

Full Length Research Paper

An expert system (Autodoc) for diagnosing diseases and prescribing medication using visual basic.net

***Aru Okereke Eze and Opara F.K**

Department of Electrical/Electronic Engineering, Federal University of Technology, Owerri, Imo State, Nigeria

*Corresponding Author's Email: okezearu@yahoo.com

ABSTRACT

This work presents the design of an expert system that aims to provide the patient with background for suitable diagnosis of some of the human diseases. The human body has always been viewed as prone to diseases. There are many disease states that may produce symptoms from the body. VB.NET is used as a tool for designing our expert system. An initial evaluation of the expert system was carried out and a positive feedback was received from the users.

Keywords: Artificial Intelligence, Expert Systems – VB.NET, symptoms, disease.

INTRODUCTION

Computer-based methods are increasingly used to improve the quality of medical services. Artificial Intelligence (AI) is the area of computer science focusing on creating machines that can engage on behaviors that humans consider intelligent. The ability to create intelligent machines has intrigued humans since ancient times and today with the advent of the computer and 50 years of research into AI programming techniques, the dream of smart machines is becoming a reality. Researchers are creating systems which can mimic human thought, understand speech, beat the best human chess player, and countless other feats never before possible. Find out how the military is applying AI logic to its hi-tech systems, and how in the near future Artificial Intelligence may impact our lives [Russell S, P Norvig, 2002]. Dependence on the human expert can be minimized if his/her expertise can be transferred into a computer system. The proposed system for dealing with the problem of eye disease diagnosis is an expert system. An expert system is a system that employs human knowledge captured in a computer to solve problems that ordinarily require human expertise [Beverly G Hope and Rosemary H Wild, 1994],[Azaab S, Abu Naser S, Sulisel O., 2000]. Expert system seeks and utilizes relevant information from their human users and from

available knowledge bases in order to make recommendations [Turban E 1992]. With the expert system, the user can interact with a computer to solve a certain problem. This can occur because the expert system can store heuristic knowledge. The development of expert system is implemented in VB.NET programming environment. [Giarranto JC ,1998], [Jackson P.1999,],[Samy S Abu Naser and Zaiter A. Ola,2008]. This programming tool is designed to facilitate the development of software to model human knowledge or expertise for medical therapy.

VB.NET program is used by reason of the flexibility, the expandability and the low cost. The human health gives us the sense of confidence, allowing us to adventure more about the surrounding world than we would have done without good health. As it is commonly said that a healthy nation is a wealthy nation, one will be more productive both in reasons and otherwise when he/she is sound in health. Without good health no organ of the body will be function perfectly well.

Diagnosis of human diseases is initially based on the symptoms that the person is experiencing, the appearance of the eyes, the body temperature and the results of an examination. Many cases of human disease can lead to death. However, if diagnosed early enough,

life can often be saved. Some of the researchers designed an expert system for search allergy and selection of the skin tests using VB.NET [Karagiannis S, Dounis A, Chalastras T, Tiropanis P, Papachristos D., 2006]; An expert system for diagnosis of coronary artery disease using Myocardial Perfusion Imaging [Rashid JQ and Syed AH, 2004]; And, an intelligent medical system for diagnosis of bone diseases [Hatzilygeroudis P, Vassilakos J and Tsakalidis A ,1994]. According to our knowledge no one designed expert systems for diagnosis and prescription of drugs, so in this work, we will present a design of an expert system for medical diagnosis and drug prescription using VB.NET.

We preset in section 2 Medical Knowledge, section 3 the Function of the System, section 4 Expert System, section 5 User Interface, and in section 6 Conclusions.

MEDICAL KNOWLEDGE

The medical knowledge of specialized doctor is required for the development of an expert system. This knowledge is collected in two phases. In the first phase, the medical background of body diseases is recorded through the creation of personal interview with doctors and patients. In the second phase, a set of rules is created where each rule contains in IF part that has the symptoms and in THEN part that has the disease that should be realized. The inference engine (forward reasoning) is a mechanism through which rules are selected to be fired. It is based on a pattern matching algorithm whose main purpose is to associate the facts (input data) with applicable rules from the rule base. Finally, the diseases are produced by the inference engine. This expert system defined the symptoms for diseases of the body. The scope of our expert system is the following some common diseases: Malaria, Leukamia, Hypertitis, and Hdgkins Disease.

THE FUNCTION OF THE SYSTEM

The proposed system performs many functions. It will conclude the disease diagnosis based on answers of the user to specific question that the system asks the user. The questions provide the system for explanation for the symptoms of the patient that helps the expert system for diagnosis the disease by inference engine. It stores the facts and the conclusion of the inference of the system, and the user, for each case, in data base. It processes the data base in order to extract rules, which complete the knowledge base.

EXPERT SYSTEM

A literature review of the last decade for the recording of

development methodologies of expert systems surveys and classifies these methodologies using six categories [8]. This expert system use following categories:

- Rule-based systems
- Knowledge-based systems
- Intelligent agent (IA)
- Database methodology
- Inference engine.
- System-user interaction.

The expert system developed in this work consists of the user interface, the explanation facility, the knowledge base, and the inference engine. The structure of the expert system is shown in Figure1.

The methodologies constitute the second generation of expert systems and they have the tendency to be developed to the direction of on one side directed also specialized knowledge (expertise orientation) and on the other hand in the development of applications in specialized problems problem - oriented). In the present article the problem of the human diseases are implemented by methodology of rule based systems. One of the well-know methods of representation of knowledge in the expert systems is the productive representation as the VB.NET (production system). VB.NET keeps in memory a fact list, a rule list, and an agenda with activations of rules. Facts in VB.NET are simple expressions consisting of fields in parentheses. Groups of facts in VB.NET, usually follow a fact-template, so that to be easy to organize them and thus design simple rules that apply to them. Our expert system contains VB.NET rules. Below, we present the rules for medical diagnosis and medication prescription:

```
IF (Fever. value, AND headache.Value –
AND Chill. Value AND Muscle pain.Value –
AND poor appetite.Value) = vb checked THEN
Form malaria.Show
ELSE
..... OR
Using the SELECT CASE Syntax
Similar to IF ..... THEN ..... ELSE
SELECT CASE .....
CASE “YES HEADACHE”
.....
CASE “YES CHILLS”
.....
CASE “YES MUSCLE PAIN”
.....
CASE “YES POOR APPETITE”
..... THEN ..... <then>
Form malaria.Show ..... <action>
```

The system rule and fact description is a formal language that has a formal syntactic description. Formal syntax being essential to the definition of a well – behaved

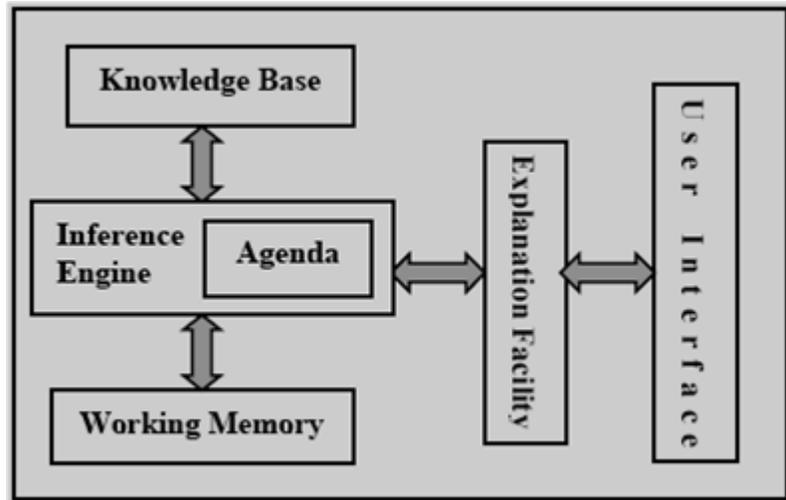


Figure 1 .The structure of the expert system

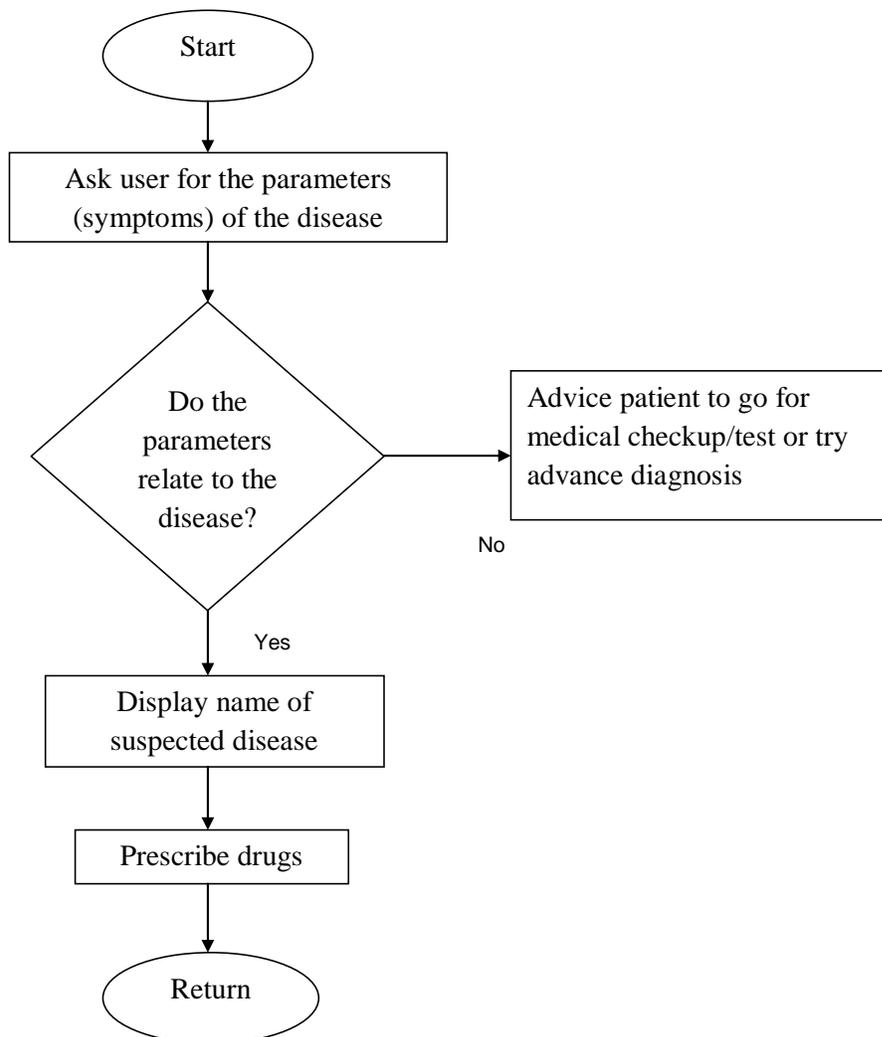


Figure 2. Application Flow Chart

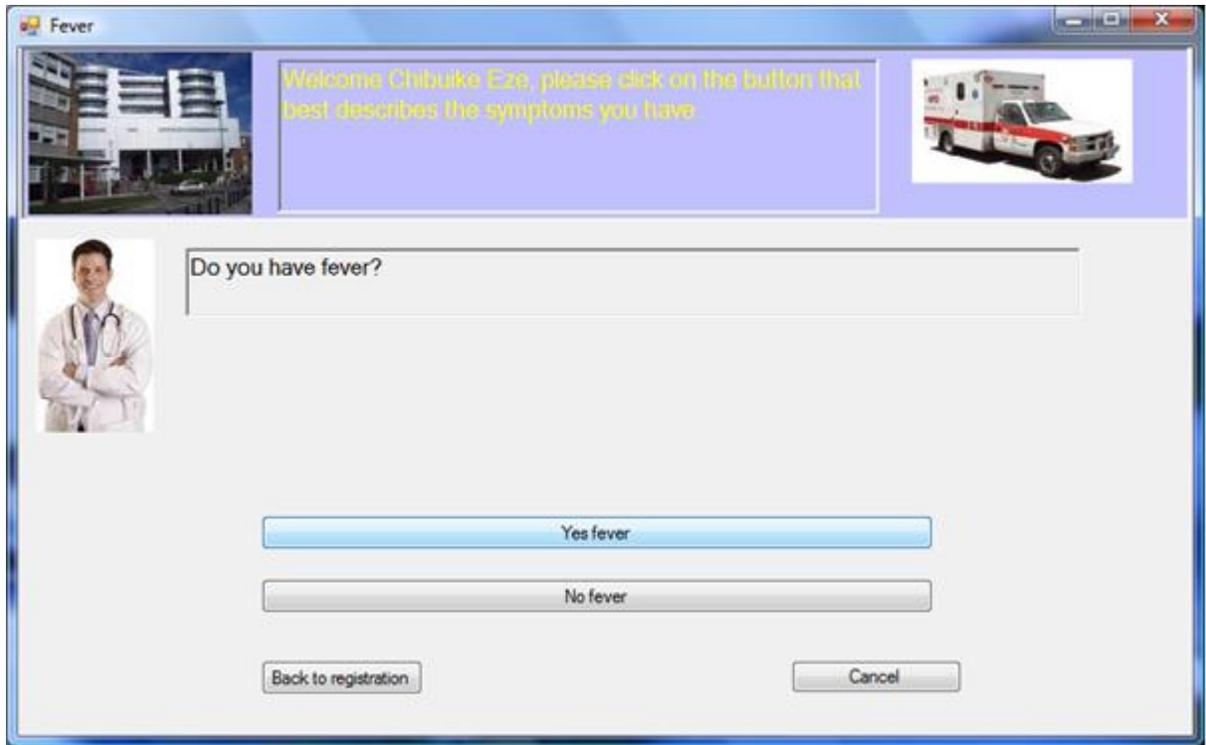


Figure 3. Patient Data Form

inference procedure. It uses such keywords as IF, THEN, ELSE, AND, OR, SELECT, CASE for its syntax.

```

<rule>    SELECT CASE
          <PREMISE>
CASE
          <PREMISE>
THEN
          <ACTION>
ELSE OR
:= <IF (Premise THEN <action> [ELSE <action>])
OR
<rule>: = <premise> <action>/<premise> <action>
<ELSE>

```

The premise (also known in literature as antecedent) of a rule consists of a conjunction of condition, each of which most hold for the indicated action to be taken.

```

<premise> := ($ AND <condition> ..... <condition>)

```

An action can lead to either a conclusion (e.g. consequent) or can lead to the invocation of an action function (e.g. Procedure) or lead to the execution of a number of conclusions or action functions.

```

<action> [,<conclusion>/<act func>]
[DO ALL <conclusion> ..... <conclusion>]
[DO ALL <act func> ..... <act func>]
or := [<consequent> ..... <conclusions>]
<action> [<procedure> ..... <procedure>]

```

A conclusion may be:

- (i) A disjunction of conditions or a predicate and its associative triple (object – attribute – value) or
- (ii) Generally, a special function and its argument, and
- (iii) Negations of the conditions are handled by individual predicates.

```

<conditions>          : = [$          OR
<condition> .... <condition>]
[<special – func> <argument>][<func 1> <constext>
<parameter>]
[<func 2> <constext> <parameter> <value>] <else> : =
          <conc part> <conc part>          : =
<conclusion>/<act func>[DO – ALL <conclusion> .....
<conclusion>] [DO – ALL <act func>] ..... <act func>

```

USER INTERFACE

Communication between the user and the system is done through the user interface which was implemented in English language. The user interface is represented as a menu which displays the diseases to the user. When the system is started a main menu is displayed on the screen which asks the user to choose symptoms he/she is having to be able to give a diagnosis and make drug prescription (Figure 2).

When the patient suffered from disease, the expert system asks the patient for his/her symptoms. The user answers with a simple yes or no.

Finally, the system informs the patient that he/she suffered from Bacterial and prescribes medication if he/she wants

CONCLUSION

The application of expert systems in medicine is very interesting and has created considerable importance systems of diagnosis. The proposed system can help doctors and patients in providing decision support system, interactive training tool and expert advice. The system constitutes part of intelligent system of diagnosis of diseases. The article presented an expert system for medical cases. An initial evaluation of the expert system was done by doctors and patients. A number of doctors and patients tested the system and gave us a positive feedback and asked us to expand the expert system to cover more diseases. As future work we will constitute the expert system to cover all known diseases.

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