listed.

II. METHODOLOGY



A. Data Gathering

The Information regarding all the symptoms and their corresponding diseases has to collected. The more the data the more accurate the prediction.

B. Pre-processing of Data

The Data has to be pre-processed according to be the necessity. Any null values as well as missing data has to be filled up or dumped.

C. Model Implementation

The working model with accurate prediction and the health card generator is the implemented as well as tested.

D. Website UI and App

We will convert the model into a website. The UI and Information collection form has to be generated by using user-friendly interface and give easy access for everyone.

E. Deployment of Developed System

The Website is then deployed using an app hosting platform like Heroku and made available for regular use.

III. OVERVIEW OF PREDICTOR SYSTEM USING NEURAL NETWORKS

A. Prediction / Recommender system:

Prediction systems are similar to recommender systems which provide recommendation or predict the potential outcome from the given resources and data. In Diseases prediction system, the data provided are the symptoms experienced by the patients. The system analyzes the data and gives the diagnostic prediction or suggestions regarding the disease or the possible cause for the symptoms. Recommender systems are most used functions provided by machine learning algorithms and combined by AI and neural networks would be revolutionary in predicting diseases.

B. Types of Recommender System

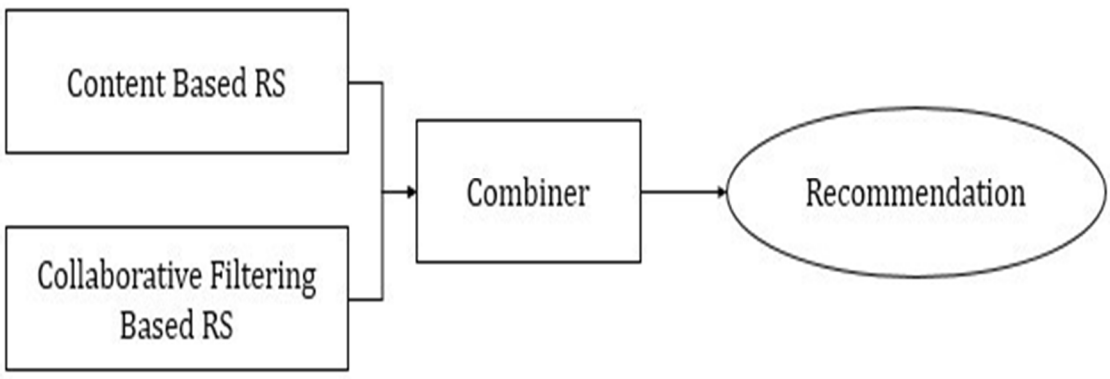
1) Content Based Recommender System
2) Collaborative Recommender System
3) Hybrid Recommender System

a) *Content Based System:* The recommendation is based on the content and can be connected by various factors like similarity and its definition. Ex. Fever can be common systems in many different serious as well as mild infections and diseases. Therefore, Content based system in not very helpful in our project.

b) *Collaborative System:* As mentioned earlier, The Predictive system is basically a recommendation system with a great prediction volume and multiple outputs. In Collaborative system, the user has to provide their required data for the system to give a recommendation. Ex. The user can give an input from the existing list and the system gives the calculated output for the similar inputs.

c) *Hybrid System:* Hybrid Systems are combination of content and collaborative system. The Hybrid system take into consideration the past historical data provided by the user as well as the new data.

It is also called as personalized system.



IV. SMART HEALTH CARD USING NEURAL NETWORK

Initially we take disease dataset from UCI machine learning website and that is in the form of disease list with its symptoms. Using machine learning techniques such as KNN and CNN we can predict accurate disease. Then we classify that data using classification techniques like KNN or CNN.

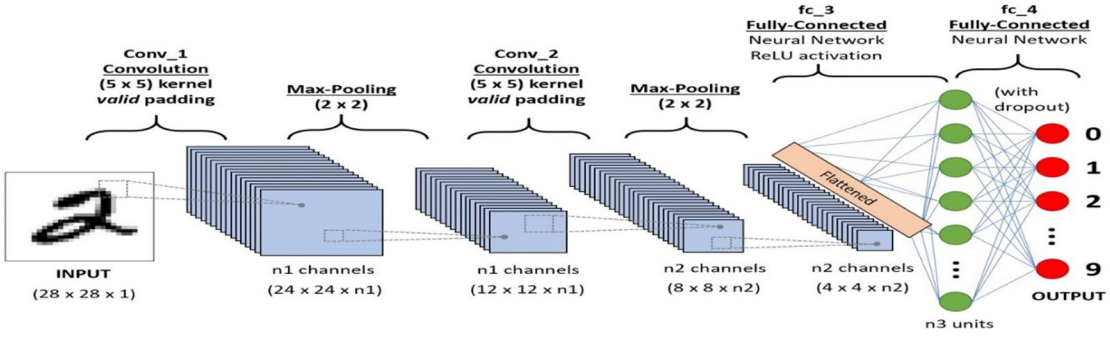
Steps To Convert Datasets using Convolutional neural network (CNN)

1) Step 1: The dataset is converted into the vector form.
2) Step 2: Then word embedding carried out which adopt zero values to fill the data. The output of word embedding is convolutional layer.
3) Step 3: This Convolutional layer taken as input to pooling layer and we perform max pooling operation on convolutional layer.
4) Step 4: In Max pooling the dataset converts into fixed length vector form. Pooling layer is connected with the full connected neural network.
5) Step 5: The full connection layer connected to the classifier.

a) *Datasets:* We will be using the datasets provided by healthcare websites and symptoms datasets (Patient disease datasets).
b) *Pre-processing:* The data will be verified and met with necessary changes as per the requirements of the system. The null values will be eliminated. The missing values will be added accordingly.
c) *Normalization:* The reoccurrence of similar values must be avoided to make a better and accurate prediction of the diseases. The most common and most frequent symptoms shall be reduced and stop words like 'at, the, on' will also be eliminated.
d) *Vectors:* The Created list of Symptoms will be converted into vectors by using CNN matrix vectorization. The method uses the following formula to calculate the similarity between two objects.

CNN is very powerful deep machine learning algorithm. The system is trained by the data provided and calculates the similarity output for the given symptoms.

CNN uses the pooling sytem to store all the calculated similaritiesfro the inputs provided.



V. IMPLEMENTATION

We will be creating a python IDE for the implementaion as python has great machine learning libraries ready to use.
The Disease Dataset will be pre-processed and converted into a Training set.
We will be taking all the the Symptoms as tags and make it as a dictionary using an array.
The Predict Function will be used to Predict and calculate the resulting prediction from the given symptoms.

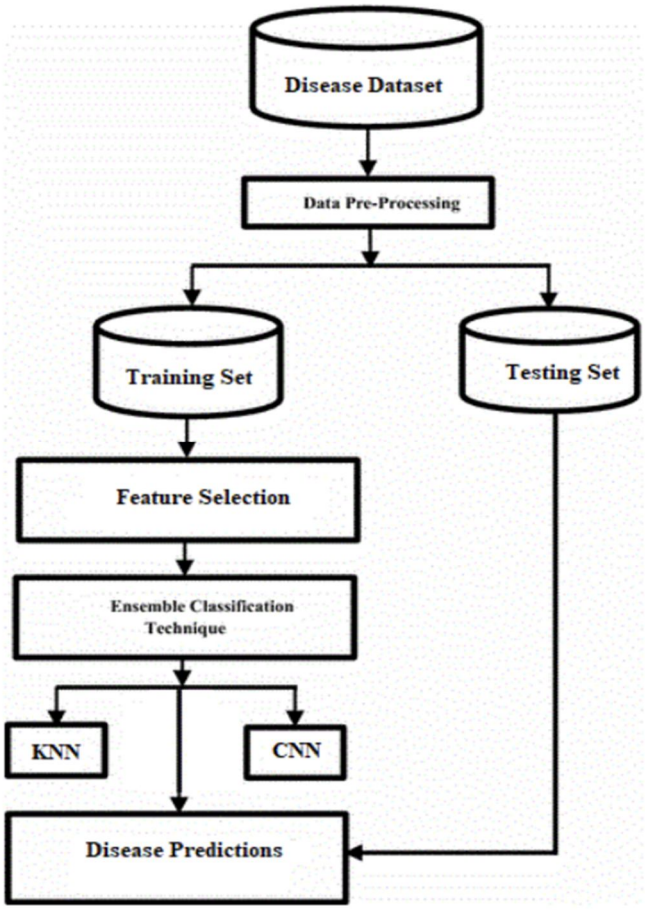
```
symptoms_to_algorithm = np.array([sym])
predictions = model.predict(symptoms_to_algorithm)
acc =  "%.2f" % round((max(predictions[0]) * 100),2)
```



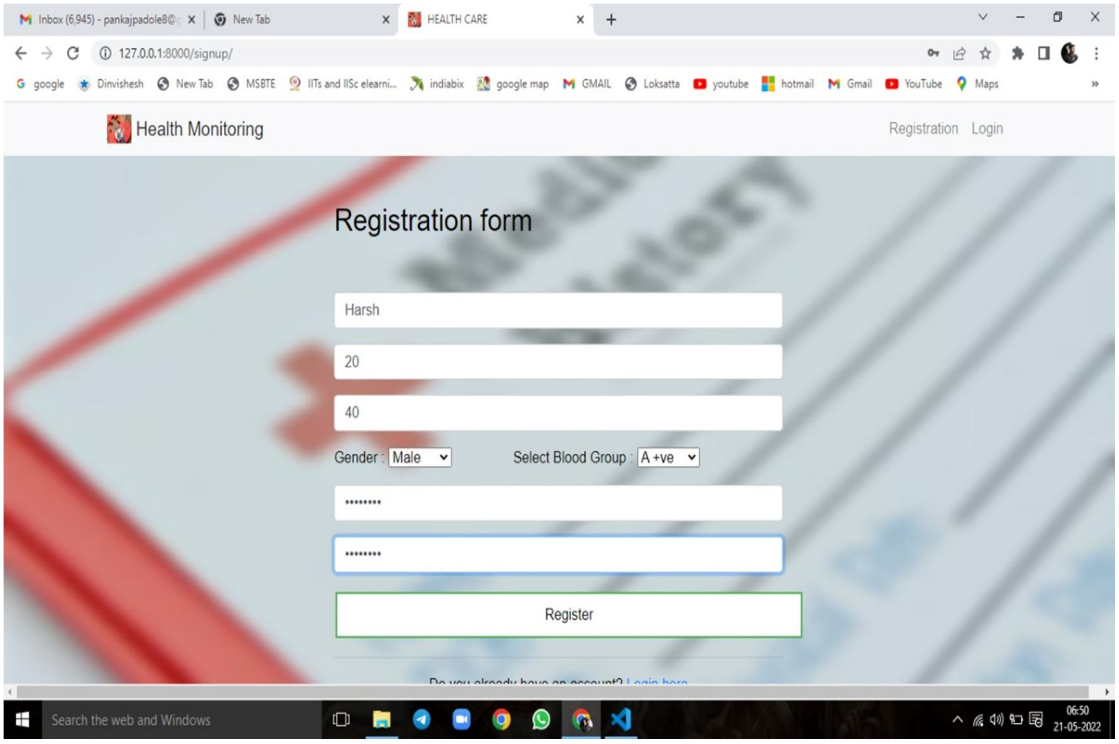
```
result_encoded = np.argmax(predictions[0])

result = encoder.inverse_transform([result_encoded])

data=pd.read_csv(path + "/todo/" + "Health_Doctor_excercise_diet.csv")

doctor = data['Doctor']
exercise = data['exercise']
diet = data['diet']
Diseases = data['disease_name']
medicine = data['medicine']
```

A patient has to login and fill up the registration form to get their results. As Medical infromation has to treated as private and has to kept in record fro fuuture medical requirement.

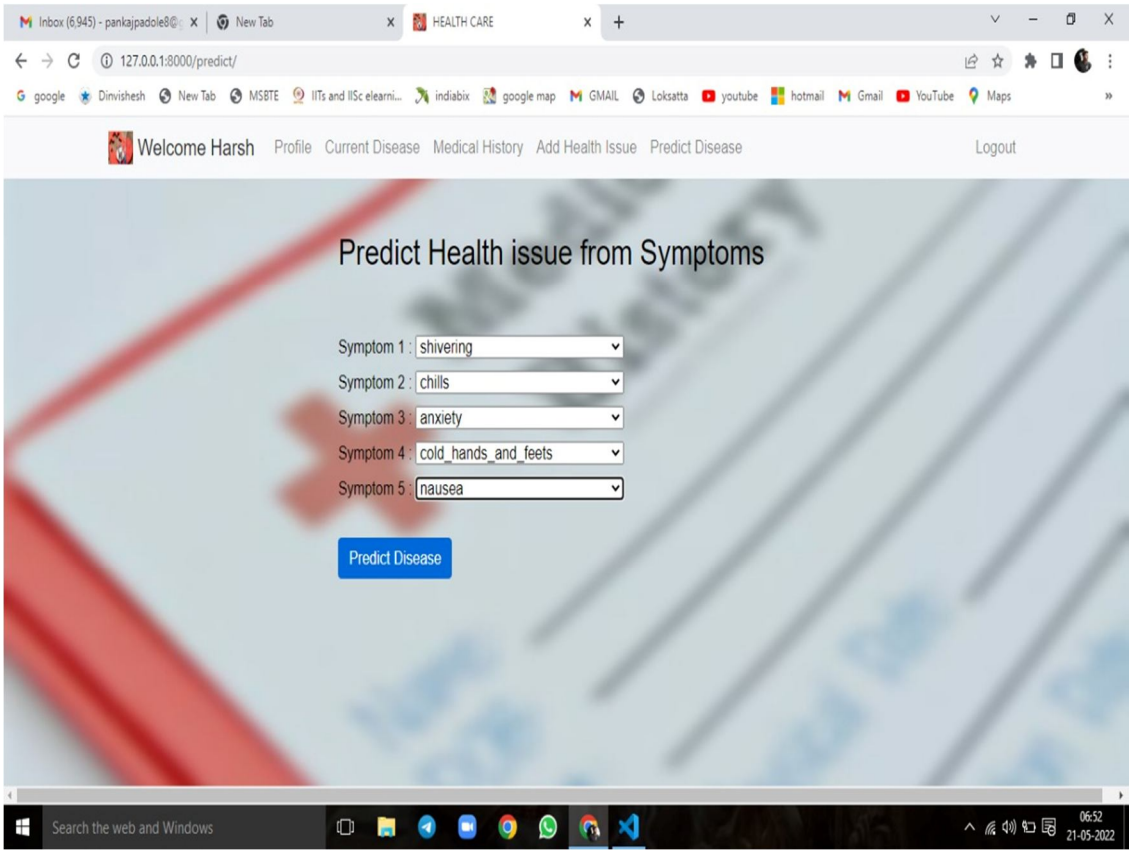
Each Login id must be unique followed by the strong password.
The patient will put his/her personal information and list down all the symptoms and also mention the previously diagnosed disease.
The System will automatically generate a report based on the provided symptoms and using the CNN algorithm.
The Disease Prediction report will be available as 'Predicted Disease from Symptoms'.



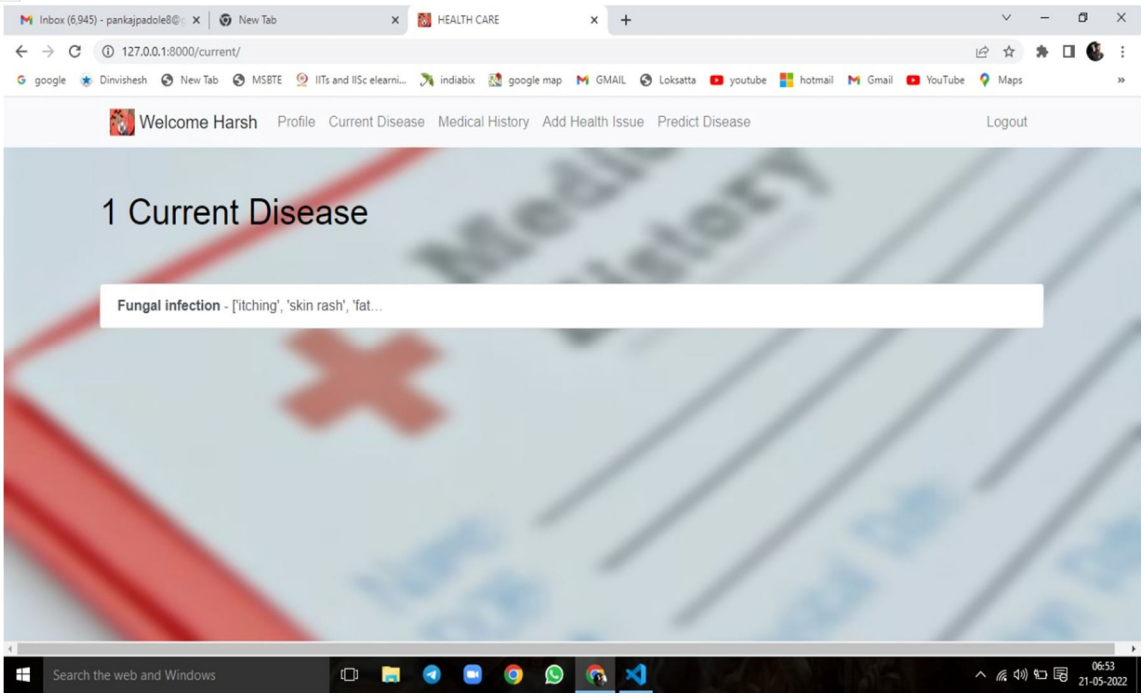
VI. RESULTS



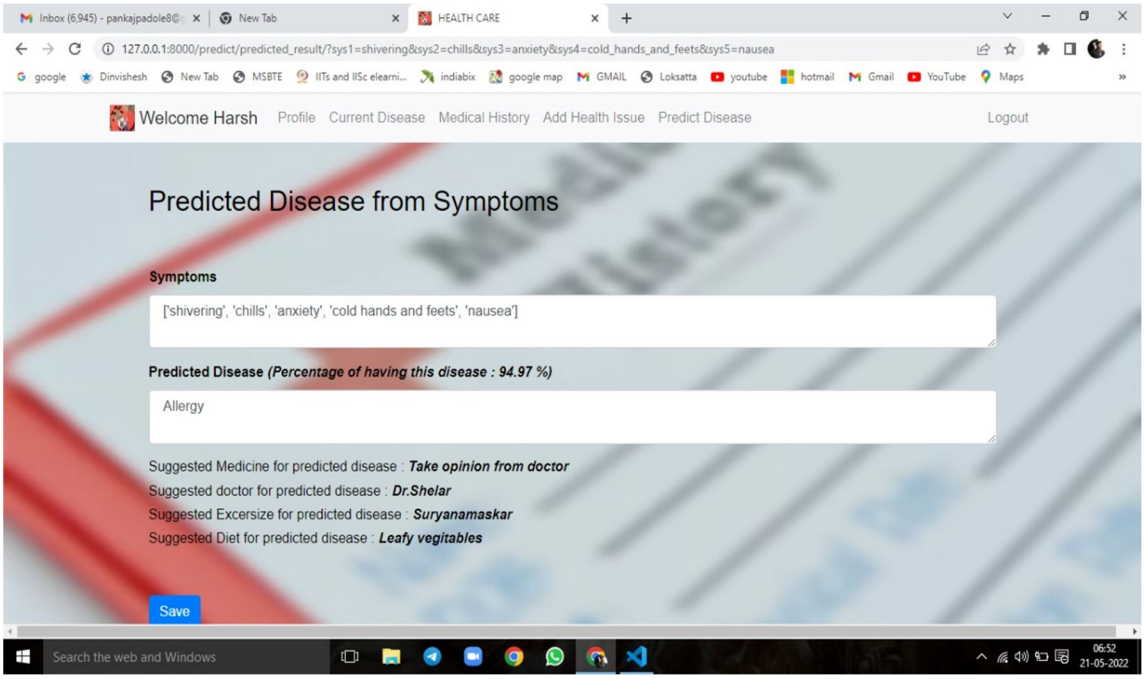
Registration Form for Patient



Symptoms Form



Current Disease



Predicted Result

VII. CONCLUSION

We proposed general disease prediction system based on machine learning algorithm. We used KNN and CNN algorithms to classify patient data. We got accurate general disease risk prediction as output, by giving the input as patients record. This system may lead in low time consumption and minimal cost possible for disease prediction and risk prediction. So, we can say CNN is better than KNN in terms of accuracy and time. We compare the results between KNN and CNN algorithm in terms of accuracy and time and the accuracy of CNN algorithm which is more than KNN algorithm and time required for classification for CNN is less than KNN.

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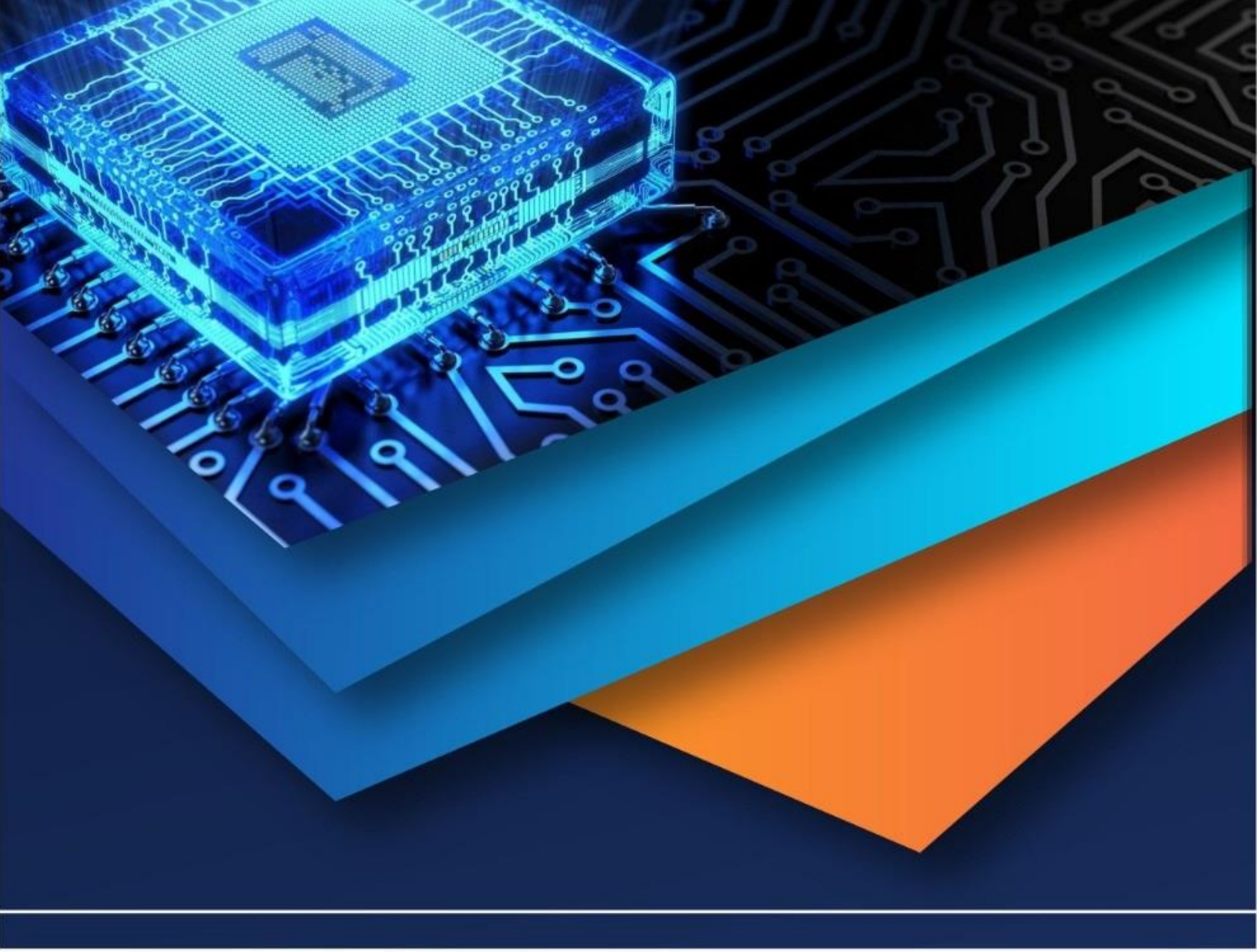

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