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E-Learning Virtual Platform with Attendanceand Query Using Deep Learning

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Abstract: ***The COVID-19 epidemic outbreak has rebounded in an unknown extrimity across the globe. The epidemic created an enormous demand for innovative technologies to break extremity-specific problems in different sectors of society. In the case of the education sector and confederated literacy technologies, significant issues have surfaced while substituting face-to-face literacy with online virtual literacy. Several countries have closed educational institutions temporarily to palliate the COVID-19 spread. The check of educational institutions impelled the preceptors across the globe to use online meeting platforms considerably. The virtual classrooms created by online meeting platforms are espoused as the only volition for face-to face commerce in physical classrooms. In this regard, scholars' attendance operation in virtual classes is a major challenge encountered by the preceptors. Pupil attendance is a measure of their engagement in a course, which has a direct relationship with their active literacy. Still, during virtual literacy, it is exceptionally grueling to keep track of the attendance of scholars. Calling scholars names in virtual classroom to take attendance is both trivial and time-consuming. Therefore, in the background of the COVID-19 epidemic and the operation of virtual meeting platforms, there is a extremity-specific immediate necessity to develop a proper shadowing system to cover scholars attendance and engagement during virtual literacy. In this design, we are addressing the epidemic -convinced pivotal necessity by introducing a new approach. In order to realize a largely effective and robust attendance operation system for virtual literacy, we introduce the Random Interval Query and Face Recognition Attendance Management System (henceforth, AI Present). To the stylish of our knowledge no similar automated system has been proposed so far for tracking scholars attendance and icing their engagement during virtual literacy.***

Keywords: E-learning; Virtual classroom; Coetaneous; Exertion Proposition; Learner engagement, ICT, Tool agreement, Synchronous, zAffordance.

I. INTRODUCTION

A virtual classroom is an online tutoring and literacy terrain where preceptors and scholars can present course account rements, engage and interact with other members of the virtual class, and work in groups together. The crucial distinction of a virtual classroom is that it takes place in a live, coetaneoussetting. Online coursework can involve the viewingof pre-recorded, asynchronous material, but virtual classroom settings involve live commerce between preceptors and actors.

Virtual classrooms and distance literacy, as alternate technology-driven literacy styles, have been growing at a reasonable pace. Virtual classrooms have been specifically in use by all sectors, including primary and advanced education as well as commercial literacy. The adding fashion of social and microlearning strategies, fostered by general social media platforms like YouTube and Twitter, and major educational technology dislocations like edX, have added to the adding acceptance of virtual modes of literacy. It is anticipated that the predominant use of virtual classrooms would increase by a whopping 16.2% compounded periodic growth rate by 2023. Nonetheless, virtual classrooms have not yet been considered as a serious volition or cover for the contemporary face-to-face (F2F) literacy.

Effects have started to look different, still, in thewake of the current, new coronavirus COVID-19 epidemic, since the entire world is under lockdown. It is the time of time when academic and tutorial conditioning are in full swing in utmost corridor of the world. The current epidemic situation paved for a ground test of virtual classrooms as a prominent tool of literacy in the current times. Seminaries, sodalities, universities, corporates, and indeed world bodies and multinational associations like the UNO, WHO, and G20 have had to switch to the lower-used virtual mode of literacy and dispatches. These emergent circumstances stand as a conducive test for companies offering virtual classroom platforms and services like Blackboard, Desire2Learn, Cisco, Microsoft, etc. The test parameters are varied, some predominant bones being bandwidth operation, network business, garcon response time, and a number of concurrent druggies.

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A virtual classroom includes the following features:

1) *Video Conferencing:* Using the best web conferencing software to grease learner- teacher-learner communication
2) *Digital Whiteboards:* Offering real-time demonstrations and plates.
3) *Instant Messaging:* Allowing compartmented exchanges on lower bandwidths
4) *Participation Controls:* Enabling scholars toparticipate in discussions, mute theirsurroundings or nearly "raise" their hands
5) *Sub-chats:* Breakout rout apartments to facilitate collaboration between learners
6) *Video Recording:* To save live lectures as video-on-demand for after reference
7) *End-to-end Encryption:* To insure virtual classroom access is confined to authorizedlearners

II. SCOPE OF THE PROJECT

In order to realize a largely effective and robust attendance operation system for virtual learning, this project introduce the Random IntervalAttendance Management System(henceforth,AIPresent).

To the stylish of our knowledge no similar automated system has been proposed so far for tracking scholars' attendance and ensuring theirengagement during virtual literacy.

The proposedmethod is the simplest and the best approach toautomatically capture the attendance during virtual literacy. The significance of the AI Present model isthat it precisely monitors attendance in virtual classrooms without hindering the learning process. Further, it can generate dedicated attendance reports,pin pointing scholars' attention during virtualliteracy at arbitary time intervals.

Moreover, thenovel arbitary attendance tracking approach can alsohelp the dropping out of actors from the virtual classroom. Randomness ensures that scholarscannot predict at which instant of time theattendance is registered. Another added advantageof the RIAMS approach is that it requires only nominal internet bandwidth in comparison with the being face recognition-based attendance trackingsystems.

AIPresent is in such a way that it does notaffect the literacy process in any way. Neither thescholars nor the teachers will have to face anydifficulties in virtual classrooms with the AIPresentdesign.

As the random intervals required forexecuting AIPresent attendance tracking modalitiesare too short (30 seconds, or lower), the teaching-learning process is not affected. The proposed modelcan be fluently gauged and integrated into a widevariety of virtual meetings, including business meetings.

III. METHODOLOGY

Proposed an attendance system based on Face Recognition and Verified the information by RFID and thus keep records by recognizing face, identifying identification number, entry and exit time by Real Time Clock (RTC) module. This information can be logged by using SD card or by uploading it to the internet by using an Ethernet shield, as per clients' need.

IV. SYSTEM SPECIFICATION

A. *Hardware Specification*

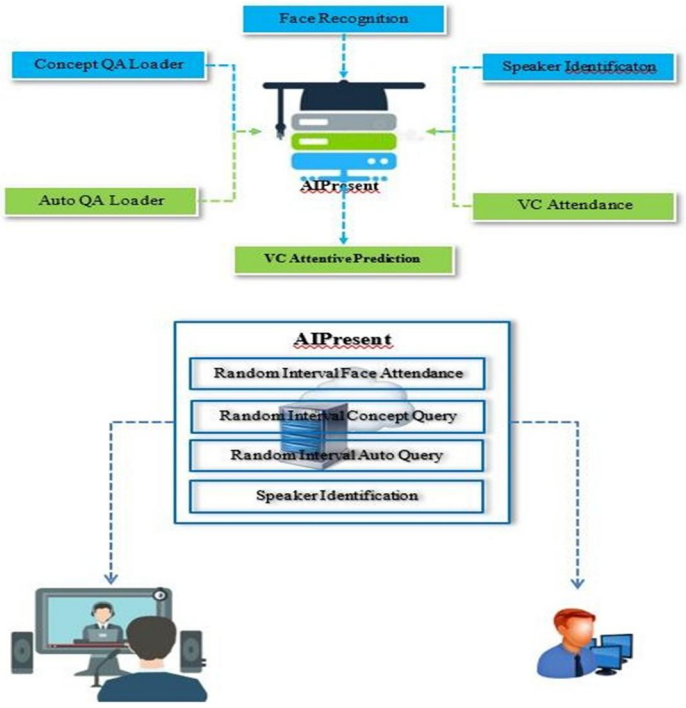
1) Processors: Intel® Core™ i5 processor 4300Mat 2.60 GHz or 2.59 GHz (1 socket, 2 cores, 2 threads per core), 8 GB of DRAM
2) Disk space: 320 GB
3) Operating systems: Windows® 10, macOS*,and Linux*

B. *Software Specification*

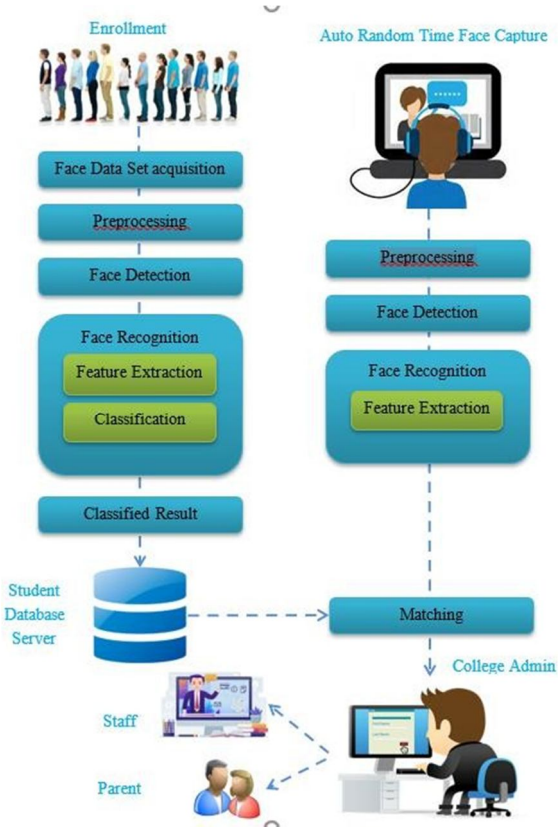
1) Server Side : Python 3.7.4(64-bit) or (32-bit)
2) Client Side : HTML, CSS, Bootstrap
3) IDE : Flask 1.1.1
4) Back end : MySQL 5.
5) Server : WampServer 2i
6) DL DLL : TensorFlow, Pandas, SiKit

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V. AIP PRESENT ARCHITECTURE



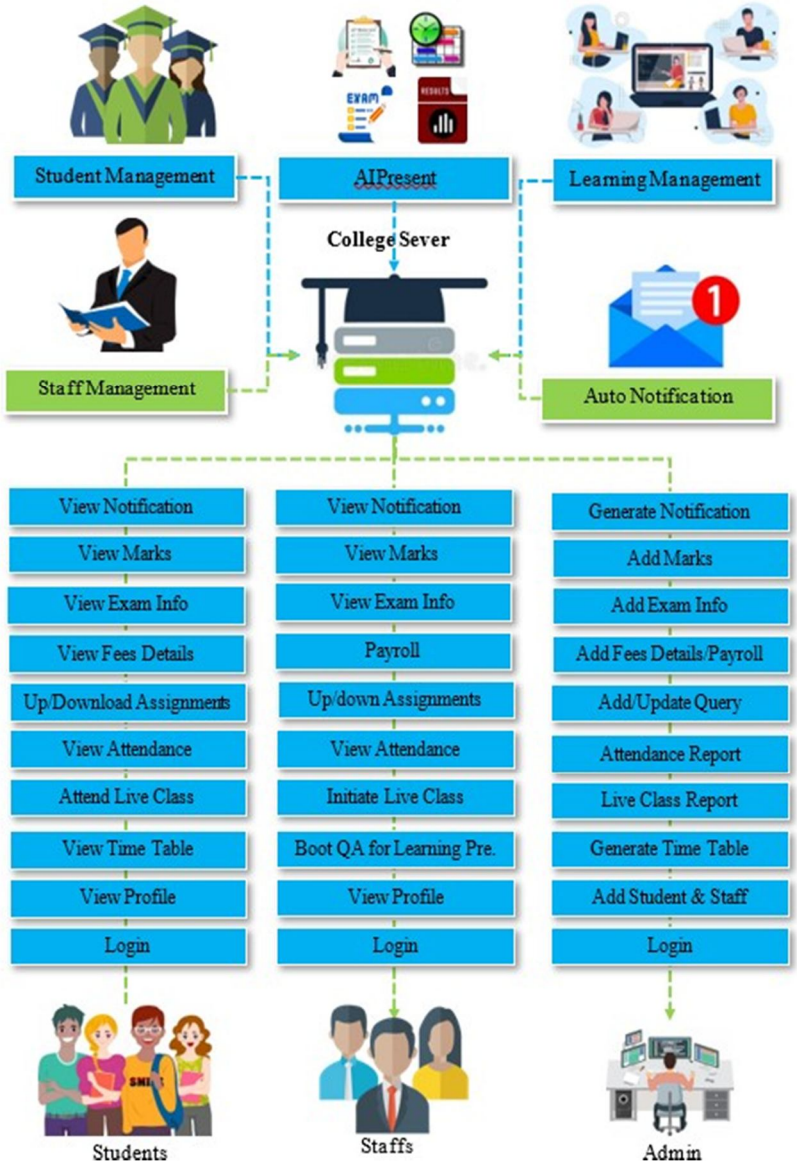
Architecture For Automatic Random IntervalFace Recognition Attendance



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VI. OVERALL SYSTEM ARCHITECTURE



VII. PROPOSED SYSTEM

Proposed System of the design introduces the new point of randomness in an AI-grounded face recognition system to effectively track and manage scholars' attendance and engagement in virtual classrooms. Enhances the efficacity of the attendanceoperation in virtual classrooms by integrating two ancillary modalities scholars' real-time responseto CAPTCHAs, Concept QA and UIN (Unique Identification Number) queries. Observers scholars' attendance and engagementduring virtual learning without affecting their focus on literacy.

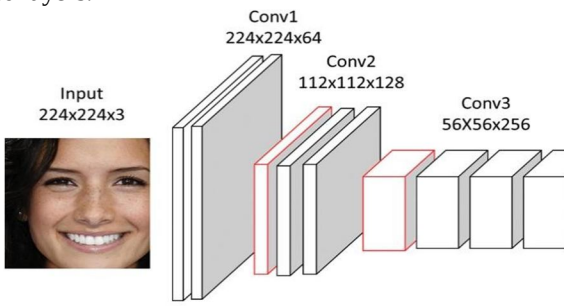
Proposed two ancillary modalities – vindicating scholars' responses to Subjects and UIN (Unique Identification) queries at arbitary intervals of time. Develops a stoner-friendly attendance recording system for preceptors that can automatically record scholars' attendance and induce attendance reportsfor virtual classrooms.

Deep literacy in the form of Convolutional NeuralNetworks (CNNs) to perform the face recognition. **DCNN**

CNNs are order of Neural Networks that have proven veritably effective in areas similar as image recognition and bracket. CNNs are a type of feed-front neural networks made up of many layers. CNNs correspond of pollutants or kernels or neurons that have learnable weights or parameters an biases. Each complication and voluntarily follows it with a non- linearity.

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A typical CNN armature can be seen as shown in Fig.1. The structure of CNN contains Convolutional, pooling, Rectified Linear Unit (ReLU), and Completely Connected layers.



1) *Convolutional Layer:* Convolutional subcaste performs the core structure block of a ConvolutionalNetwork that does utmost of the computational heavylifting. The primary purpose of Convolution subcaste is to prize features from the input data which is an image. Convolution preserves the spatial relationship between pixels by learning image features using small places of input image. The input image is convoluted by employing a learnable neurons. This produces a point chart or activation chart in the affair image and after that the point charts are fed as input data to the coming convolutional sublayers.
2) *Pooling Layer:* Pooling subcaste reduces the dimensionality of each activation chart but continuesto have the most important information. The input images are divided into a set of non-overlapping blocks. Each region is down-tried by a non- direct operation similar as average or maximum. This subcaste achieves better conception, briskly confluence, robust to restatement and deformation andis generally placed between convolutional layers.
3) *ReLU Layer:* ReLU is a non-linear operation and includes units employing the therapy. It is an element wise operation that means it is applied per pixel and reconstitutes all negative values in the point chart by zero. In order to understand how the ReLU operates, we assume that there is a neuron input given as x and from that the therapy is definedas f(x)= maximum (0, x) in the literature of neural networks.
4) *Fully Connected Layer:* Fully Connected Layer (FCL) term refers to that every sludge in the former subcaste is connected to every sludge in the coming subcaste. The affair from the convolutional, pooling, and ReLU layers are images of high-position features of the input image. The thing of employing the FCL is to employ these features for classifying the input image into colourful classes grounded on the training dataset. FCL is regarded as final pooling subcaste feeding the features to a classifier that uses Soft Maxactivation function. The sum of affair chancesfrom the Fully Connected subcaste is 1. This is ensuredby using the SoftMax as the activation function. TheSoftMax function takes a vector of arbitrary original- valued scores and squashes it to a vector of values between zero and one that sum to one.

VIII. ADVANTAGES

A. Randomness ensures that scholars cannot prognosticate at which moment of time the attendance is registered.
B. Largely effective and robust attendanceoperation system for virtual literacy.
C. Observer scholars' attendance and engagement during virtual learning withoutaffecting their focus on literature.
D. scholars' attention and engagement invirtual learning are enhanced.
E. Introduces the new point of randomness
F. face-embedding literacy approach thatyielded a recognition delicacy of 98.95%
G. Provide authorized access.
H. Ease of use.
I. Multiple face discovery.
J. Provide styles to maximize the numberof extracted faces from an image.
K. Ease of use.
L. Manipulate and fete the faces in realtime using live videotape data.

IX. FUTURE ENHANCEMENT

By incorporating other ancillary modalities like speech recognition and adding suitable adaptive weights for each modality, the efficiency and reliability of the system can be further enhanced. Further implement this system to online examination.

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X. ALGORITHM

Algorithm 1 Training algorithm of CNN

Input:

train_x, train_y: features and labels of Training Set

test_x, test_y: features and labels of Test Set

Output:

w_{ij}^l, b_j^l,: weights and bias of **Convolution and Pooling Neural Network** (**CPNN**).

w_{jk}, b_{jk}: weights and bias of **Full Connection Neural Network** (**FCNN**, **FCNN** have 2 layers)

Required parameters:

***max_time*:** maximum value *n* of *n*ACs in every 1SP

***target_error*:** when the current training error is less than target error, the training is finished

***η_CPNN*: the** learning rate of CPNN

Initialization work:

w_{ij}^l, b_j^l, w_{jk}, b_{jk}: weights and scaling parameters of **CNN** (**CPNN**+**FCNN**) are set as random numbers.

t: *t* is the current simulation time, which is initialized as *t*=1 before the training loop.

$L(t)$: $L(t)$ is the mean square error at simulation time *t*. $L(t)$ is initialized as $L(1)$ = **1>*target_error***.

Begin:

1: Set the required parameters and complete the initialization work

2: **while** $t <$ ***max_time*** and $L(t) >$ ***target_error***

3: **for all** *trainingSet*:

4: ***train_p*** (prediction of label) is calculated according to ***train_x*** and forward calculation formula 1-9

5: **end for**

6: $L(t)$ is re-calculated as $L(t) = \frac{1}{2}\sum_{n=1}^{N}(train_p(n) - train_y(n))^2$, N is the total number of *training*

7: Δw^l , Δb^l , Δw_{ij}^{-1}, Δb_j^{-1} are updated according to the formula 20-23

8: $w^l(t), b^l(t), w_{ij}^{-1}(t), b_j^{-1}(t)$ are adjusted according to the formula 24-27

9: t++

10: **end while**

End

XI. CONCLUSION

Random Interval Attendance Management System (AIPresent) is an innovation based on Artificial Intelligence – Deep Learning, specially designed tohelp the teachers/instructors across the globe for effective management of attendance during virtual learning. AIPresent facilitates precise and automatictracking of students' attendance in virtual classrooms. It incorporates a customized face recognition module along with specially designed ancillary submodules. Both the face recognition and the sub modalities are for students' attendance monitoring in virtual classrooms. The submodules check students' responses to CAPTCHAs, ConceptQA and UIN queries. The system captures face biometric from the video stream of participantsand gathers the timely responses of students to ConceptQA and UIN queries, at random intervals oftime. An intelligible and adaptive weighting strategyis employed for finalizing the decisions from the three modalities. AIPresent could be integrated with any existing virtual meeting platform through an application interface like a web page or a specific App.

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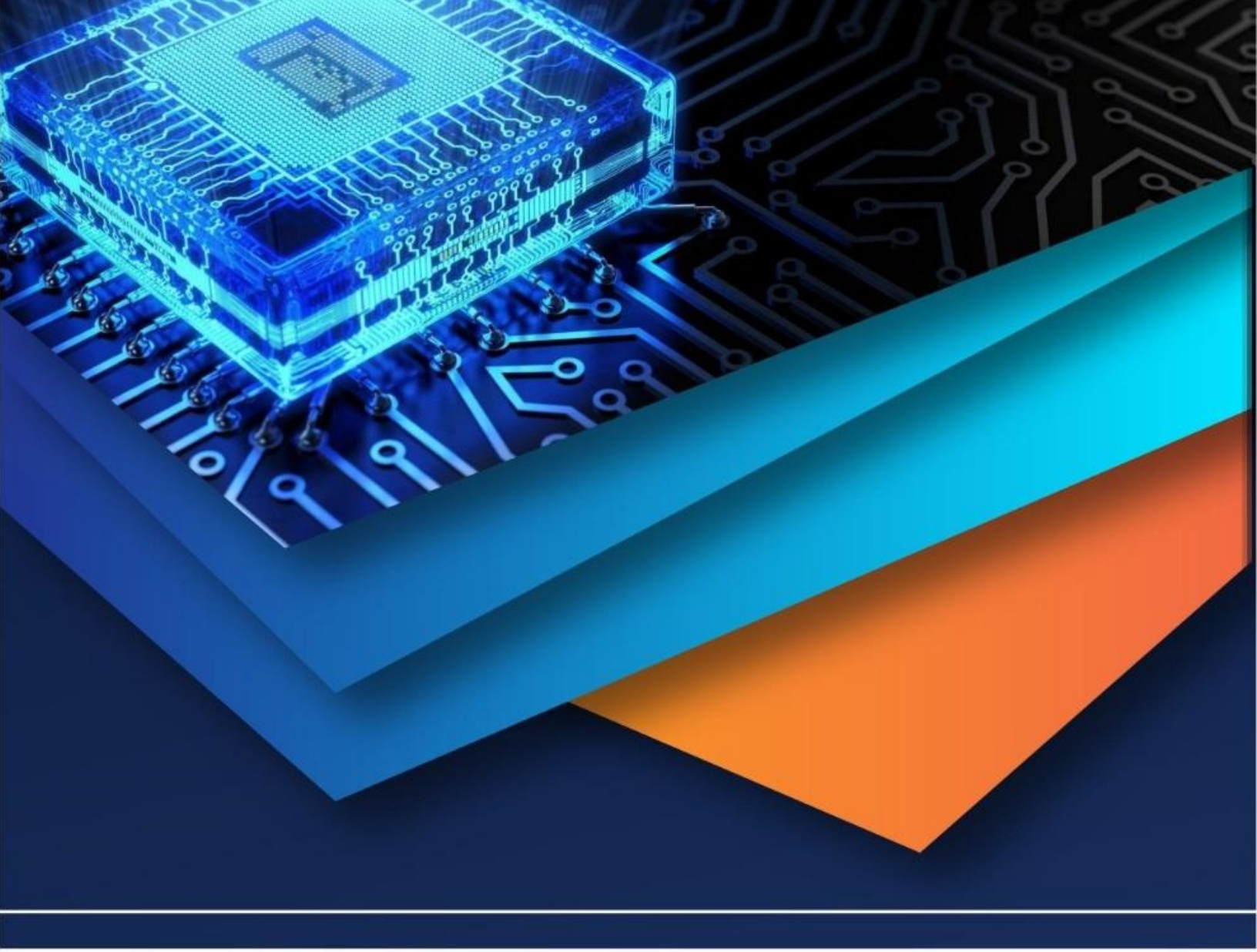
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