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Expert system development for homeopathy medicine

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Abstract. Health is the most critical thing in life. It is invaluable for every individual because health is a prosperous state of soul, body, and social that enables everyone to live a good and productive life. Homeopathy is an alternative treatment that has a fundamental theory that sick people can carry by using the effect of the reflection of substance or energy in the body that produces symptoms in healthy people. This study aims to assist the public in obtaining information from doctors or homeopathic medicine experts based on symptoms, complaints, illnesses, and suggested drugs. The method used is the Expert System Development Life Cycle (ESDLC) with expert system reasoning using forward chaining inference techniques. This research resulted in an application to help expert homeopathic medicine experts with pediatric patients who can facilitate the process of diagnosing the disease along with the recommended medicine. In conclusion, the implementation of an expert system created can help diagnose the condition with homeopathic treatments. This research also expected to contribute to facilitate the community in diagnosing and alternative medicine.

1. Introduction

The development of the world of health is now increasingly rapid, both in terms of technology and treatment techniques. Health is the most critical thing in life. It is invaluable for every individual because health is a state of well-being of the soul, body, and social that enables everyone to live a good and productive life [1]. Health care is an effort to prevent and prevent disease; this is related to treatment, which is the remediation of health problems that usually follow the diagnosis [2]. The condition will be found a drug or treatment after going through a process of diagnosis or deeper checking of the patient. Therefore, the determination of a disease is an indicator of the success of medical experts when the condition is known [3,4].

An expert system is one branch of artificial intelligence that uses specialized knowledge possessed by an expert to solve a particular problem [5,6]. Expert system functions to imitate human experts must be able to do things that can be done by an expert [7,8]. In the process of implementing an expert system usually by applying certain classification techniques and algorithms in the decision-making process such as backward chaining and decision tree [7,9].

Homeopathy is an alternative medicine where the underlying theory is that sick people can cure by using the effect of reflection of substances or energy in the body that produces symptoms in healthy people [10]. Information on homeopathic treatment obtained from research by collecting data and information from doctors who usually treat patients to provide facts, complaints, illnesses, and suggested medications [11]. As for the group of diseases that can operate with homeopathy, including; Child and Adult Disease, Emergency / First Aid, Surgery, Nerve, Soul, Eye, ENT, Internal Medicine, Midwifery,



Urology, Skin, Teeth, and Mouth. From the results of the 12 groups of diseases, the selection of symptoms or conditions in children most often handled by homeopathy experts. The homeopathy expert who used it as the source is Dr. H. M. Saleh SA., M. Kes. At the Bandung Homeopathy Clinic. For diagnoses of the disease used as research, samples are Cough, Fever, Diarrhea, Headaches, and Minor Accidents that occur in children [12].

This study aims to make the application of an expert system of homeopathic medicine to find out the types of diseases that often occur in children as well as suggested drugs based on expert diagnoses. The system development method uses Expert System Development Life Cycle (ESDLC) with decision making techniques using forward chaining [5,13].

2. Methodology

2.1. System development

In this design, the Expert System Development Life Cycle (ESDLC) system design method introduced by Durkin consists of six stages, namely assessment, knowledge acquisition, design, test, documentation, and maintenance [5,14], as in figure 1.

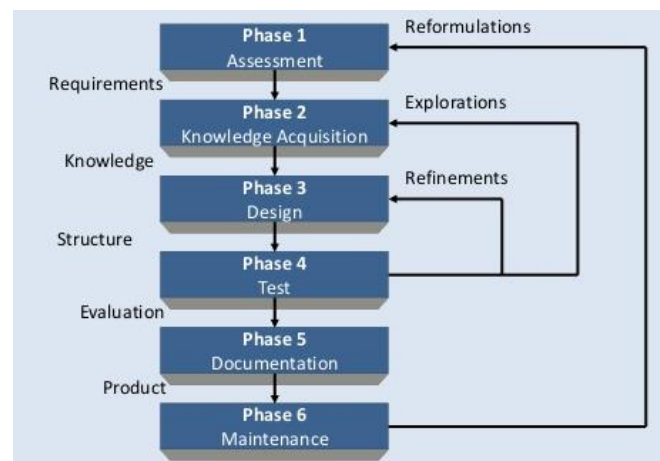


Figure 1. Expert system development life cycle.

Next to the method of concluding using forward chaining is the tracking process that starts by displaying a collection of data or facts that can be convincing towards the conclusion [3,13].

2.2. Research workflow

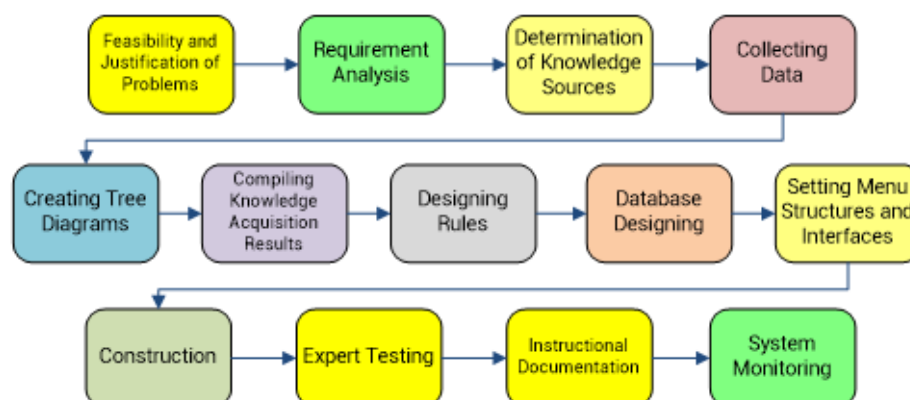


Figure 2. Research workflow.

The research workflow based on the ESDLC method is presented in Figure 2. The stages begin with the Feasibility and Justification of Problems, Requirement Analysis, Determination of Knowledge Sources, Collecting Data, Creating Tree Diagrams, Compiling Knowledge Acquisition Results, Designing Rules, Database Designing, Preparation of Menu and Interface Structures, Construction, Experts Testing, Expert Documentation, and System Monitoring [15].

3. Results and discussion

3.1. Assessment

This assessment stage is a determination in determining the research topic by conducting a feasibility test and justification, needs analysis, and determining the source of knowledge for the expert system of homeopathic medicine.

- Feasibility and Justification. By using an expert system of homeopathic medicine, it hoped that patients would be able to take practical first steps if they experience symptoms of the disease in this expert system.
- Needs Analysis. Based on the results of the feasibility study, it is determined the need for device specifications in making expert systems such as functional and non-functional specifications.
- Determination of Knowledge Sources. Knowledge comes directly from a health expert, namely Dr. H M. Saleh SA, M. Kes, supported by several references from research books and journals related to this research.

3.2. Knowledge acquisition

The results of the knowledge acquisition stage are compiled based on data collected and tree diagrams, with the following step.

- First step is collecting data generated from interviews with experts, books, and journals related to research, the second makes a Decision Tree Diagram as shown in Figure 3.

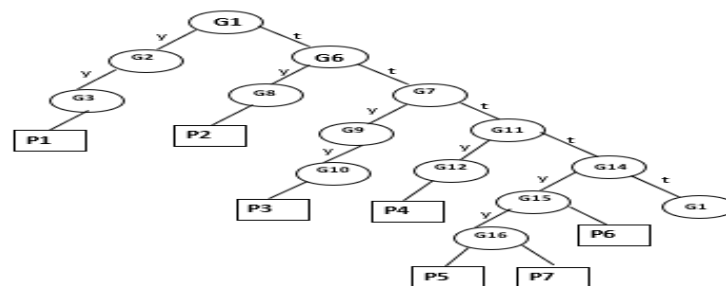


Figure 3. Decision tree diagram.

- Research acquisition

Table 1. Research acquisition results.

No.	Diagnosis	Recommendation
1.	The symptoms	Data that contains questions raised by patients to experts will then be questions for patients.
2.	Disease	Data generated from symptoms experienced by patients.
3.	Cause	Information on symptoms experienced by patients contains information on the factors causing these symptoms.
4.	Treatment	A solution to the type of disease experienced by patients.

3.3. Design

The results of the design phase include design rules, database design, preparation of menu structures and interfaces, as well as construction.

- Draft rules containing information about the type of disease and the type of treatment described in specific codes.
- Database design is a repository of knowledge bases previously obtained from experts. The database used to process data and rules relating to the design of expert systems of homeopathic medicine.
- Preparation of the menu structure and interface produces a menu structure design and application interface layout.
- Construction, creating expert system applications.



Figure 4. Display interface of expert system homeopathy.

3.4. Test

Blackbox testing is used to ensure all application features run according to design. This is also to test the expert system output produced in accordance with the rules set by the actual expert. The results are all the features in the app run well based on function and rules set by the expert.

3.5. Documentation

Documentation used to describe the system and the features contained in the application. Activities at this documentation stage produce instructions for using an expert homeopathic medicine system for users to be able to understand each function of the features in the expert system application.

3.6. Maintenance

The system has errors that were previously not detected and only seen when the order has run, whether it is experiencing an operating system update, the development of information contained in the system, or changes due to a virus. In addition to experiencing its differences, the system can also experience changes in features desired by the system user. Therefore, this stage is vital for system monitoring activities to minimize any errors that occur in the system.

4. Conclusion

The conclusion of this research is to produce applications to help homeopathic medicine experts in the process of diagnosing diseases as well as counseling the recommended treatments for their patients. The

general public can also use this application as a homeopathy treatment tool without having to consult directly with experts. This research conducted with an expert and the form was produced according to the request of the expert. Hopefully, this application can produce solutions and recommended treatments based on the results of diagnosing the disease automatically.

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