Expert System for Diagnosing Spine Diseases Using the Forward Chaining Method

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ABSTRACT

An expert system is a technology that is able to integrate medical knowledge and data processing to diagnose spinal cord diseases. With various algorithms and a carefully structured knowledge base, this expert system can identify spinal cord diseases based on the symptoms presented by the patient. The main advantage of this expert system is its ability to process data quickly and provide diagnostic recommendations consistently. The results provided from this research are an expert system for identifying spinal cord disease which was built using the Visual Basic software application system. From patient data and symptom data applied to the expert system for in spinal cord disease, it is known that the accuracy of the system for diagnosing spinal cord disease is 95% of patients.

Keywords: Spinal Cord Diseases, Expert Systems, Forward Chaining Method

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1.   INTRODUCTION

In today's era of globalization and technology, the use of computers as an information technology is needed in almost every aspect of life. The use of computer devices as supporting devices for data management and processing is very appropriate by considering the quantity and quality of data. One branch of computer science that is widely used by humans to help their work is the formation of expert systems, which is one of the sub-fields of artificial intelligence (Artificial Intelligence).

An expert system or Expert System is a system that attempts to adopt human knowledge to a computer which is designed to model the ability to solve problems like an expert. The design of this expert system is built using reasoning that starts with facts first to test the truth of the hypothesis and combining rules to produce a conclusion or goal which is called the Forward Chaining method. The creation of an expert system in this research is on spinal cord disease.

Spinal Nerve Pain is a very common occurrence but definitely not normal. Often a bad lifestyle is the cause, in addition to not getting enough rest, sitting for long periods of time such as driving or workers sitting for a long time in front of a computer, improper body posture causes the curve of the spine to not be in a straight line. People tend to wait until the pain subsides. However, spinal pain that is left for a long time accelerates the occurrence of paralysis. If the condition worsens, surgery may be necessary to correct the spinal deformity. Damage from a pinched nerve can be mild or severe. This can cause temporary or long-term problems. The earlier you get a diagnosis and treatment, the sooner you will find a solution.

Sometimes, one neurologist has a different opinion from another neurologist in diagnosing a disease, which results in inappropriate treatment and therapy. Neurologists are also limited in number and working hours. Human expertise also cannot last long, it can be lost due to death, retirement, or changing jobs. Therefore, we need a computer application that can store expert knowledge to diagnose disease and provide consistent, fast, precise and

accurate results. This system can be used as an experienced assistant to help specialist doctors work based on the symptoms felt by the patient.

2. RESEARCH METHODOLOGY

Forward chaining is a method used in expert systems and artificial intelligence to make decisions or predictions based on a set of rules and a given initial set of facts. It's not typically used to diagnose medical conditions, but I can provide you with an example of how you might apply forward chaining to a simplified case of diagnosing a spinal cord or backbone-related disorder. This method too called using the IF–THEN rule where the premise (IF) leads to the conclusion (THEN) or can also be written as follows:

R1: IF A and C,THEN B
R2: IF D and C, THEN F
R3: IF B and E, THEN F
R4: IF B, THEN C
R5: IF F, THEN G

Expert systems are branches from AI (Artificial Intelligence). create extensions for specializations knowledge to solve something problems with Human Experts.Human Expert is an expert in a field of science certain, means the expert has a problems that cannot be solved solved by others efficiently. (Angga Kresna, 2015).

Information Systems are "A system within an organization meet processing needs daily transactions, support operations, managerial and strategic activities of an organization and provides certain external parties with the necessary reports." System Information is: "a system that made by humans consisting of components in the organization to achieve a goal, namely present information." (Mara, Destiningrum, 2017).

Based on the description above, the author concluded that Information Systems is a collection of data facts inside an organization that functions as information to produce a reports presented to certain parties.

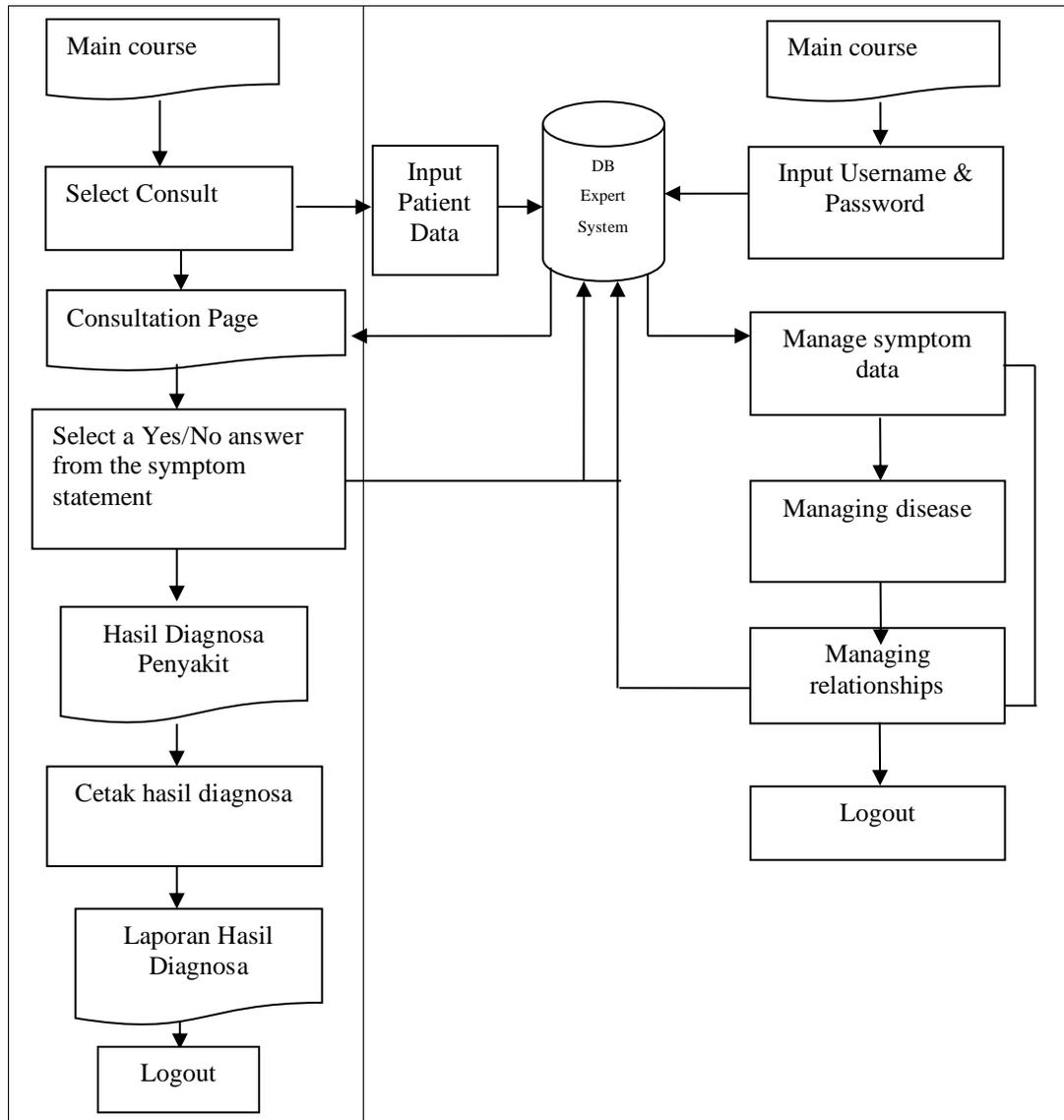| User	Administrator

Figure 1. Proposed Information Systems (ASI) Flow

Unified Modelling Language (UML)
Use Case Diagram

Use Case Diagrams describe the expected functionality of a system which emphasizes what the system does and represents an interaction between actors and the system.
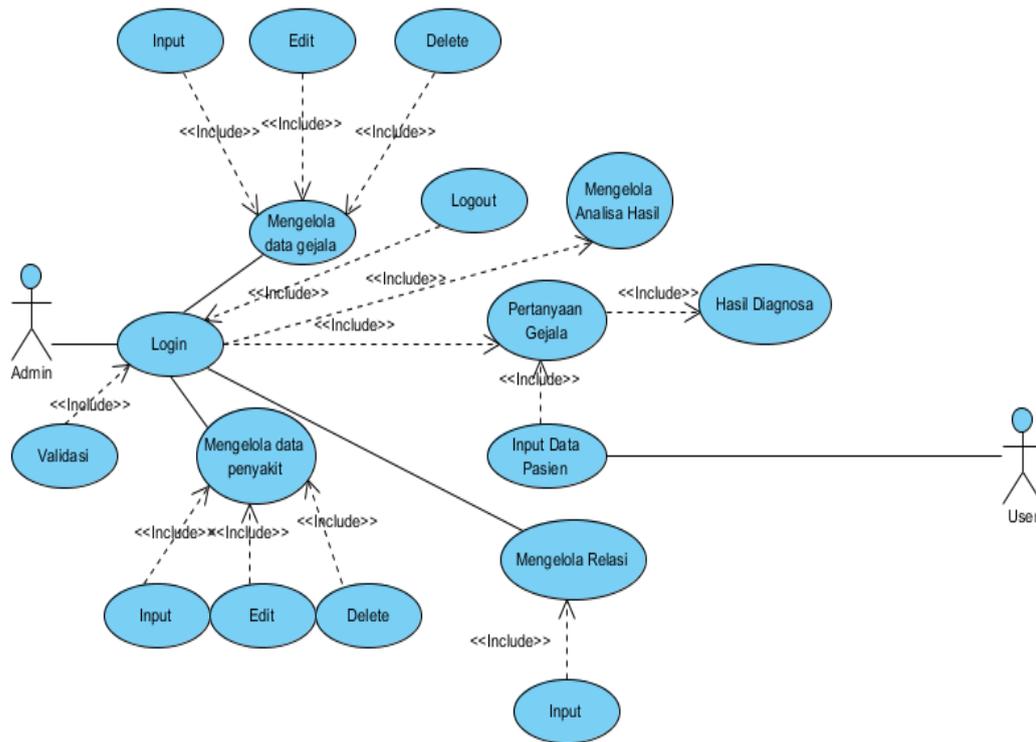
Figure 2. Use Case Diagram

3. RESEARCH RESULTS

The test results are a display of the final results of a new system that has been designed to diagnose spinal cord diseases. The test results are as follows:

Login Page
The login page is a page for clarifying user rights to enter the system. Users who have a valid username and password have the right to enter the system via the login page, following the login page display.

Figure 3. Login Page Display

Home Page
The menu page is the initial page found after the user enters this expert system website which contains information about the spinal cord, along with the home page display.

Figure 4. Home Page Display

Disease List Page
The disease list page is a page that contains information about types of spinal cord diseases, below is the disease list page display.

Figure 5. Disease List Page Display

Relationship Input Page
The relationship input page is a page that contains relationship input information, along with the relationship input page display.

Figure 6. Relation Input Page Display

Disease Report Page
The disease report page is a page that contains reports of spinal cord disease, following is the appearance of the disease report page.

[**Input Penyakit** | **Input Gejala** | **Input Relasi**] [**Edit/Delete Penyakit** | **Edit/Delete Gejala**] [**Lap Penyakit** | **Lap Gejala**] **[Logout]**

Figure 7. Disease Report Page View

4.   CONCLUSION

Based on the research that has been carried out while creating this system, several conclusions can be drawn as follows:

1. This expert system can diagnose spinal cord diseases so that users can access the system more easily to obtain data.
2. This expert system for diagnosing spinal cord diseases can help neurologists.
3. This expert system for diagnosing spinal cord disease can be accessed anywhere if connected to the internet because it is web-based.
4. The expert system for diagnosing spinal cord disease is made dynamic so that it can be changed quickly and easily.

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