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Image Data Categorization Based on Texture Feature and Neural Network Based Classifier

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Abstract— The classification and categorization of digital multi-media data is very challenging task for the storage manager and server. The diversity of multi-media data faced a problem of retrieval over the internet. The retrieval of image over internet required image classification and categorization. In this paper, proposed texture based image categorization model using the scenario of neural network. The extraction of texture feature used Wavelet Transform Function. Wavelet defined as texture feature extractor. The neural network model used for the purpose of classification. Our proposed algorithm implemented in MATLAB software, and for the validation of algorithm used coral image dataset. Our empirical evaluation of result shows that proposed method is better than exiting method of image classification and categorization.
Keywords— Image Classification, Texture Feature, DWT, RBF

I. INTRODUCTION

The demand of multi-media data is increase over the internet. The increasing rate of demand for multi-media data needs proper storage and retrieval. Image classification is one of the important techniques for proper storage and retrieval multimedia data. Efficient indexing and retrieval of large number of colour images, classification plays an important and challenging role [2]. Digital images can be formed by a variety of devices like digital scanners, cameras, co-ordinate measuring machines, digital video recorders, digital synthesizers and airborne radars. Among the various media types, images are of prime importance. Not only it is the most widely used media type besides text, but it is also one of the most widely used bases for representing and retrieving videos and other multimedia information. Usually, images are automatically recorded in meaningless alphanumeric filenames [3]. Mostly, people attempt to manage their digital images by annotating them manually, but at the time of retrieval are very time consuming and often subject to individual interpretation. Alternative solution for this, the images can be archive in file system folders according to their semantics such as an event, a venue and a person of interest. During the time of searching, one has visually scanned through all the images in the collection manually, possibly by viewing them as a slideshow. The searching task is manageable when we have a small image collection. However, the vast number of images has the problem of locating a desired image, especially in a large and varied collection [4]. Meanwhile, the large number of images has the issue of locating a desired image, especially in a varied and large collection. Therefore, commercial organizations, researchers and users are exploring new and compelling ways to access stored images [5]. For the purpose of image, classification used features of image. In image, three types of features such as colour, texture and dimensions. The texture feature is very important feature for the classification of image. The process of image classification used classification algorithm. The classification algorithm has two sections one is training model and other is test data for the purpose of classification. In this paper, we have used proposed texture based classification technique. Rest of this paper is organized as follows in Section II discusses about texture feature, Section III proposed algorithm, Section IV discussed Experimental result analysis, finally, concluded in section V.

II. FEATURE EXTRACTION

In the process of image classification and categorization, extraction of feature plays an important role. The extracted feature passes through the classification algorithm. In this paper, used WTF for the feature extraction's process. The WTF is well-defined texture feature extraction method. For the process of classification, texture feature is most dominating feature. In block diagram, the process of feature extraction given.

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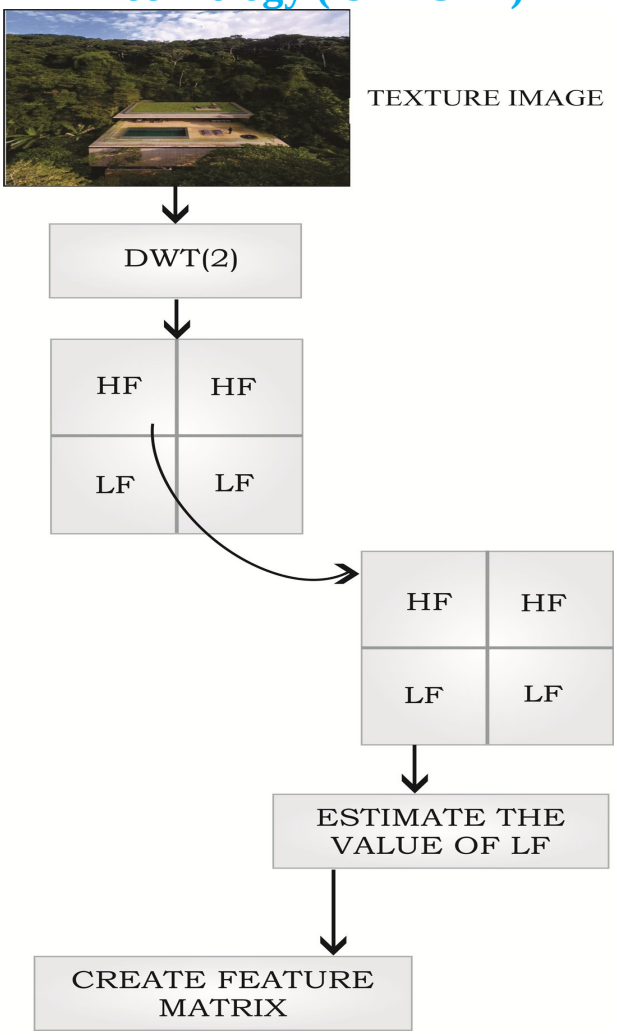

Figure 1 Shows that process of feature extraction depends on DWT (2) transform function for the texture feature extraction.

III.PROPOSED METHOD

In this section introduced a proposed technique for improved KNN algorithm for classification of image data. The classification of image data process through two different processes: one is KNN and other is RBF neural network. The RBF (radial biases function) is Gaussian nature. By KNN algorithm, the nature of mixture data correlation calculated. With the combination of RBF and KNN algorithm, implement well feature reduction cum classification process over image data. The RBF [14] function increase the sample selection's size. The increasing size of sample selection increases the range of feature attribute of input image. RBF function is generating for sample selection for categories of reduces and unreduced data sample for dealing out of KNN classification. For classifier, the training phase's input processing is data sampling method. Single-layer RBF networks can potentially learn virtually any input output relationship; RBF networks with single layers might learn complex relationships more quickly. From the input to all cascaded layers, the function netKNN generates forward networks. The network-layer network also has connections. The additional connections might increase the speed at which the network learns the desired relationship. RBF artificial intelligence model is similar to feed-forward back-propagation neural network in using the back-propagation algorithm for weights updating, but the main indication of this network is that each layer of neurons related to all previous layer of neurons. The process of feature extraction and classification process are described below

A. Input the image dataset
B. Apply DWT (2) transform function for feature extraction.
C. Applied transform function decomposed image data into HF and LF component. The component of HF is preserve and the component of LF proceeds for the feature extraction.

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D. The decomposed transformed measured in terms of H (T), V (T) and D (T).

E. Combined all transform value and creates the texture feature matrix.

F. Estimate the feature correlation attribute as $\mathbf{Rel(a,b)} = \frac{cov(a,b)}{\sqrt{var(a) \times var(b)}}$ Here a and b the input data feature attributes

G. The estimated correlation coefficient data passes through RBF function as

$$x(t) = w0 + \sum_{j=1}^{total\ data} wj\ exp\left(\frac{-(total - xj)}{\sigma^2}\right)$$

H. Create the relative feature difference value $\mathbf{Rc} = \sum_{k=1}^{r} \sum_{i=1}^{m} (hi - h)(eik - et)$

I. After sampling of feature data get deducts set of feature attribute of feature matrix.

J. Produce each matrix feature attribute

K. Consider the similarity of feature attribute for each feature

L. $\mathbf{Sim(s)} = \sqrt{|xi - yi|}$

M. Measure the min and max similar value and estimate Xs.

$$Xs = \frac{X - Min}{Max - Min}$$

N. Determine Xs value to individual class and passes RBF feature to classifier.

O. Image data are classified in assigned class

P. The classification ratio estimated

Q. Exit

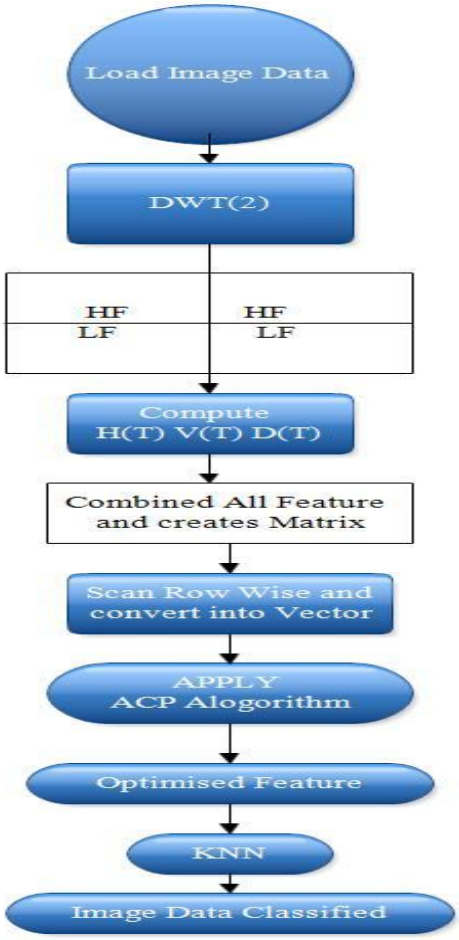

Figure 2: Block diagram of proposed model for image data categorization.

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IV. EXPERIMENTAL RESULT AND ANALYSIS

To evaluate the performance of proposed technique of content-based image classification, we have used version of 7.8.0 of MATLAB software with a variety of image dataset for our implemental work. The experimental result partitioned by two methods one is KNN and another is our proposed technique SVM -RBF. In RBF, we changed the kernel function of SVM with Gaussian kernel of SVM and here we used the number of neurons 400. For dedicated dataset of image and Feature Matrix of dataset used 3×3 Feature Matrix Vector. One-time input of vector is 9 vectors. In this vector contents DCD and TXD features for classification of image. In this experimental set up, we used 2 classes of data. Now we design two level classes at classification.

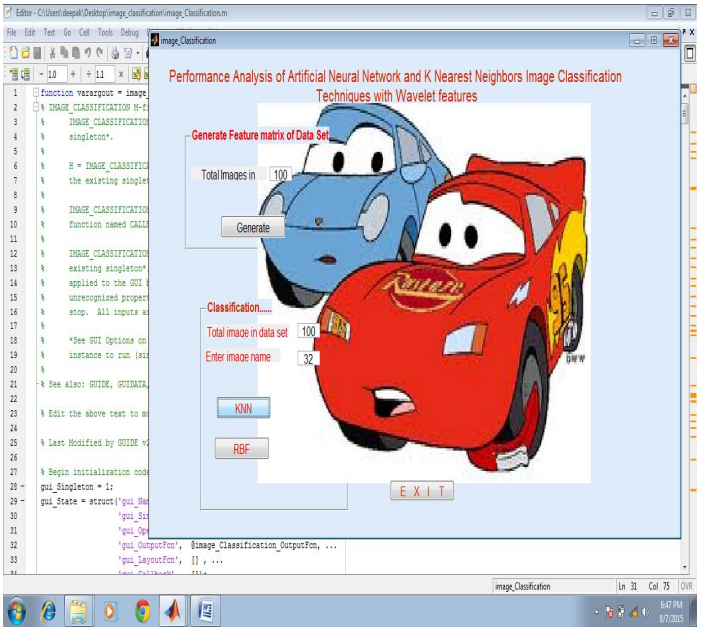

Figure 3: Shows that the input image of red car for the processing of categorization.

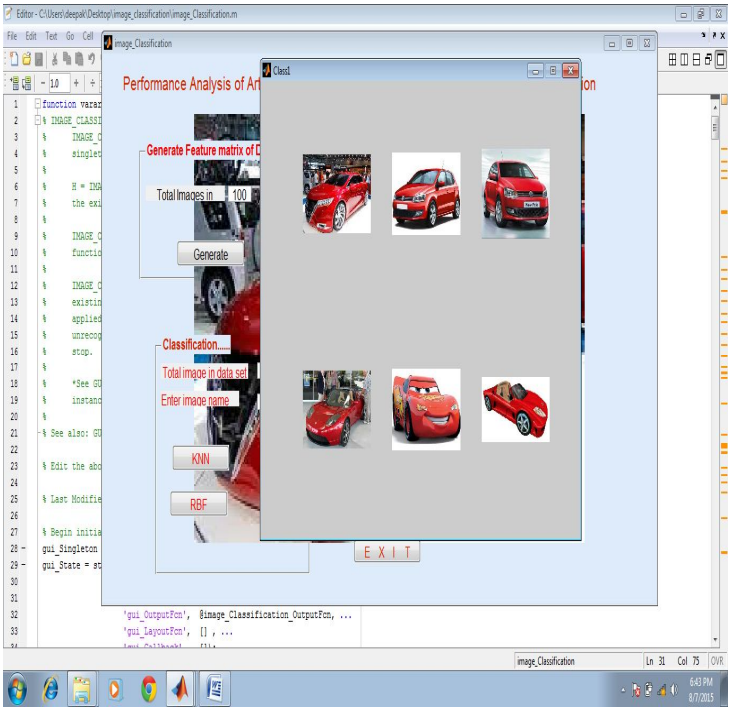

Figure 4: Shows the categorization of image per the input image of red car.

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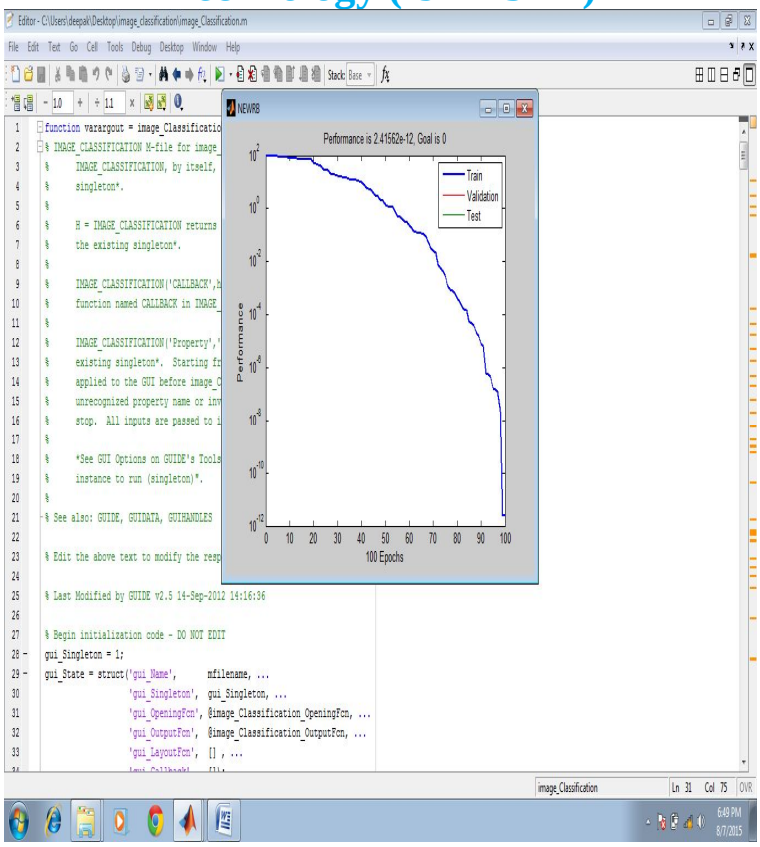

Figure 5: Shows that training of feature data for the process of classification.

Table 1: Shows the comparative result analysis of different dataset contains the different image for the process of image categorization using two methods KNN and RBF.

Data set	Method	Precision (%)	Recall (%)
Data set 1	KNN	86.66	80.21
	RBF	91.33	83.60
Data set 2	KNN	86.66	78.66
	RBF	90	78.6

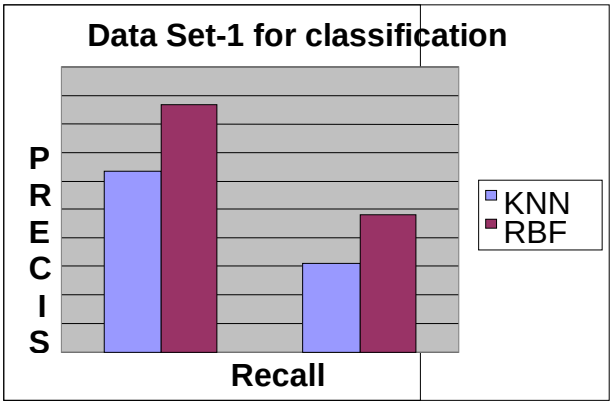

Figure 5: Graph window shows that performance of data set 1 counts of data with rate of precision 91.33 % and recall is 83.60 %.

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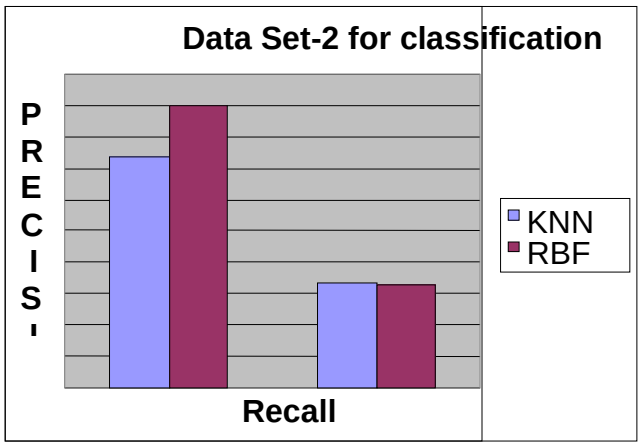

Figure 6: Graph window shows that performance of data set 2 counts of data with rate of precision 90% and recall is 78.6%.

V. CONCLUSION AND FUTURE WORK

The process of optimization considers the large feature space in two sections: one is feature space and optimization process, another one is feature sub space. The process of optimization calculates the process of feature for the artificial neurons. The artificial neurons move around the feature space and consider the mapping of feature space. The dissimilar feature of input image as per the index of data not matched the process of feature removed these data as optimized. For the valuation of performance, used coral image data set and experimental software is MATLAB. Our experimental result proves compared good performance instead of shape-based technique and some other technique. In this research, achieved average precision is 98%. In future improve the efficiency of precision is likely 100%. In this paper, we proposed a hybrid method for colour image of classification. Our experimental result shows that better result in compression of old and traditional method of image classification. However, the computational time of process is increase. We used optimizations technique for the reduction of time and improvement of image classification in future. In addition, some other work of future is used SOM model for sampling process followed in combined feature classification for image classification.

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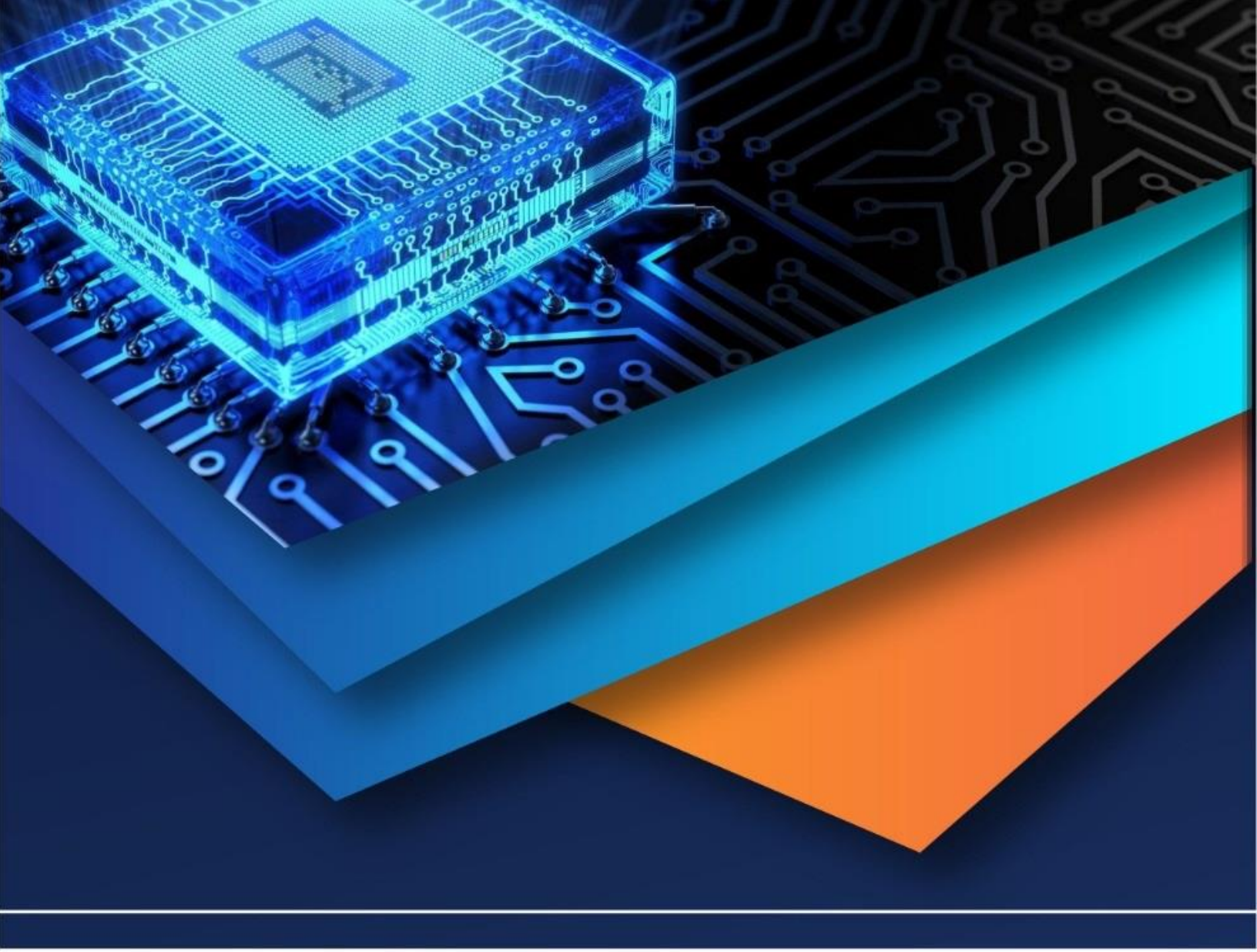

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