

## EFFECTIVE DIAGNOSIS OF DISEASES THROUGH SYMPTOMS USING ARTIFICIAL INTELLIGENCE AND FUZZY LOGIC.

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**ABSTRACT:** *In this Research paper is based on artificial intelligence. Artificial Intelligence means learn by knowledge. In this research mechanism for artificial doctor that based on knowledge based. This artificial doctor has the capability to give possibilities of all diseases on the basis of symptoms of patient. It's like an assistant doctor with more intelligent's. This mechanism asks the patient about the symptoms. On the basis of those symptoms it will suggest about the possibilities of diseases. This mechanism helps to doctor to identify the disease of the patient. It will also ask about the previous and family history. This mechanism gave the result by studying the previous treatment also, so it takes every possibility of diseases. And it will also alert the doctor for the medicine which cannot be given to the patient.*

**Keywords:** *Artificial Neural Networks, General Disease Diagnosis, Medical Diagnosis, Medical Knowledge, fuzzy logic, fuzzy algorithm.*

### I. INTRODUCTION

Artificial intelligence in medicine and health care has been a particularly very hot topic in recent years. While there is a great sense of great potential in the application of AI in medicine. Artificial intelligence in medicine refers to the use of the artificial intelligence/ automated processes in the diagnosis and the treatment of patients who requires care. A diagnosis process starts with the patient complaint and the doctor learn more about the patient situation interactively during the interview, as well as measure the patient's body temperature and blood pressure. The diagnosis is then determined by taking the whole available patients status into the account.[1]

AI doctors are different from the human doctors but they aren't limited by the human capacity. AI doctors have million of points of data draw on; will remember where a human doctor might forget because of this, they are in theory designed for more accurate diagnosis. AI doctors also do not need to sleep or eat and do not get sick themselves. This means they can work 24/7, stay alert the whole time and may cut costs for the hospital and may cut costs for hospital they work.

### II. MEDICAL DIAGNOSIS PROBLEMS

The major task of medical science is to prevent and diagnosis of the correct diseases. Here our focus is the second task , which is mentioned before, is not direct and simple task at all.[1]

- Generally doctor does not remember each and everything. In some cases, sometimes doctor takes

the patient symptoms normally, they don't take much care about to identify the particular diseases and as they find the diseases they are too late to cure it.

- As consider, in some cases sometimes doctors or the patients take the tumor normally and treat it normally, as they find later that it is cancer, at that time it's too late to cure it. So it is a major problem.
- The quality of the diagnosis is totally depending on the physician talent as well as his/her experience.

The training procedure of the doctors, in particular specialists, is a lengthy and expensive one. So even in developed countries as may feel lack of MDs.

### IV. PROPOSED SOLUTION

The diagnosis of diseases involve the several levels of uncertainty and imprecision, and its inherent to medicine. A single disease may manifest itself quite differently, depending on the patient, and with different intensities. A single symptom may correspond to different diseases. On the other hand, several diseases present in the patient may interact and interfere with the usual description of any of the diseases. To deal with the imprecision and uncertainty, we have fuzzy logic. Fuzzy logic introduces the partial truth values, between true and false. According to the Aristotelian logic, for a given proposition or state we have two logical values; true-false, black-white, 1-0. In the real life, things are not either black-false but most of times are grey. Thus, in many practical situations, it is convenient to consider intermediate logical values. Let us show this with a very simple medical example. Consider the statement "you are healthy". Is it true if you have only a broken nail? Is it false if you have a terminal cancer? Everybody is healthy to some degree  $h$  and ill to some degree  $i$ . if you are totally healthy, then of course  $h=1$ ,  $i=0$ . Usually, everybody has some minor health problems and  $h<1$ , but

$$h+i=1.$$

In the other extreme situation,  $h=0$  and  $i=1$  so that you are not healthy at all (you are dead). In the case you have only a broken nail, we may write  $h=0.999$ ,  $i=0.001$ ; if you have a painful gastric ulcer,  $i=0.95$ ,  $h=0.05$ .

Uncertainty is now considered essential to science and fuzzy logic is away to model and deal with it using natural language. We can say that fuzzy logic is a qualitative computational approach. Since uncertainty is inherent in fields such as medicine and massive data in bioinformatics and fuzzy logic takes into account such as uncertainty, fuzzy set theory can be considered as a suitable formalism to deal with imprecision. fuzzy logic is a logic to render precise

what is imprecise in the world of medicine.

#### V. FUZZY LOGIC IN MEDICINE

The complexity of medical practices makes traditional quantitative approaches to analysis inappropriate. In medicine, the lack of information and its imprecision, and many times, contradictory nature are common facts. The source of uncertainty can be classified as follows.

- Information about the patients.
- Medical history of the patients, which is usually supplied by the patients. This is usually highly subjective and imprecise.
- Results of laboratory and other diagnostic tests, but they are also subject to some mistakes, even to improper behavior of the patient prior of the examination.
- The patient may include simulated, exaggerated, understand symptoms, or may even fail to mention some of them.

Fuzzy logic plays an important role in medicine.

#### Fuzzy Logic ALGORITHM

The designed algorithm used is as follows:

```
Input patients" ID;
If the ID is already in the data base then
Read name, age, and gender from the database;
Else
Input name, age and gender;
Input the catalyst factors(If any);
Get the input symptom;
Evaluate the symptoms against the fuzzy rule in the
knowledge base and construct fuzzy membership function
such that
 $X^f = \text{fuzzy}(X)$ 
Where  $X^f$  is the fuzzy membership value and X is the
original symptom;
Match the input variable to the fuzzy rule in the knowledge
base;
Repeat Step 5 for all the generated symptoms;
Determine the probable diseases using fuzzy logic;
Add catalyst factors and history if present;
Filter the determined diseases;
If online diagnosis
then
Prescribe a treatment procedure available;
Else
Give "online diagnosis free"
as message;
11. Stop.
```

#### MATHEMATICAL REPRESENTATION

We consider a set of m diseases D, and define a collective set of n features F relevant to these diseases. Usually we have  $n \gg m$ . Let:

$D = \{d_1, d_2, d_3, \dots, d_m\}$   $F = \{f_1, f_2, f_3, \dots, f_n\}$

To specify the symptoms of a patient, he would be checked against all features in the set F and a fuzzy value would be

assigned to each feature. The fuzzy values are selected from the set:

{ Very Low, Low, Moderate, High, Very High }

For example, a single symptom can be specified as < chest pain , Moderate >. By checking the patient for all n features of the set F and assigning a proper fuzzy value for each feature, the set of patient"s symptoms S will be obtained as follows:

$S = \{ \langle f_1, v_1 \rangle, \langle f_2, v_2 \rangle, \langle f_3, v_3 \rangle, \dots, \langle f_n, v_n \rangle \}$

Where,  $v_i$  is the fuzzy value assigned to the feature  $f_i$  when checking the patient,  $i=1, \dots, n$ .

The final symptom set „S“ is then compared with the disease set „D“

```
D=d1; S=f1,v1;
do {
If(S==D) {
If(S==fn,vn){
Print disease name „D“; }
Else{
S++; }
}
Else{
D++; }
}while(D<=dn);
```

#### VI. CONCLUSION

Its mechanism help to identify the particular diseases and In some Cases also identify the serious diseases those not operate on O.P.D. level, its early Identify as soon as cure and giving suggestion of investigation and then it will clear the Diseases are present or not and its mechanism also helpful for not experienced doctors. And all general doctor and its initially level also beneficial for general physician. Physician Feed the symptom and according to symptoms identifies the disease. Its mechanism helps doctor"s decision but can"t replace doctor position.

#### ADVANTAGE

Its mechanism work as real time environment it"s beneficial in following field- All Hospitals in O.P.D. level. □ General physician.

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