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Expert System for Disease Diagnosis: An Attempt to Develop Ai Based Diagnostic System

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Abstract: Traditionally diagnoses of diseases done manually by consultant with the expert or a physician. In general human can perform a major role to solve complex medical problems as an expert. Now as the population is increasing and the time has become more valuable for modern civilization they don't have time for an appointment to the physician, so expert systems were designed to recognize diseases at home or office by simply putting the symptoms and find out the recommended medicine and reduce the burden of hospitals. In this paper, a rule based expert system is designed with twelve rules to diagnoses diseases Measles, German Measles, Flu, Common Cold, Mumps, Chicken Pox, Whooping Cough, Meningitis, Diphtheria, Influenza, Typhoid Fever, Anaemia for provide good services in health.
Keywords: Expert System; Artificial Intelligence; Inference Engine; Rule-based; Diseases Diagnosis

I. INTRODUCTION

An Expert System or master frameworks utilize artificial intelligence to display a choice that specialists or experts in the field would make. Unlike decision support systems with many options from which the user may choose, expert systems pass on the scheme that computer settled on the best choice in view of criteria that expert would use [1]. Expert system use knowledge of human expert to solve real-world problems where generally need interfere of human intelligence. Within the computer this knowledge is often represented by some rules or as data and depending on problem requirement, these rules can be evoked [1].Expert system can help physicians by advising them about unrecognized data needs of a diagnosis, analysing and treatment procedures by the helps of tools comprises of symptoms, conditions and finally come out with actual result. The significant issue in building up a medical decision support neural network is relies on substantial number of training cases which are required to pick up a decent diagnostic ability [2]. These substantial numbers of training cases may not be generally available always.

II. INFERENCE ENGINE IN EXPERT SYSTEM

A rule based system comprises of if-then statements and it can be manage by the form "if x is P then y is Q", where "x is P "is called the forerunner or antecedent and y is Q " is known as the subsequent or conclusion. An inference engines can be used as a part of rule based frameworks in following two ways: Forward chaining framework, starting with initial facts and continue utilizing the rules to reach destination by given those facts [3]. On reverse in backward chaining frameworks, hypotheses are prepared first and continue searching the rules that would allow presuming that hypothesis [3]. Systems of forward chaining are basically information driven, while systems of backward chaining are goal driven. Consider an example

Rule 1
If P and R then Y
Rule 2
If P and X then Z
Rule 3
If Q then X
Rule 4
If Z then S
If the task is to prove that S is true, given P and Q are true.

In forward chaining, begin with Rule 1 and moving down until a rule fires. Rule 3 is the case that fires only in first iteration. After the first iteration, it can be reasoned that P, Q and X are true. The second iteration utilizes this significant data. In same way after the second iteration, Rule 2 fires and makes Z is valid statement, which thus encourages Rule 4 to fire and make S is valid. Forward methodology is particularly fitting in circumstances where information is costly to gather; only few are available [4]. A deep care is to be taken when these rules are built, with the preconditions determining as correctly as conceivable when distinctive rules should fire. In the backward chaining technique, handlings begin with the targeted goal and after that discover evidence for demonstrating the goal.

Coming back to a similar illustration, the undertaking task that S is true would be started by first finding a rule that demonstrates S. Rule 4 does such thing, which gives a sub goal to demonstrate that Z is valid. Then rule 2 comes forward and as it is now already realized that P is valid, the new sub goal is to demonstrate that X is valid. Rule 3 gives the next sub goal of demonstrating that Q is valid. Subsequently, it could be inferred that X is valid, which suggests that Z is valid, which thus likewise infers that S is valid. It is valuable in circumstances where the amount of information is possibly huge and where system under consideration follows some particular characteristics [4]. Forward chaining frameworks might be wasteful when there isn't much enough knowledge available for conclusion, or there available few hypothesis to test [4]. In a general both chaining framework uses similar set of rules.

III.PROPOSED SYSTEM MODEL

Generally, patients complain about their diseases by visiting any medical hub but in this case there situated an automated machine called expert system interviews the patients through many questions and basis of their response expert system searches the appropriate symptoms from the database according to the patient's problem. If some match symptoms found in the database then the expert system comes to a conclusion and provides a prescription on basis of that particular conclusion. The proposed framework is shown in Fig. 1.

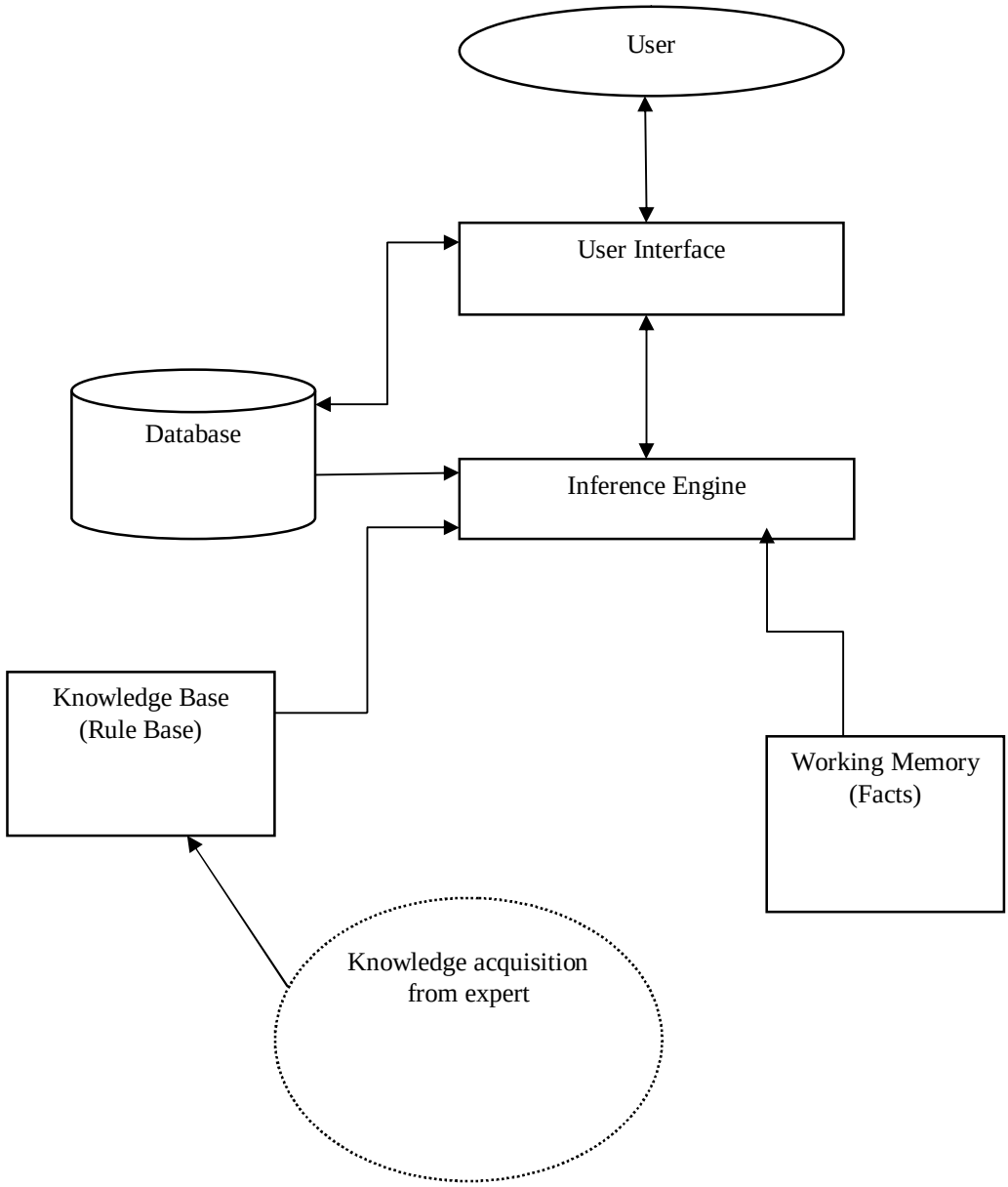

Fig. 1. Proposed framework for medical diagnostic system

IV. KNOWLEDGE ACCESSION PROCESS

The primary power of the expert system is knowledge. Rules are built by all available facts contained in the knowledge base. For this in expert System main source of rules is knowledge.

Table i

Rule-base for the propsed model

1. IF (fever for more than 2 days AND runny nose AND cough AND rash,usually covers the face,the body AND conjunctivitis AND body_ache) THEN MEASLES
2. IF(fever for more than 2 days AND runny nose AND rash,usually covers the face,the body AND sore throat) THEN GERMAN_MEASLES
3. IF(fever for more than 2 days AND runny nose AND cough AND conjunctivitis AND body_ache AND headache AND sneezing) THEN FLU
4. IF(runny nose AND cough AND headache AND sneezing AND sore throat AND) THEN COMMON_COLD
5. IF (fever for more than 2 days AND swollen salivary glands AND dry mouth) THEN MUMPS
6. IF (rash,usually covers the face,the body AND itching skin AND general weakness) THEN CHICKEN-POX
7. IF(cough AND Sneezing AND runny nose) THEN WHOOPING COUGH
8. IF(fever for more than 2 day AND rash,usually covers the face,the body AND body_ache AND vomiting AND headache) THEN MENINGITIS
9. IF(fever for more than 2 day AND lymph nodes in the neck enlarged AND slurred speech AND difficulty breathing or swallowing AND skin lesion with pain,red and swollen AND double vision) THEN DIPHTHERIA
10. IF (fever for more than 2 days AND cough AND headache AND myalgia) THEN INFLUENZA
11. IF(fever for more than 2 days AND rash,usually covers the face,the body AND rose colored spot on body AND general weakness AND headache) THEN TYPHOID-FEVER
12. IF(chest pain AND Paleness AND low blood pressure AND general weakness AND difficulty breathing or swallowing) THEN ANAEMIA

V. RESULTS AND DISCUSSION

In proposed model patients need to register themselves first by fill up their details in registration form. The interface for registration is shown in Fig. 2.

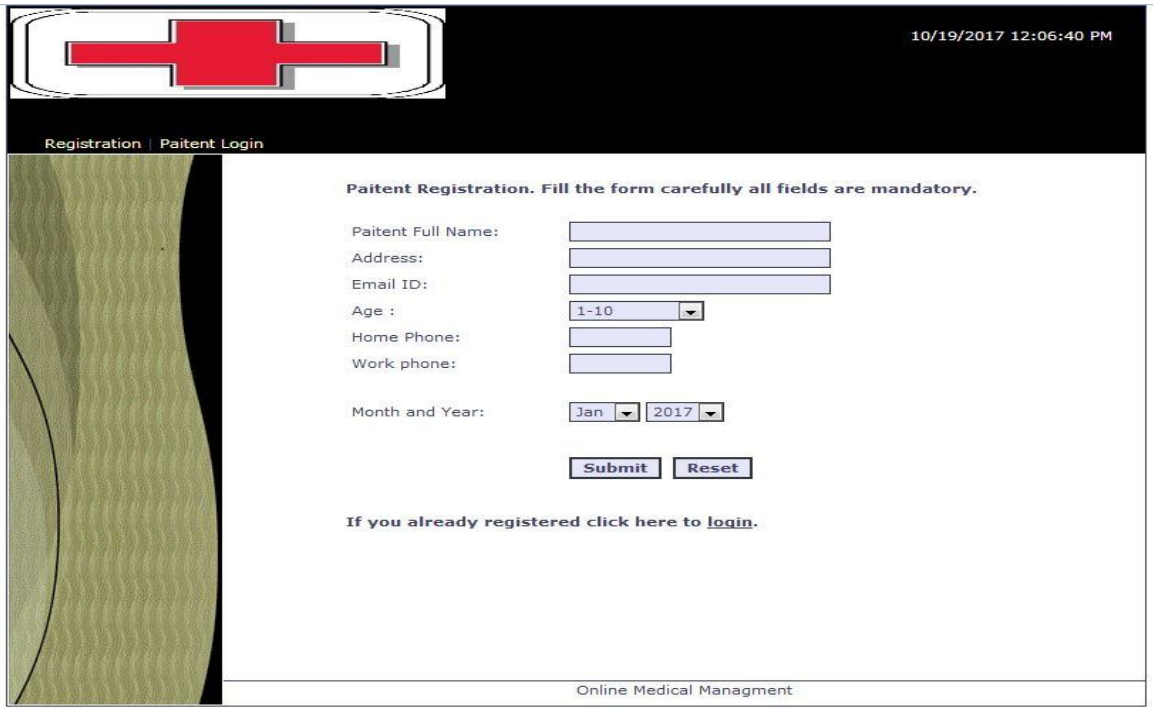

Fig. 2. Paitent registration page

After registration a valid patient can access the facilities provided by the system with their unique username and password. The interface shown in Fig. 3.

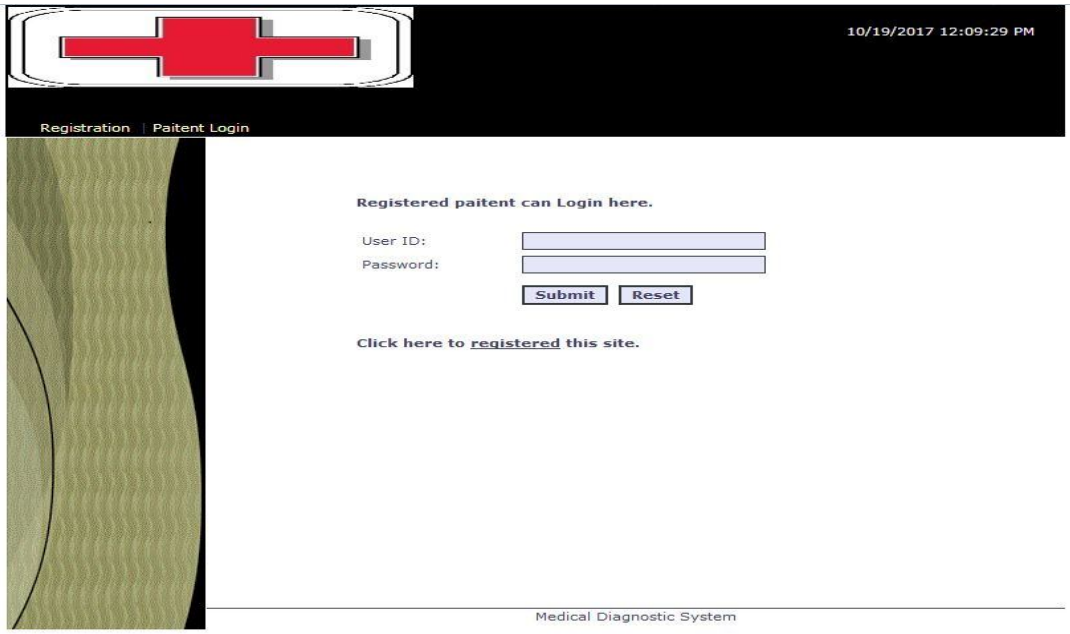

Fig. 3. Login page

After enter the system, the patient proceeds to diagnosis centre where she/he can check the appropriate symptoms and push the "result" button. The interface for diagnosis centre is shown in Fig. 4.

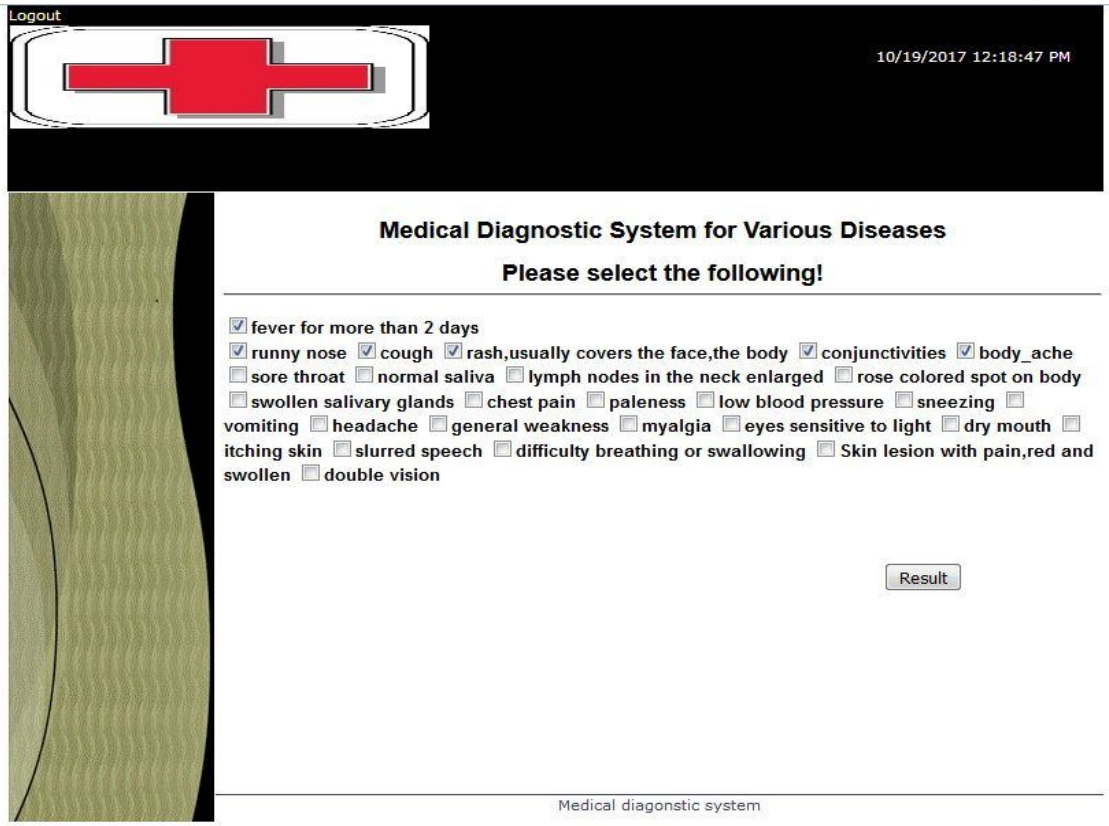

Fig. 4. Diagnostic page for proposed medical diagnostic model

Fig. 5 shows interface that can be used to generate the final report about her/his diseases.

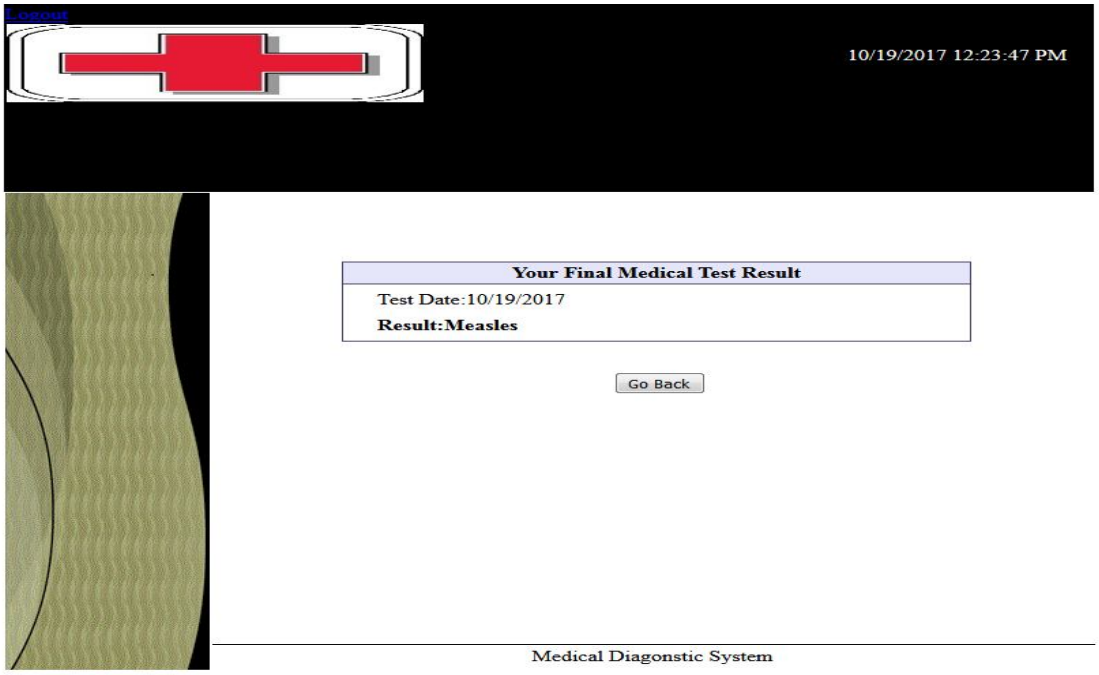

Fig. 5. Reporting page for proposed medical diagnostic model

VI. CONCLUSION

Today world is driven by knowledge base expert system which is one of very useful technology in artificial intelligence's world.

Stored knowledge is extracted and this knowledge can be used as an expert in case of demise. It perform an important role especially in medical field as there exist a few number of specialist person. In this paper, a rule based expert framework can be design to diagnose diseases apart from traditional method. In future databases of corresponding medical should be enough good and fair so that it can reduce queue of patients and easy to generate result data after accurate diagnosis of diseases.

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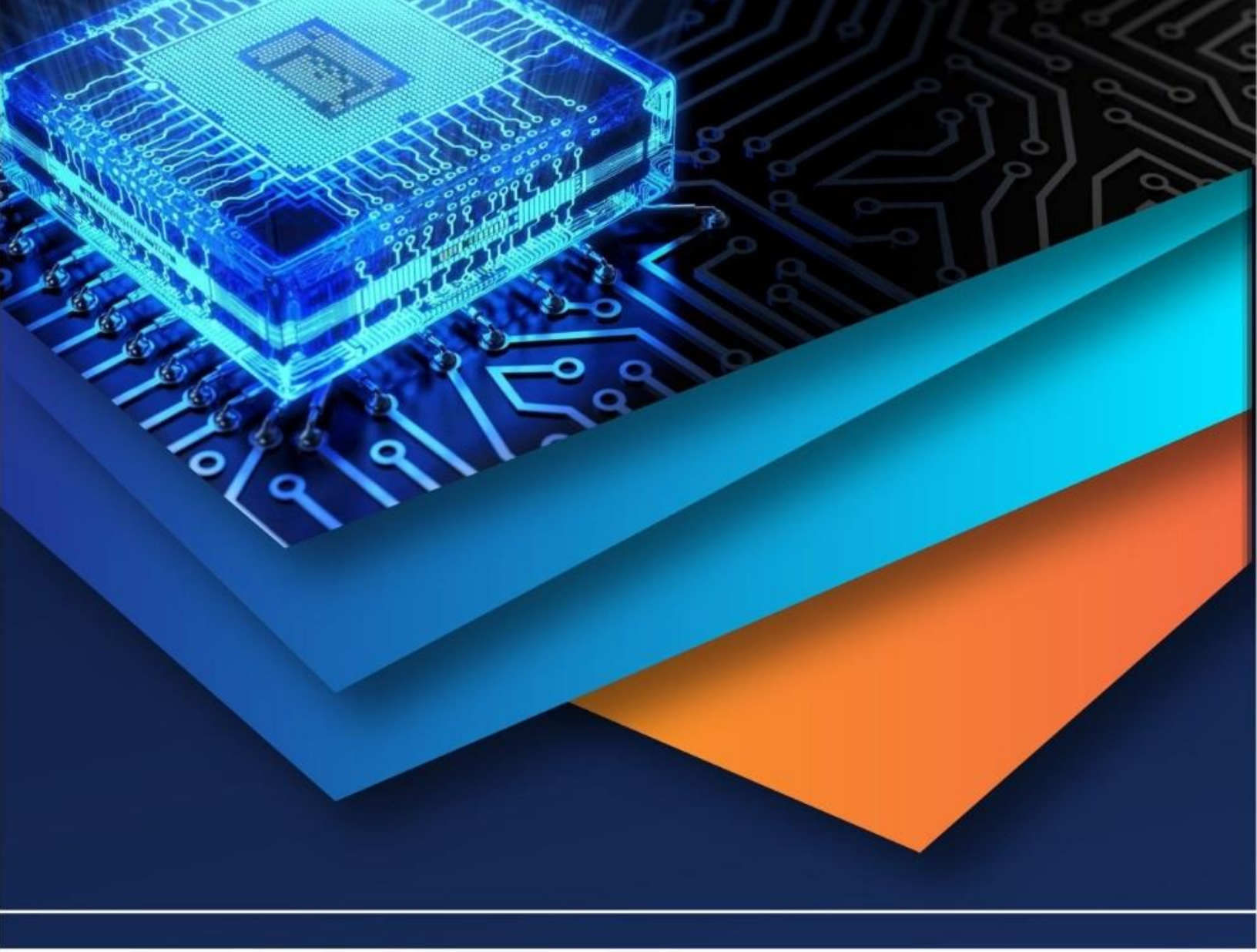

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