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Expert System for Diagnosing Skin Diseases Using the Forward Chaining Method

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ABSTRACT

Puskesmas is one of the most important places in daily life. The puskesmas always records and manages patient data for treatment and provides a consultation service for patients with specialist doctors. the opportunity for patients to consult for skin diseases, but this is deemed less effective, and takes a lot of time while many patients who want to seek treatment are immediately examined. To overcome this problem, a solution is given by building an Expert System for Diagnosing Skin Diseases using the Forward Chaining Method. Where this system is expected to help effectiveness in handling patient consultations and does not interfere with the time of patients queuing for treatment to be immediately treated by doctors. Consultation for patients is provided to give patients the opportunity to help identify and overcome a symptom of a disease without having to come to the puskesmas to queue and can prevent the symptoms of the disease quickly.

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1. Introduction

Puskesmas is one of the most important places in daily life. Puskesmas is a community health center that assists the community in dealing with health problems. Its services that are populist and close to the community, as well as public health services that are affordable for the cost are the people's choice for treatment. Therefore, currently many puskesmas are trying to provide comfort, for example providing comfort, for example providing comfort in terms of consultation, cleanliness of the place, providing comfortable and more seats, and trying to provide satisfactory service. The facilities provided in this Puskesmas are also encouraged by services during patient consultations with specialist doctors. In consultation, patients are asked to register and queue to meet with a specialist. This is intended, in order to help the efficiency of time in the queue of patients so as not to wait long. Patient consultation is provided to give the patient the opportunity to help identify and overcome a symptom of a disease, this method is done directly face to face with a specialist doctor at the puskesmas.

At the Kalasan Health Center, it is still difficult to allocate time in dealing with patients who seek treatment and consult. The existence of patient facilities in consultation is often considered time-consuming for patients who are sick and want to be treated quickly. One of the services that is still needed here is, where the efficiency of patient consultation time is still not improved, because the

service is still long by queuing up to register and waiting for the registration queue call to make patients less comfortable with services from the Puskesmas. The efficiency of consultation at the puskesmas is still considered lacking, while in consultation the time is too long so that patients who should be waiting for treatment are also waiting. This causes the time for patients who want to be treated by doctors to be long and less effective because of this. From this background the author is interested in making an Expert System for Diagnosing Skin Diseases with the Forward Chaining Method. Where this Expert System, is expected to help specialist doctors at the puskesmas, to be more efficient and effective in dealing with patients who are consulted. This Expert System was created for processing skin disease consultation data that can be done digitally, so that time is more efficient, effective, and helps to deal with patients who consult more quickly.

In general, Turban, et al (2005), Expert System is a system that seeks to adopt human knowledge to a computer designed to model problem solving abilities like an expert. In its preparation, the expert system combines inference rules or inference rules with a knowledge base given by one or more experts in a particular field. The combination is stored in a computer, which is then used in the decision-making process for solving certain problems. In general, Turban, et al (2005), Expert System is a system that seeks to adopt human knowledge to a computer designed to model problem solving abilities like an expert.

Forward Chaining method is a search method or forward tracking technique that starts with existing information and combines rules to produce a conclusion or goal. Forward Chaining uses a data-oriented approach. In this approach, it starts from the available information, or from the basic idea, then tries to draw conclusions. The computer will analyze the problem by looking for facts that match the IF part of the IF-THEN rule. The following are the basic rules of Forward Chaining. (Tutik A, 2009)

Rule base Work
R1 : IF A AND B THEN D A,B
R2 : IF B THEN C
R3 : IF C AND D THEN E

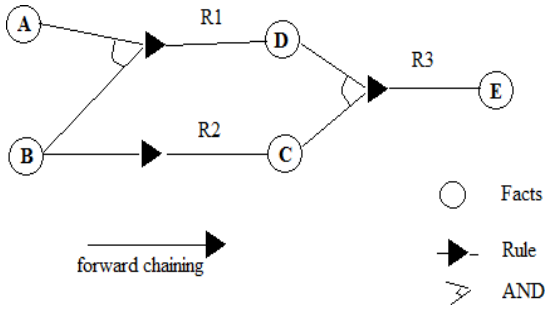

Figure 1. Forward Chaining Basic Rules

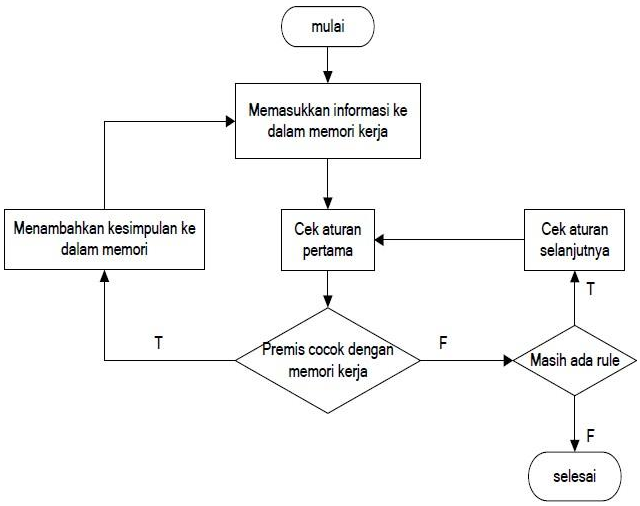

Figure 2. Top Categories of Android Apps (AppBrain, 2014)

The advantages of the Forward Chaining Method: The main advantage of forward chaining is that this method will work well when the problem starts from collecting/unifying information and then looking for what conclusions can be drawn from that information. This method is able to provide a large amount of information from only a small amount of data.
Weaknesses of the Forward Chaining Method: The main drawback of this method is that there may be no way to identify where some facts are more important than others. The system may ask unrelated questions. Although the answer to the question is important. But this will confuse the user to answer on an unrelated subject.

2. Method

The research method used in making this final project with the following stages: Observation of the data process of patient consultations with specialist doctors. Literature Study Looking for references related to web technology for expert system development. Expert system development using the waterfall method (Kristanto, 2004): System analysis In this stage the author prepares and collects data related to the symptoms of fungal skin diseases, information or information about fungal disease. System design is a multi-step process that concentrates work on databases, software architects, detailed procedures and interface characteristics, so that the implementation of making applications is easier and on target.

In this stage the author designs the database, user interface (user interface), administrator interface. System implementation The results of the design are translated into a language that is understood by the machine, using the PHP programming language as a web-based programming language. System testing Testing the program whether the results are as expected, and free from errors, then test the program for a unified system.

3. Results and Discussion

3.1 Result

a. Skin Expert System Homepage

This is the home page of the Expert System for Diagnosing Skin Diseases for the patient to consult. This start page is filled with an understanding of fungal skin diseases.

Figure 3. Use case diagram of an android-based computer repair expert system

b. Page Types of Skin Diseases

This disease page provides information on skin diseases. When the user clicks on the name of the disease, a pop up information will appear about the disease.

Figure 4. Types of Skin Diseases

c. Patient Consultation List Page

On this consultation page, a form will be displayed for the patient to register for a consultation. Without registering first, the patient will not be able to consult.

Figure 5. Patient Consultation List

d. Patient Consultation Page

This page is a patient consultation page, where after the patient registers the following page will appear, the patient is asked to answer any questions that arise according to the actual situation (symptoms).

Figure 6. Patient Consultation

e. Patient Consultation Results Page

On this page, the results of the consultation with patients who seek treatment will be displayed, which will show the disease they are suffering from, examples of pictures of the disease, causes, information and solutions or drugs that can help cure the disease.

Figure 7. Patient Consultation Results

f. Expert Login Page

This is the login page for admins.

Figure 8. Admin login page

Trial of this Skin Disease Diagnosis Expert System, was carried out using Mozilla Firefox and Chrome browsers for web systems using computers and cellphones. Overall, the Expert system can function properly to conduct consultations on skin disease diagnoses, view disease information, provide diagnostic results according to symptoms and manage data on diseases and symptoms suffered by patients. From the results of the system that was created, the writer then conducted an evaluation, by giving questionnaires to doctors and patients/general public. This is done so that the authors can see if

this expert system is efficient and effective in helping doctors in providing consultation to patients, and helping patients in time efficiency during consultations.

Data Collection Stage Questionnaire creation is made in 2 types, namely questionnaires for patients or the general public and for doctors. Distribution of questionnaires. The distribution of questionnaires is carried out for 2 weeks. Questionnaire Distribution Target

Dermatologists The questionnaire was distributed to dermatologists, to find out whether it is effective in helping to provide consultations, and to find out the ease and difficulty of using the Expert System for Diagnosing Skin Diseases using the Forward Chaining Method. Patients or the general public Patients or the general public as users who will use the Skin Disease Diagnosis Expert System to find out the efficiency in conducting online consultations and the ease of consultation in using the online system.

3.2 Discussion

a. Patient/Society Questionnaire Results

1). This Skin Disease Diagnosis Expert System is efficient (time-saving) helping me in consulting skin diseases.

TABLES 1.
SKIN DISEASE CONSULTATION QUESTIONNAIRE RESULTS

Answer	Answer Weight (1-5)	Number of Respondents	Result(1-5)	Total
Strongly agree	5	8	40	66.6%
Agree	4	4	16	33.3%
Doubtful	3	0	0	0.0%
Do not agree	2	0	0	0.0%
Strongly Disagree	1	0	0	0.0%
Total		12	56	-
Final Score (Total Results 1-5/Total Number of Respondents)			4.6	

From the calculation of table 5.1, it can be analyzed that in general this Skin Disease Diagnosis Expert System is efficient (time-saving) in helping patients/communities in consulting skin diseases, with a score of 4.6 on a scale of 1-5.

2). This Expert System is effective (appropriate) in helping me find a cure (solution) for skin diseases.

TABLE 2.
QUESTIONNAIRE RESULTS STATEMENT 2

Answer	Answer Weight (1-5)	Number of Respondents	Result(1-5)	Total
Strongly agree	5	10	50	83.3%
Agree	4	2	8	16.6%
Doubtful	3	0	0	0.0%
Do not agree	2	0	0	0.0%
Strongly Disagree	1	0	0	0.0%
Total		12	58	-
Final Score (Total Results 1-5/Total Number of Respondents)			4.8	

3). The menus in the Skin Disease Diagnosis Expert System are easy to understand and easy to use.

TABLE 3.
QUESTIONNAIRE RESULTS STATEMENT 3

Answer	Answer Weight (1-5)	Number of Respondents	Result(1-5)	Total
Strongly agree	5	8	40	66.6%
Agree	4	4	16	33.3%

Answer	Answer Weight (1-5)	Number of Respondents	Result(1-5)	Total
Doubtful	3	0	0	0.0%
Do not agree	2	0	0	0.0%
Strongly Disagree	1	0	0	0.0%
Total		12	56	-
Final Score (Total Results 1-5/Total Number of Respondents)			4.6	

4). The information contained in this expert system is easy to understand.

TABLE 4.
QUESTIONNAIRE RESULTS STATEMENT 4

Answer	Answer Weight (1-5)	Number of Respondents	Result(1-5)	Total
Strongly agree	5	4	20	33.3%
Agree	4	8	32	66.6%
Doubtful	3	0	0	0.0%
Do not agree	2	0	0	0.0%
Strongly Disagree	1	0	0	0.0%
Total		12	52	-
Final Score (Total Results 1-5/Total Number of Respondents)			4.3	

4. Conclusion

The conclusions that can be obtained after the implementation of the Skin Disease Diagnosis Expert System using the Forward Chaining Method are as follows: In general, the Skin Disease Diagnosis Expert System has been successfully implemented using the Forward Chaining Method with the PHP programming language. The Expert System can function well in providing consultation on skin diseases efficiently and effectively, providing information about the disease, its symptoms and solutions, as well as managing patient data and symptoms. The Expert System can function properly to produce an analysis of the results of the diagnosis of the disease according to the symptoms suffered by the patient. The output of the expert system is in accordance with the needs of the patient during the consultation.

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