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THE USE OF ARTIFICIAL INTELLIGENCE SYSTEMS AS A TOOL TO DIFFERENTIATE IN QUALITY AND COMPETITIVENESS (PREVIOUS STUDIES)

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ABSTRACT: Expert systems have a major role in medicine. The expert system can: Diagnose and treat diseases by building intelligent database. There are many expert systems used in the treatment of diseases. In this paper, the researcher reviews some of the expert systems used to diagnose diseases.

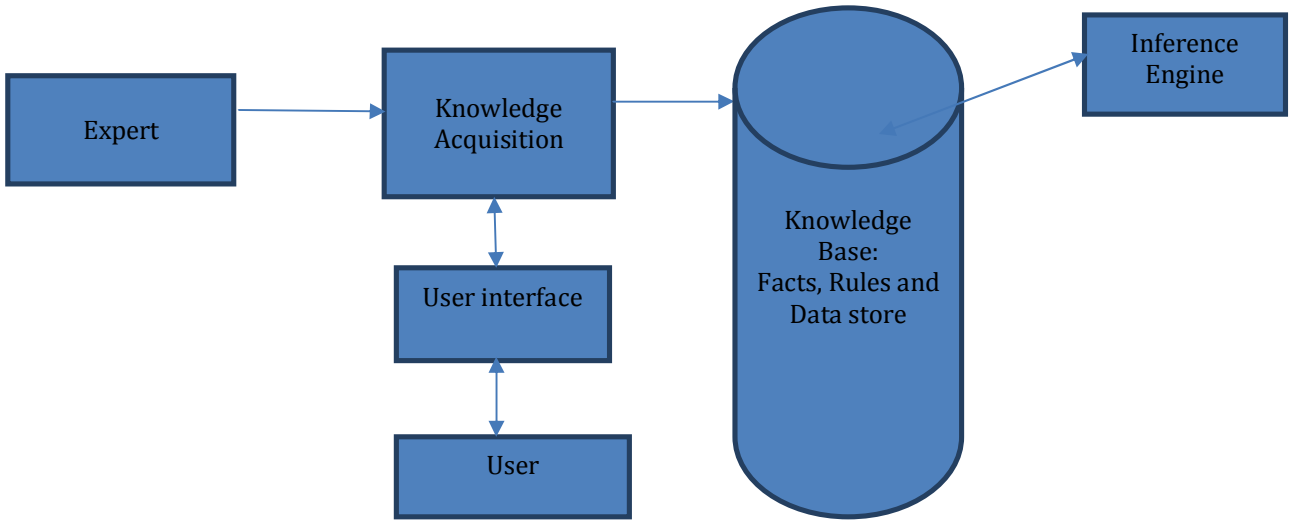
Keywords: Artificial Intelligence; Intelligent System; Expert System;

I. INTRODUCTION

In any society, hospitals represent the cornerstone of health care and development and the fight against infectious and non-communicable diseases. Hospitals are an essential core of the health services economy. It is widely believed that hospitals are still dealing with modern information systems, especially artificial intelligence systems. Although artificial intelligence enables an enterprise to perform efficiently and efficiently, it contributes to the preparation of reports and the provision of required databases, which means improving the quality of decisions and services based on this data, The proportion of artificial intelligence systems used in hospitals is limited. This may be due to a number of reasons, the most important of which is the view of senior management and hospital administrators on the application of the artificial intelligence system that these systems are considered additional costs, In addition to his term as a complex process and it requires high skills. The inability of some hospital administrators to benefit from artificial intelligence places the organization in a competitive position, not a pioneer. The subject of industrial intelligence is one of the topics to be considered. It is important to contribute to the success of health projects of all kinds and develop them within an integrated administrative program. This study deals with the dimensions of information systems technology affecting the formation of the dimensions of the digital organization and the definition of the digital organization behind the application of artificial intelligence as the intellectual mind of the digital organization serves decision-maker in decision-making in high quality. This study focuses on the importance of industry and decision-making in hospitals based on intelligence applications In order to improve the quality of services. Therefore, the researcher provides a set of expert systems that contributed to the treatment of diseases to apply expert systems in hospitals.

II. CONCEPT OF EXPERT SYSTEMS

An expert system is a computer program that uses artificial intelligence (AI) technologies to simulate the judgment and behavior of a human or an organization that has expert knowledge and experience in a particular field. The following diagram illustrates the components of expert systems



The MYCIN Expert System

This system is an expert in medicine and was designed at Stanford University in the 1970s. The system is distinguished by the fact that it can be deduced from the knowledge base so that it can be used with any other system. It has a separate name, EMYCIN.

First study: Build Intelligent Medical System to Treat Depression

Introduced by (HamamElMalik Othman 2015)

Objectives:

This study aims to design and develop advanced computer system based on artificial intelligence technology and expert systems, the computer is used to provide the best solution in a way that simulates the way the human expert thinks. As well as to identify cases of depression as easy as the specialist doctor. The tool was used to extract knowledge from the specialist doctor through interviews and meetings between the researcher and the specialist doctor, Visual Basic has been used for system programming because it is an easy-to-use language.
Obtained a system that can diagnose the depressive of the patient and describe the appropriate medication

The second study: Expert System for Diagnosis of Skin Diseases

A.A.L.C. Amarathunga, E.P.W.C. Ellawala, G.N. Abeysekara, C. R. J. Amalraj(2015)

Methodology of the study:

Using digital image processing and data mining, an image of the skin disease is uploaded, then appropriate treatment is described. This system determines the type of disease by 85% of Eczema, 85% for Skin Cancer, and 95% of disease of leprosy. Given the current state of computer-aided Skin diagnosis systems, there are few available solutions that are still under research development, research solves this problem in three different ways:

1. Diagnosis of Skin for children online: The system is based on the sequence of the inference engine approach to identify the disease that has afflicted the skin; the user can identify Skin diagnosis for children via the Internet and make useful medical suggestions.
2. Diagnosis based on the image method: The system focuses mainly on the diagnosis of skin diseases that occurred by viruses and bacteria. This system uses different images and images are taken with automated learning techniques, the image is processed for computer training on diagnosis of Skin.
3. Automated system recognizes the case of human skin disease: In this method the case of the skin disease is identified by analyzing the Skin images by using a set of similar gray images. The system works efficiently and economically to help automatically identify skin diseases, this system works with relational databases to store text images of the skin.

The third study: **Building an expert system for the diagnosis of internal diseases**
Introduced by: (Jad Allah HamedJad Allah Adam 2014)

Objective of the study:
The goal of this research is to build an expert system that diagnoses and analyzes internal diseases, *(*diseases of the digestive system, chest diseases, respiratory illness, and endocrine diseases), through the introduction of the symptoms experienced by the patient and then give appropriate treatment.

Methodology:
A knowledge base containing the facts and rules of internal diseases is designed using Visual Prolog; also a user interface and subprograms were designed to supplement the system of diagnosis of internal diseases. The program is designed to receive the patient's complaint, and then create a list of all possible diseases based on the symptoms entered, after that compare the symptoms with the main symptoms of each disease and exclude diseases that do not apply to the condition. The program displays the disease in a page as a result of the diagnosis and display prescription according to age and weight. This system cannot determine the type of disease with less than three symptoms.

The fourth study: Building an Expert system to diagnoses a Stomach Germs
(Maryam Amin Taha, 2016)

Objective:
Design an expert system for the detection of stomach germs at Royal Care Hospital in Khartoum (Sudan country). Stomach germ is common throughout the world.

Methodology:
The deductive approach was used to formulate hypotheses and structure the research using the case study method. Then collect the data of the study, analysis and interpretation of the hospital's laboratory section, by Using Oracle to create the system accurately. The system extracts the required reports periodically and with high quality. Thus, the system can save time and effort when searching for a specific file and saving files for the long time.

The fifth study: A Medical Multimedia Expert System for Heart Diseases Diagnosis & Training
(Abdul Hamid Mohammed Rajab, Khalid Abdullah Fakih, and Mohamed Ismail Rushdie 2005)

Objective:
This research introduces a new and innovative design that integrates multimedia technology and services with expert systems technologies to build and implement a multi-media expert medical system, it is used effectively in the training and diagnosis of heart disease for humans.

Methodology:
The use of the language of artificial intelligence (visual prolog), and the building of the interface between the expert system and users by visual multimedia technology. The system consists of a group of units that cooperate with each other to provide medical solutions suitable for heart patients, after the system is loaded expert and trained information, then the system provides treatment according to diagnosis.

The sixth study: Expert system for diagnosis of digestive system diseases
Introduced by (Mohammed QasimHammadi, Rania Raad Hamid and Raghad Ahmed Abd 2016)
In this study, an intelligent program for the diagnosis of digestive system diseases was implemented. It consists of four main parts:

a. The internal knowledge base contains diseases.
b. The inference engine included the rules of diagnosis of the disease.
c. Interface between the user and the computer in order to determine the symptoms of the disease.
d. Knowledge base outside the program is configured during the diagnosis according to the answers of the patient with the computer.

The program depends on the diagnosis of one of the matching symptoms of the patient with the symptoms of the specific disease. The program was written in prolog because it is a flexible language in logical reasoning as a language of artificial intelligence.

The seventh study: An expert medical system in drug interactions for the safe and effective use of drugs
(M. Ramona Al-Durai and Dr. Ammar Jukhdar 2013)
This study provides a solution that allows physicians to know the drug interactions according to other factors such as age, weight and physiological, the solution is incremental not only at the level of providing the database with information about drug interactions but also in its ability to infer more complex interventions through an expert system.

The system can infer interactions between drugs by knowing its components and its knowledge of potential interactions between ingredients or between drug families. The system can determine whether the drugs currently being taken by the patient have side effects that may be the cause of his illness? It can also alert the doctor to the presence of overlaps between drugs that he wishes as a patient with the drugs currently being taken by the patient, Or with the patient's physiological or physiological case and can introduce alternative medicines. One of the characteristics of the system is the difference between the scientific name and the trade name of the drug. Expert systems have been used because they help to characterize a large number of cases with a few rules.

The eighth study: Building an expert system that diagnoses Malaria Disease

(Dr.Hiba Ali Nasser .International University of Africa. 2018 .Sudan)

Malaria is a disease that affects the digestive system and spreads disease in Sudan. The system begins by asking about the symptoms. For example, it starts by asking about the presence of fever. If the patient responds yes, he starts looking at diseases that have fever, the system continues to inquire about malaria diseases, the inquiry is in the form of questions and the answer is yes or no. If the patient's response is not from the beginning, a back tracking occurs and the system moves to another disease. The system contains:

Knowledge Base:

It represents information about the relationships between knowledge, which is used by artificial intelligence in the process of reasoning in order to solve a particular issue by searching within the knowledge base. For example, in this system, the relationship between diseases and symptoms was represented in the **hypothesis ().**

Inference Engine:

Is a control program to help manipulate knowledge within the knowledge base for the purpose of inference. For example, in this system, the main rule is to call all the other sub-rules that are in the process of inference and diagnosis.

Production rules:

Is one of the most common methods in the representation and analysis of knowledge and is represented using (conditional case If _ then)

For example, in this system, the relationship between measles and its symptoms can be represented as follows:

If fever and cough then fc
If fc and cough then fcc
If fcc and conjunctivitis then fccc
If fcccand runny_nose then fcccr
If fcccr and rash then measles.

III. PROLOG PROGRAM IS THE DIAGNOSIS OF MALARIA DISEASES:

```
Domains
disease,symptom =symbol
query =symbol
replay = symbol

database
xpositive(symptom)
xnegative(symptom)
predicates
hypothesis(disease)
symptom(symptom)
go
positive(query,symptom)
clear_facts
remember(symptom,replay)
ask(query,symptom,replay)
clauses
go:-
clearwindow,
hypothesis(Disease),!,
write("the patient probably has ",Disease),
clear_facts.
go:-
```



```
write("sorry idont seem to be able to diagnose the disease "),
clear_facts.
positive(_,Symptom):-
xpositive(Symptom),!.
positive(Query,Symptom):-
not(xnegative(Symptom)),
ask(Query,Symptom,Reply),
Reply="y".
ask(Query,Symptom,Reply):-
write(Query),
readln(Reply),
remember(Symptom,Reply).
remember(Symptom,"y"):-
asserta(xpositive(Symptom)).
remember(Symptom,"n"):-
asserta(xnegative(Symptom)).
clear_facts:-
retract(xpositive(_)),fail .
clear_facts:-
retract(xnegative(_)),fail .
clear_facts .
symptom(fever):-
positive("Dos the patient have the fever (y/n) ",fever).
symptom(headache):-
positive("Dos the patient have the headache (y/n) ",headache).
symptom(body_ache):-
positive("Dos the patient have the body_ache (y/n) ",body_ache).
symptom(conjuctvitis):-
positive("Dos the patient have the conjuctvitis (y/n) ",conjuctvitis).
symptom(chills):-
positive("Dos the patient have the chills (y/n) ",chills).
symptom(sore_throat):-
positive("Dos the patient have the sore_throat (y/n) ",sore_throat).
symptom(couph):-
positive("Dos the patient have the couph (y/n) ",couph).
symptom(runny_nose):-
positive("Dos the patient have the runny_nose (y/n) ",runny_nose).
symptom(rash):-
positive("Dos the patient have the rash (y/n) ",rash).
symptom(conjuctvitis):-
positive("Dos the patient have the conjuctvitis (y/n) ",conjuctvitis).
symptom(sneezing):-
positive("Dos the patient have the sneezing (y/n) ",sneezing).
%**************************************************
hypothesis(measles):-
symptom(fever),
symptom(cough),
symptom(conjuctvitis),
symptom(runny_nose),
symptom(rash).
hypothesis(german_measles):-
symptom(fever),
symptom(headche),
symptom(runny_nose),
symptom(rash).
hypothesis(flu):-
symptom(fever),
```


symptom(headache),
symptom(body_ache),
symptom(conjuctvitis),
symptom(chills),
symptom(sore_throat),
symptom(couph),
symptom(runny_nose).
hypothesis(common_cold):-
symptom(headache),
symptom(sneezing),
symptom(sore_throat),
symptom(chills),
symptom(runny_nose).
hypothesis(mumps):-
symptom(fever),
symptom(swollen_glands).
hypothesis(chiken_pox):-
symptom(fever),
symptom(rash),
symptom(body_ache),
symptom(chills).
goal
go.

IV. SUMMARY AND CONCLUSION

Expert systems have helped the doctor and patient by building a smart database that saves time and effort. Expert systems diagnose the disease through mechanisms that work in the cognitive conclusion, so training must be based on expert systems in order to benefit from their characteristics.

The researcher seeks to build an intelligent system by expert systems working on general guidelines to avoid the patient , This system is available in three hospitals as educational tools, allows a questionnaire to find out the competitive quality of the doctor and the patient.

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