Proceeding
International Conference
on Social, Sciences and Information Technology
Kisaran, August 19th, 2020, page. 391 - 398
DOI: https://doi.org/10.33330/icossit.v1i1.787
Available online at https://jurnal.stmikroyal.ac.id/index.php/ICoSSIT

ISSN 2723-4509 (Online)

DIAGNOSTIC EXPERT SYSTEM OF ARTHRITIS DISEASE WITH CERTAINTY FACTOR METHOD

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Keywords:
expert system
certainty factor
php and mysql
yenny midwife clinic

ABSTRACT

The process of diagnosing arthritis that runs currently at the Yenny Midwife Clinic still has to meet directly with Midwife Yenny. Clinics need an expert system to diagnose arthritis due to the large number of patients who want to do the examination plus in terms of diagnosis This clinic ha slightly busy time and is difficult to be consulted on health issues related to arthritis. An Expert system created using the PHP and MySQL programming languages to diagnose and provide the best solution for arthritis that affects patients. This expert system consists of several menus consisting of: diagnosis menu, about the menu, menu of symptoms, illness, knowledge, and admin. Where on the diagnosis menu, medical personnel can immediately diagnose what kind of arthritis they suffer as well as prescribe, advise and regulate medication use without waiting for Midwife Yenny

INTRODUCTION

This computer technology makes it easy for humans to carry out activities, ranging from easy things too complicated ones so that the need for computers today has led to the main aids. The Utilization of computers is not only limited to data processing but also used as a provider of solutions to a given problem as well as an expert system. Expert systems are systems that try to imitate the ability of an expert to solve a problem using a computer.

Expert System is a system that takes human knowledge and uses it to a computer so that the computer can solve problems like humans or that is done by experts in general, so that the expert system can solve a problem even mimic the work of an expert [1].

Yenny Midwife Clinic is a business that is engaged in health. The consultation system at the Yenny Midwife Clinic sometimes still uses a manual process and in addition to diagnosis, the Yenny Midwife Clinic has a slightly busy time, and it is difficult to consult on health related issues in the case of arthritis. Arthritis is a disease that is often suffered by many parents and the majority of people with this disease are elderly and very rarely by children of course.

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Yenny's Midwife Clinic needs an expert system to speed up the diagnosis of arthritis. This expert system to diagnose arthritis uses a certainty factor method that aims to trace the symptoms that appear in the form of questions to diagnose the type of disease.

This method is appropriate because it accommodates the uncertainty of thinking of an expert, as possible, most likely, almost certain of the problem at hand [2].

METHOD

The framework that researchers do can be seen from the picture below:

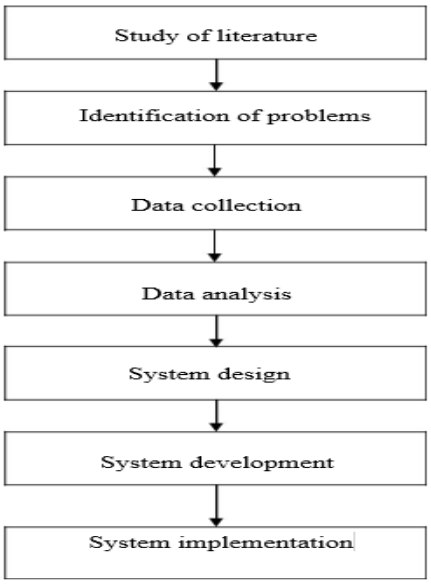

Figure 1. The framework

Framework Description

Based on the research framework described earlier, the framework can be described as follows:

1. Literature Study
   At this stage, the search for theoretical foundations obtained from various books and also the internet is to complete the treasury of concepts and theories about expert systems with the Certainty Factor method, so that they have a good and appropriate foundation and knowledge.
2. Identification of Problems
   Problem identification is the action needed to find out the core of the problem or problem, the cause of the problem as well as the right solution to fix or solve a problem. And in this study there were problems in diagnosing arthritis with the system still manual.

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3. Data Collection
   At this stage the data collection process was carried out using interview and observation methods to conduct observations and analysis of the consultation process related to the diagnosis of arthritis that is currently running on Midwife Yenny so as to obtain the data and information needed by researchers.
4. Data Analysis
   This data analysis seeks or ways to process data into information so that the characteristics of the data can be understood and useful for solutions to problems, especially problems related to this study, of course.
5. System Design
   The design of this system is the next stage after the system analysis, get a clear picture of what is done in the system analysis, then proceed how to form the system.
6. System development
   System development is the preparation of a new system to replace the old system as a whole or improve existing systems.
7. System Implementation
   In the implementation of this system, it will explain the steps for using each menu in the system of diagnosing arthritis by using the certainty factor method and system testing is the process of finding errors in the software before sending it to the user .

Data collection technique

Data collection methods carried out by the author are as follows:

1. Interview
   In this method, the authors conducted interviews with Midwife Yenny and continued with Mrs. dr. Sri Wahyuni to obtain information related to arthritis. This interview was conducted to obtain the required data.
2. Observation (Observation)
   The author makes observations made either directly or indirectly to objects related to the research produced to obtain more accurate information and data.

3. Documentation
   The documentation method, which is looking for data about things or variables in the form of notes, books as a support in writing this research.

Research methods

The research methods used by the author in conducting this research are as follows:

1. Field Research
   That is a method of collecting data through an approach to the field by taking data that occurs in the field or doing a direct review of the object under study.
2. Library Research
   Research conducted by studying theories obtained from literature sourced from books and journals as well as other scientific sources relating to the issues discussed

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and used as a guide for comparison in research.

System Understanding

The system can be interpreted as a collection or set of elements, components, or variables that are organized, interact with each other, are interdependent, and integrated.

A system is a set of elements or elements that are interrelated and influence each other in carrying out joint activities to achieve a goal. The system is also a unit of interconnected parts that are in an area and has movable items, general examples such as the state. The state is a collection of several other unitary elements such as provinces that are interconnected to form a state where the role of the mobilizer is the people in the country. A system consists of various elements that complement each other in achieving goals and objectives. The elements contained in the system are called subsystems. These subsystems must be interconnected and interact through relevant communication so that they can work effectively and efficiently. The word system is used a lot in daily conversation in discussion forums and scientific documents. This word is used for many things, and in many fields as well, so the meaning varies.

Based on some understanding of the system above, it can be concluded that the system is a collection of elements that are interconnected, work together, influence each other and interact with each other and have the attachment to form a unity to achieve a certain goal[3]–[4].

Expert System Understanding

In general, an expert system (expert system) is a system that seeks to adopt human knowledge to a computer so that the computer can solve problems as usual by the experts. A good expert system is designed to solve a particular problem by imitating the work of the experts. With this expert system, ordinary people are also expected to be able to solve quite complex problems. Where the truth can only be solved with the help of experts.

An Expert system is a system designed to be able to imitate the expertise of an expert in answering questions and solving a problem. Expert system will provide a solution to the problem obtained from dialogue with users. With the help of an expert system, a person who is not an expert or expert can answer questions, solve problems and make decisions that are usually made by an expert.

An Expert system is a system that utilizes human knowledge captured on a computer to solve problems that usually require human expertise.

The Expert systems are generally defined as a system designed to model the ability to solve problems like an expert (human expert).

An expert system is an artificial intelligence program that combines a Knowledge Base with an inference system. This is a part of high-level specialized software that seeks to duplicate the functions of an expert in one area of expertise.

From some of the above understanding, it can be concluded that an expert system is a system that tries to imitate the ability of an expert to solve a problem using a computer [5]–[7].

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Certainty Factor Method

Certainty Factor is defined as follows: CF (H, E) = MB (H, E) - MD (H, E). Where :

1. CF (H, E)
   Certainty Factor of hypothesis H which is influenced by symptoms (evidence) E. The amount of CF ranges from -1 to 1. The value of -1 indicates absolute mistrust, while 1 indicates absolute trust.
2. MB (H, E)
   The Measure of increased confidence (a measure of increased belief) of hypothesis H which is influenced by symptoms of E.
3. MD (H, E)
   A measure of increased disbelief of the H hypothesis that is influenced by the symptoms of E [8].

Symptoms and Solutions

The symptom table along with the weights obtained from interviews with experts or home doctors ill-used as a list of questions check menu and weight as data will be calculated to find the value of the certainty factor every disease. Because every symptom has different weighting values for each disease so when calculated values from each disease will be different the result. Table 1 is a symptom table.

Table 1. is a symptom table

No	symptom	Uric acid	Rheumatism
1	Fever	0.6	0.2
2	Pain in the joints	0.8	0.6
3	swollen joints	0.8	0.3
4	reddish swollen joints	0	0.8
5	cold	0.8	0
6	decreased appetite	0	0.8
7	lose motion	0	0.6
8	Pain that is felt only when the air is cold	0	0.8

Below is an example calculation to look for certainty factors for Uric Acid.

CF{symptom1, symptom2} = 0.6 + 0.8 * (1 - 0.6) = 0.92
CF{previous symptoms, symptom3} = 0.92 + 0.8 * (1 - 0.92) = 0.984
CF{previous symptoms, symptom4} = 0.984 + 0 * (1 - 0.984) = 0.984
CF{previous symptoms, symptom5} = 0.984 + 0 * (1 - 0.984) = 0.984
CF{previous symptoms, symptom6} = 0.984 + 0 * (1 - 0.984) = 0.984
CF{previous symptoms, symptom7} = 0.984 + 0.3 * (1 - 0.984) = 0.9888
CF{previous symptoms, gender_women} = 0.9888 + 0.8 * (1 - 0.984) = 0.99776
CF{previous symptoms, age} = 0.99776 + 0.6 * (1 - 0.99776) = 0.999104

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RESULT

The results of this test are the results of the display program that has been completed. The following are the results of the application program of an expert system, diagnosis of arthritis by using the certainty factor method at Yenny Midwife Clinic.

Patient Data Display

Patient data display is a display for input of patient data such as name, gender, and age. The following is a display of data for arthritis patients:

Figure 2. Display Patient Data Input

Menu Display Diagnosis of Arthritis

Display menu diagnosis of arthritis is a display that will be opened when there is a patient who will be consulted related to arthritis.

Figure 3. Display the Diagnosis Menu

Display Data Input Form Symptoms

Symptom data input form functions to process symptom data, such as symptom codes and symptom names. Following is the display of the symptoms data input form:

Figure 4. Display Form Data Input Symptoms

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Display Knowledge Input Form
Knowledge data input form functions to process knowledge data. The following is the display of the input data input form:

Figure 5. Display Knowledge Input Form

Display Print Results of diagnostic

The following is a printed screen for suggestions and prescriptions that will be given by medical personnel to patients.

Figure 6. Display Print Form

CONCLUSION

Based on the results of research and observations during data collection at the Yenny Midwife Clinic several conclusions can be drawn including:

1. The process of diagnosing arthritis that runs currently at the Yenny Midwife Clinic still has to meet directly with the Midwife Yenny. Yenny Midwife Clinic really needs an expert system to diagnose arthritis due to the large number of patients who want to do the examination plus in terms of diagnosis Yenny Midwife Clinic has a little busy time and difficult to be consulted in matters of health-related to arthritis.

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2. An Expert system created using the PHP and MySQL programming languages to diagnose and provide the best solution for arthritis suffered by patients at Yenny Midwife Clinic. This expert system consists of several menus consisting of a diagnosis menu, about the menu, menu of symptoms, illness, knowledge, and admin. Where in the diagnosis menu, medical personnel can immediately diagnose what kind of arthritis they suffer as well as prescribe, advise and regulate the use of drugs without waiting for Midwife Yenny.
3. This expert system makes it very easy for Yenny's Midwife Clinic to diagnose arthritis in patients because patients are no longer waiting for Midwife Yenny to check for related diseases, what medications should be given, and suggestions for what to do. To avoid misdiagnosis of the disease, and the slow process of providing solutions to the ailments encountered, the Yenny Midwife Clinic needs an expert system that helps in the process of diagnosing patients especially arthritis.

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