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Leaf Disease Detection in Android

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Abstract: ***In agriculture, early disease identification is crucial for a productive crop product. Ails similar as bacterial spot, late scar, Septoria splint spot, and unheroic twisted splint the quality of the tomato crop. Automatic bracket ways of factory conditions also help in taking action once they're discovered diseased splint symptoms Presented below is a Convolutional Learning Vector Quantization and Neural Network(CNN) model system for detecting tomato splint dis- ease grounded on the(LVQ) algorithm and categorization. There are 500 tomato prints in the dataset. leaves that display four complaint symptoms. We created a model of CNN for point birth and categorization automatically. Color Research on factory splint conditions laboriously uses information. In our model, three channels grounded on RGB are subordinated to pollutants***
Keywords: CNN algorithm, Python Language, Machine learning.

I. INTRODUCTION

Plant diseases have an impact on plant growth and agricultural productivity impact agriculture insocial, ecological, and economic ways. Recent research on leaf diseases demonstrates how they damage to the vegetation Plant leaf ailments also result in substantial losses to farmers' financesearly disease identification merit particular consideration. Plant ailments are investigated in the literature that primarily emphasises biological issues. They make predictions based on the plants' apparent surface and goes. The early detection of illnesses is essential for a crucial step in the proper therapy of disease. The finding is typically performed by human professionals. Experts on humans visualise diseases, although they encounter several challenges that might undermine their work. In this situation, spotting and identifying and categorising diseases.

In recent years, there has been significant research conducted on leaf diseases and their impact on plant growth and agricultural productivity. These diseases have profound effects on agriculture, not only in terms of the social and ecological aspects but also economically. The damage caused by plant leaf diseases leads to substantial financial losses for farmers, making early disease identification a matter of great importance.

The literature on plant diseases primarily focuses on the biological aspects of these ailments. Researchers often make predictions based on the visible signs and symptoms present on the plants' surfaces and leaves. Early detection of diseases plays a crucial role in implementing proper disease management and treatment strategies. Currently, disease detection is primarily performed by human professionals who visually inspect plants for signs of diseases.

However, human experts face several challenges that can hinder their ability to accurately spot, identify, and categorize diseases. These challenges include the vast number of plant diseases that exist, the variability in disease symptoms, and the potential for misinterpretation or misdiagnosis. Additionally, human experts may be limited by factors such as time constraints, subjective judgment, and fatigue, which can affect the consistency and accuracy of their assessments.

To address these challenges and improve disease detection, researchers are exploring various technological solutions. One promising approach is the use of artificial intelligence (AI) and machine learning algorithms. These algorithms can be trained on large datasets of plant disease images, enabling them to learn patterns and characteristics associated with different diseases. Once trained, AI models can analyze images of plant leaves and accurately identify and categorize diseases with high precision and efficiency.

By leveraging AI technology, early disease detection can be enhanced, allowing for timely intervention and treatment. Automated systems can continuously monitor plants in fields or greenhouses, quickly alerting farmers to the presence of diseases and enabling proactive measures to mitigate their spread. This can potentially reduce crop losses, improve agricultural productivity, and minimize the economic impact of plant diseases.

In summary, recent research has highlighted the significance of early detection of plant diseases in agriculture. While human experts play a valuable role in disease identification, the integration of AI and machine learning technologies holds great promise for more accurate and efficient disease detection. By combining the expertise of human professionals with the capabilities of AI systems, farmers can better manage plant diseases and safeguard agricultural productivity.

II. LITERATURE SURVEY

1) In this paper, Rohit Nalawade, and Apoorv Nagap. real-time monitoring. Users can automatically control the flow of water if not physically present via an app, also the real time values can be tracked

2) One of the major problems faced by this sector today is plant disease which is a major threat to global food security and leads to the excess use of chemicals and pesticides harming the eco-system.

3) It has been widely used in image and video, voice, and natural language processing. At the same time, it has also become a research hotspot in the field of agricultural plant protection, such as plant disease recognition and pest range assessment.

4) This paper presents a method for the early detection of leaf diseases in plants based on some important features extracted from its leaf images. This proposed system consists of a device called Beagle bone Black; itis interfaced with a digital camera or web camera which is used to detect diseasesin leaves. In the proposed system, images of leaves are captured and compared withimage healthy leaves images which are in a database that is pre-stored in the device.

5) Due to drastic climatic changes and scarcity of water, the need for properand sustainable irrigation methods is in high demand. The water demand for plants varies from place to place with the changes in soil content, texture, climatic factors, and so on. The plants need to be irrigated according to their water requirements at that climatic conditions. As like as the water requirements, plant diseases are alsoa factor that keeps the plants not growing properly.

6) This study describes the creation of an expert system for identifying plant illnesses in the Barracuda mango (Nam-Dok Mai), one of Thailand's key agricultural export products.

7) This study has combined four CNN models to create a novel plant diseasedetection method. An open-source library of 36258 photos divided into 61 classes ofhealthy and diseased plant leaves and 10 plant species was used in the experiment.

III. REQUIREMENTS SPECIFICATIONS

A. Software Requirements

1) Operating System: Windows OS

The application is compatible with the Windows operating system. It can be installed and run on Windows-based devices, such as laptops or desktop computers.

2) Android Studio

Android Studio is the integrated development environment (IDE) used for developing Android applications. It provides tools for designing user interfaces, writing code, debugging, and testing Android apps. The application will be developed using Android Studio to ensure compatibility with Android devices.

B. Hardware Requirements

1) RAM: 8GB or above

The application requires a minimum of 8GB of RAM for optimal performance. Adequate RAM ensures smooth multitasking and efficient handling of data within the application.

2) Hard Disk: 40 GB or above

The application requires at least 40 GB of free disk space for installation and storage of necessary files. Sufficient disk space allows for smooth operation and storage of user data, documents, and application resources.

Key Board: Standard Windows Key

IV. METHODOLOGY

Image Accession It's the original condition for the work inflow series of image processing because as processing is possible only with the help of an image. image accession is indeed the original step in the workflow of image processing. Image processing involves manipulating and assaying digital images, and this can only be done with the presence of an image as the input. Image accession refers to the process of capturing or carrying digital images from colorful sources similar as cameras, scanners, or detectors. This step involves converting the physical visual information into a digital format that can be reused by a computer.

Image Segmentation- It's the system for isolation of digital image into several parts. Objects and bounding line of images are located by using image segmentation Image segmentation is a abecedarian fashion in image processing that involves dividing a digital image into multiple parts or regions.

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The purpose of image segmentation is to identify and separate different objects or regions of interest within the image. The thing of image segmentation is to assign each pixel in the image to a specific member or region grounded on certain characteristics or parcels. By grouping pixels with analogous attributes together, image segmentation helps in distinguishing different objects, boundaries, or areas of interest within an image.

Feature Extraction - Four point vectors are considered videlicet color, texture, morphology and structure of hole of the fruits. Indeed, in the environment of fruit analysis or fruit image processing, four point vectors are generally considered color, texture, morphology, and structure of the fruit's hole

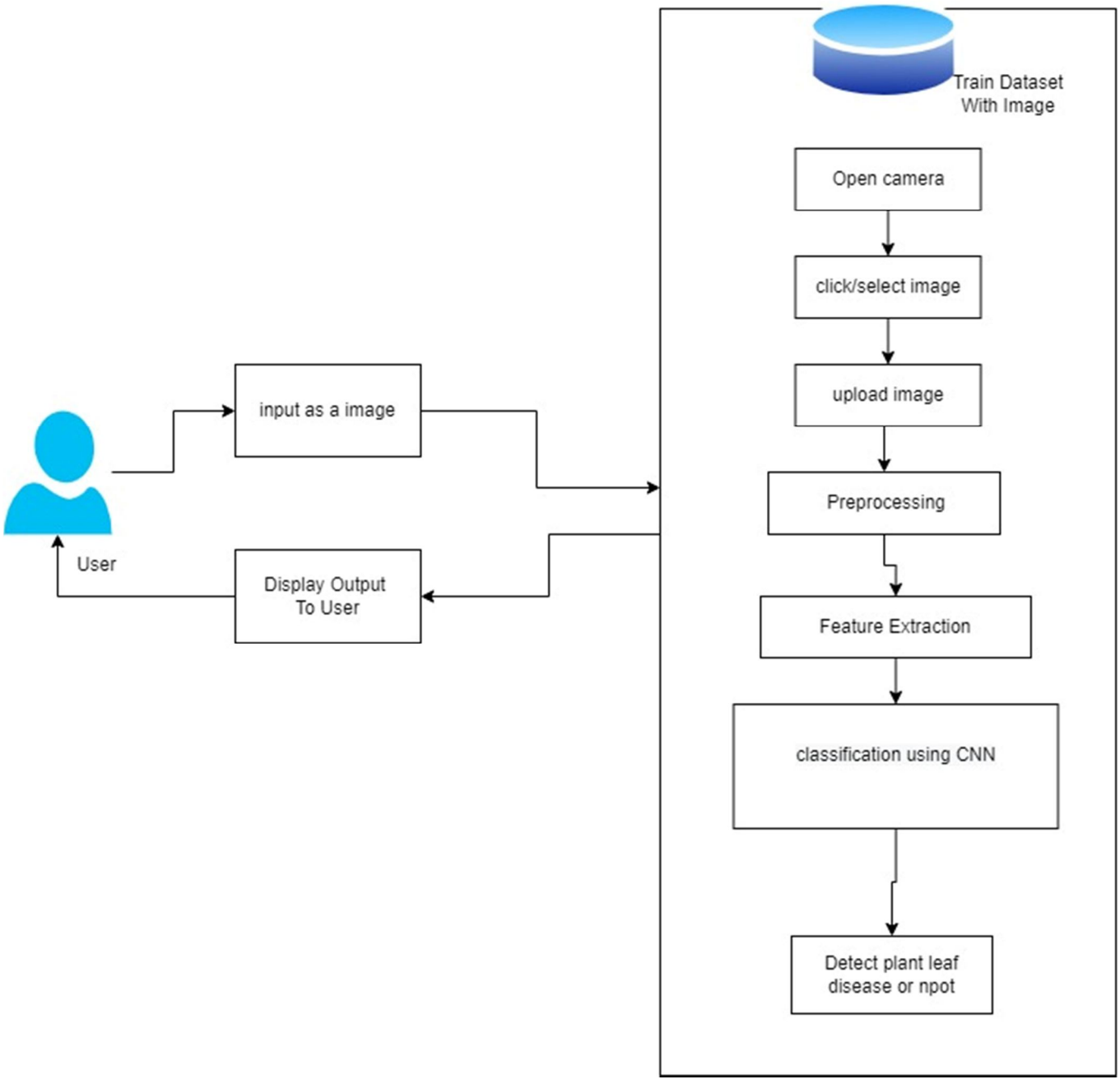


Fig 1: System Architecture

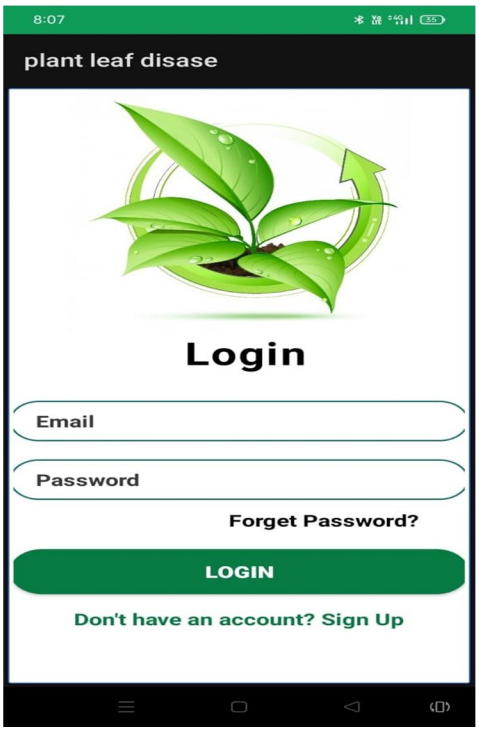
V. IMPLEMENTATION

Implementing leaf disease detection in an Android project involves several steps. Here is a general outline of the process:

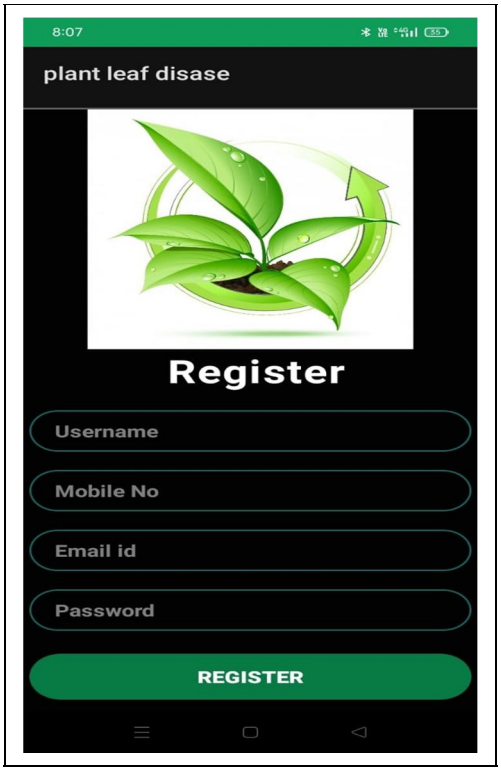
1) *Dataset Collection:* Gather a dataset of labeled images containing healthy leaves and leaves with various diseases. The dataset should cover a range of diseases and include different variations in lighting conditions, angles, and backgrounds.
2) *Preprocessing:* Preprocess the collected images to enhance their quality and facilitate feature extraction. This may involve operations such as resizing, normalization, noise removal, and image enhancement techniques.
3) *Feature Extraction:* Extract relevant features from the preprocessed images. As mentioned earlier, these features can include color, texture, shape, or other relevant characteristics. You can use image processing techniques, such as color histograms, texture analysis algorithms (e.g., GLCM), or shape descriptors to extract these features.
4) *Training Phase:* Split the dataset into training and testing sets. Use the training set to train a machine learning model or a deep learning neural network. Depending on the complexity of the task, you can choose different algorithms such as Support Vector Machines (SVM), Random Forests, Convolutional Neural Networks (CNNs), or transfer learning approaches.
5) *Model Training:* Feed the extracted features and their corresponding disease labels into the selected machine learning or deep learning model. Train the model using the training dataset to learn the patterns and characteristics of different diseases.
6) *Model Evaluation:* Evaluate the trained model using the testing dataset to assess its accuracy, precision, recall, and other relevant performance metrics. This step helps ensure the model's effectiveness in detecting leaf diseases.
7) *Android Application Development:* Develop an Android application using a suitable development framework like Android Studio. Design the user interface and integrate the trained model into the application.
8) *Image Capture and Processing:* Implement the functionality to capture leaf images using the device's camera or select images from the gallery. Preprocess the captured images using similar techniques applied during the dataset preprocessing phase.
9) *Disease Detection:* Apply the trained model to the preprocessed leaf images to predict the presence or absence of diseases. Utilize the extracted features from the test images to make predictions based on the trained model's learned patterns.
10) *Display Results:* Display the disease detection results to the user, indicating whether the leaf is healthy or affected by a specific disease. You can also provide additional information or recommendations based on the detected disease.

VI. RESULT

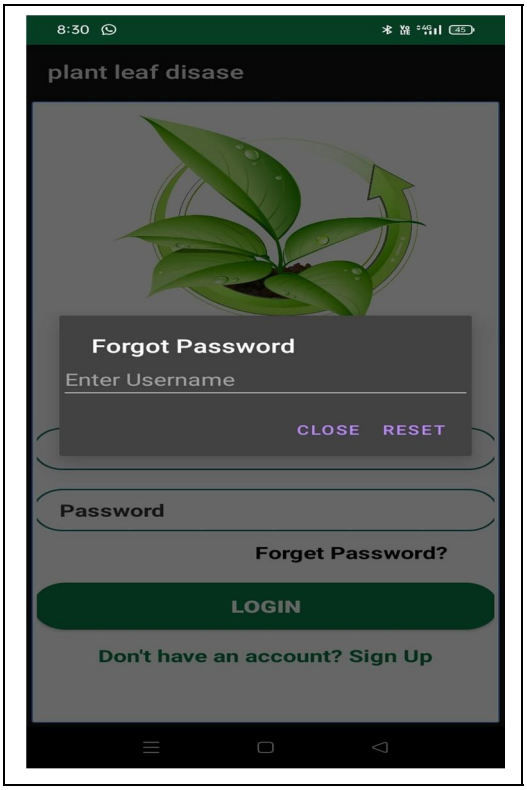
A. *Login Page*



B. Register Page

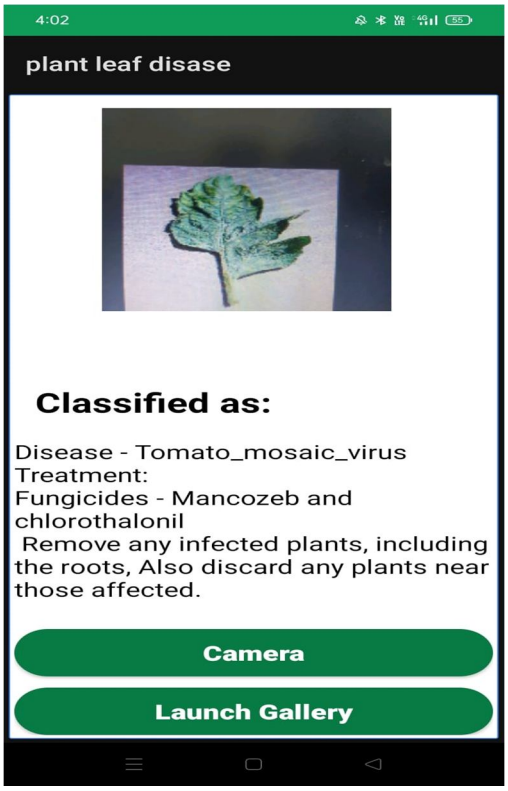


C. Forget Page



D. Upload Page

E. Result Page



VII. CONCLUSION

Grayscale images are easier to analyse and execute for a variety of applications since they are more clear and well-suited for analysis than RGB images, according to the report The usage of histogram equalisation improves the contrast of the images and gives the human eye a crisp image. Histogram Using equalisation, improved image quality can be obtained in using grayscale for different medical uses, biological uses like plant leaves and digital X-rays illness, etc. In light of this, these kinds of imagery will examination and diagnosis of plant leaf disease. determines the plant leaves' amount of illness.

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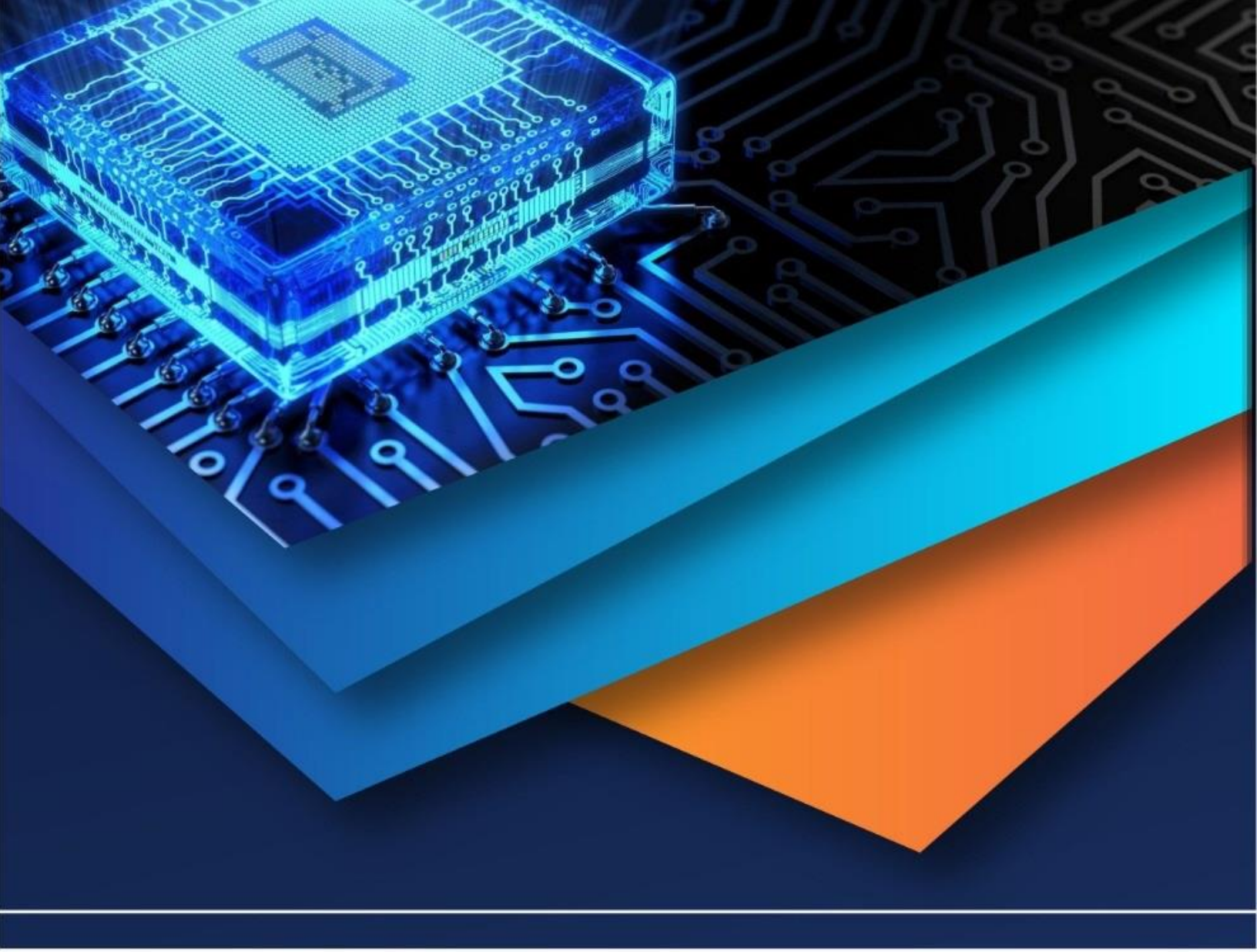

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