Short Text Messages Gateway-Based Expert System for Diagnosis of Skin Disease

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Abstract

Skin disease is the most common infectious disease in people of all ages. In Indonesia, skin diseases are mostly caused by bacterial, fungal, parasitic, and allergic basic diseases. This is different from western countries which are more influenced by degenerative factors. Apart from differences in causes, other factors such as climate, habits and environment also contribute to differences in the clinical picture of skin diseases. Health service policy is one of the main components. Improving good services should not stop with the development of good infrastructure, or only to the examination or diagnosis of doctors for patients, but good health care also lies in how to do it so that people can get health services easily. Cases of ineffective health services often occur in the community, ranging from slow hospital services, practice malls, to a common problem, namely the queuing process that must be carried out by prospective patients who are going to a general practitioner or specialist. In improving the service, you want to develop a problem using the system. the system to be developed is a system that will adopt expert knowledge into a server or also known as an expert system. The expert system to be built will be based on Short text messages or SMS (Short Message Service). This system provides SMS sending services from a website or server to a cellphone number, either free or for a fee. Technology like this is called the SMS Gateway.

Keywords: Diagnosis, Expert System, Skin Disease

I. INTRODUCTION

Skin disease is the most common infectious disease in people of all ages. In general, skin diseases in Indonesia are mostly caused by bacterial, fungal, parasitic, and allergic basic diseases. This is different from Western countries which are more influenced by degenerative factors. Apart from differences in causes, other factors such as climate, habits and environment also contribute to differences in the clinical picture of skin diseases [1][2][3]. Most skin infection treatments take time to show an effect. It is more worrying if the disease does not respond to treatment[2][4].

Health service policy is one of the main components. Improving good services should not stop with the development of good infrastructure, or only to the examination or diagnosis of doctors on patients. However, good health service also lies in how to do it so that people get health services easily. Cases of ineffective health services often occur in the community, ranging from slow hospital services, practice malls, to problems that are often found, namely the queuing process that must be carried out by prospective patients who are going to a general practitioner or specialist doctor [4][5].

The long queue process and limited waiting places are often common problems experienced by patients when they want to consult or seek medical treatment. In improving these services doctors want to develop a problem using the system. The system to be developed is a system that will adopt expert knowledge into a server or also known as an expert system. In developing an expert system, there must be a method, including the forward chaining method. The expert system to be built is through a future search process using SMS (Short Message Service) as a tool for diagnosing [4][6][7][8]. This system provides SMS sending services from a website or server to a cellphone number, either free or for a fee. Technology

like this is called the SMS Gateway. This is done because of the limited time doctors have in serving patients and the queue of patients who have to wait a long time to get services in consultation. The expert system here is used to find out the types of diseases, symptoms and their prevention or solutions that attack the skin early [6][9][10].

II. RESEARCH METHOD

Expert system design uses the forward chaining method, this stage is carried out to make a disease decision based on the symptoms that arise by using symptom processing through the forward chaining method. In this method, the system will look for existing facts by calculating the future. For example, if it starts from selecting the first symptom and then the next symptom, if the symptom has another choice, if not or only has one symptom choice, the system will explain the choice of yes (Y) or no (T) so that it finds the conclusion of the disease through the input symptoms. The workflow and specifications of the software being developed are as follows.
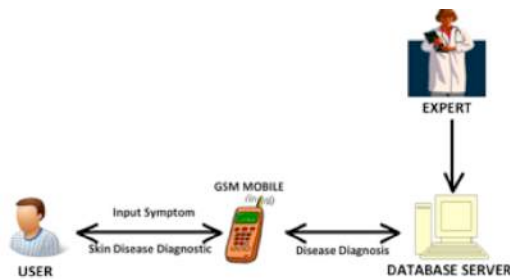

Figure 1 Expert System Workflow

Furthermore, the design process will translate the requirements of a software design that can be estimated before implementation is made. This process focuses on data structures, expert reference system architecture and detail (procedural) reference. This stage assists in the specification of expert system requirements and defines the overall system architecture.

III. RESULT AND DISCUSSION

A. System Analysis Requirements

1) Hardware

The following are the minimum recommended hardware specifications:
1. Intel Core Duo 2.1 GHz processor
2. 1 GB DDR2 memory
3. LCD 11"
4. Flash Disk
5. Modem
6. Handphones (all types)

2) *Software*

Software requirements include the operating system that will be used in making applications. The component aspects of the software include:

1.PHP

PHP is a programming language designed to build web applications and functions as data processing on a server. When called a web browser, the program written in PHP will be parsed by the PHP interpreter and translated into an HTML document, which will then be displayed back to the web browser. Because the processing of the PHP program is carried out in a web server environment, and PHP is also said to be a server side language.

2.Mysql

Msql is the definition of MySql according to Kadir [3] (2009), an interactive and dynamic website, of course, requires flexible and fast data storage to be accessed. One of the databases for the server is MySQL, this type of database is very popular and is used on many websites on the internet as a data bank. MySQL uses SQL and is free (free or no need to pay to use it). In addition, MySQL can run on various platforms, including Linux and Windows.

3.Gammu

Gammu is a tool for developing an SMS Gateway application which is quite easy to implement and free. Gammu's advantages over other SMS gateway tools are:

a. Gammu can be run on Windows or Linux.

b. Many devices or cellphones are compatible with Gammu.

c. Gammu uses a MySql database and can use desktop applications and web-based interfaces.

d. Gammu can help use the features available on your cellphone more efficiently.

e. Both USB and SERIAL data cables are all compatible on Gammu [4] (Ariza Novianti, Ami Fauzijah, 2009)

B. Modelling Tools

Modeling tools are one of the features of a structured approach. The capital used is context diagram (CD), data flow diagram (DFD) to describe the flow of the system and ERD (Entity Relationship Diagram) to describe the relationships between entities.

1) Context Diagram (CD)

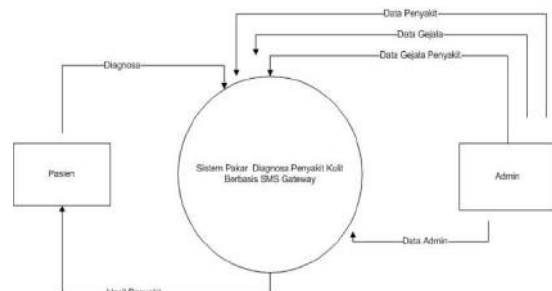The following is a context diagram of an expert system for diagnosing skin diseases:

Figure 2 Context Diagram

2) Data Flow Diagram (DFD)

Data Flow Diagrams (DFD) are a logical description of the system. This picture is independent of the hardware, software, data structure of the organization. At the analysis stage, handling the circular and arrow symbol notations representing / describing the flow of data in system design is very helpful in communicating with the use of the system using these notations to describe the flow of system data.
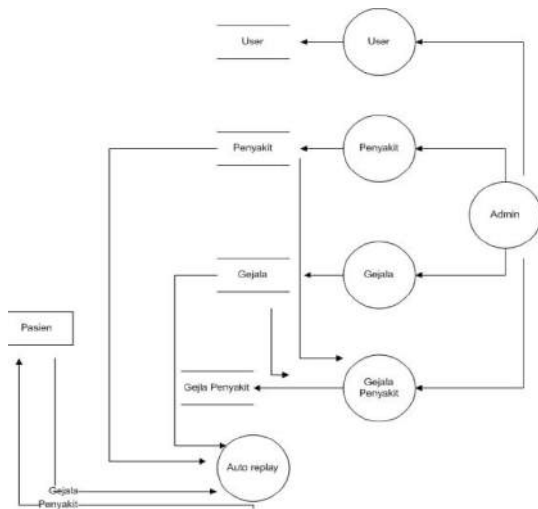

Figure 3 Data Flow Diagram (DFD) Level 1

DFD level 1 above shows the main processes or functions, data flow, entities, and data stores contained in the expert system for diagnosing skin diseases based on Short Text Messages gateway. The DFD is designed there; two external entities, namely admin, and patient as shown in the context diagram; There are seven main processes, namely user data, symptom data, disease symptom data, auto replay, admin, and patients; Five data storage, namely user data, disease data, symptom data, disease symptom data, and patient sms data.
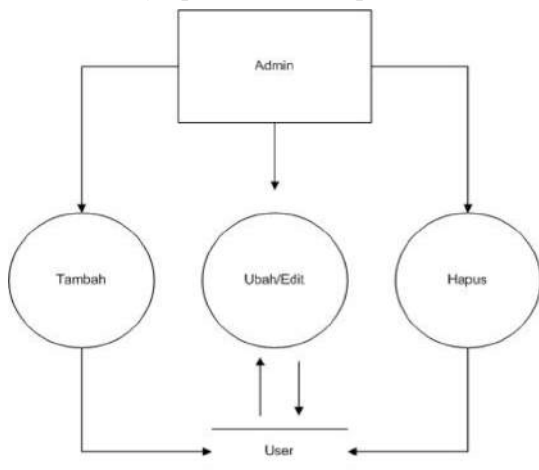

Figure 4 Data Flow Diagram (DFD) Level 2 - User

DFD level 2 process 1 - User, it can be explained that the admin enters user data through the process of adding users to the user table, the admin changes user data through the process of changing users to user tables, admin deletes user data through the process of deleting user to user tables.
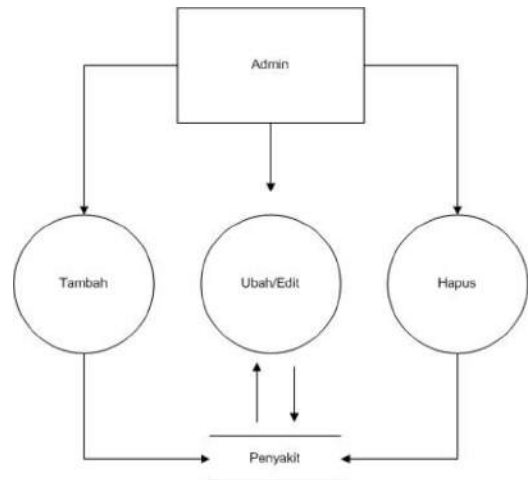

Figure 5 Data Flow Diagram (DFD) Level 2 – Disease

DFD level 2 process 2 - Disease above, it can be explained that the admin enters disease data through the process of adding disease to the disease table, the admin changes disease data through the process of changing disease to a disease table, admin deletes disease data through the process of removing disease into a disease table.
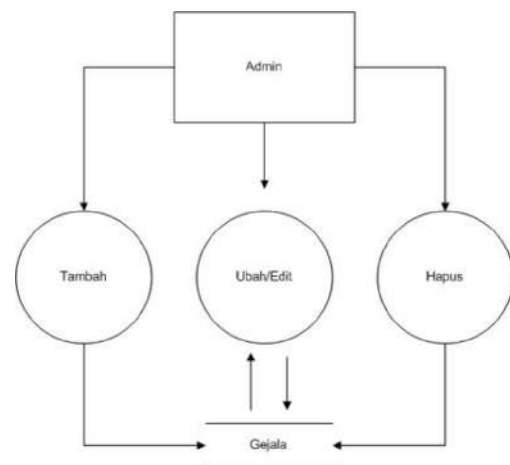

Figure 6 Data Flow Diagram (DFD) Level 2 – Symptoms

In DFD level 2 process 3 above, it can be explained that the admin enters symptom data through the process of adding symptoms to the symptom table, the admin changes symptom data through the process of changing symptoms to

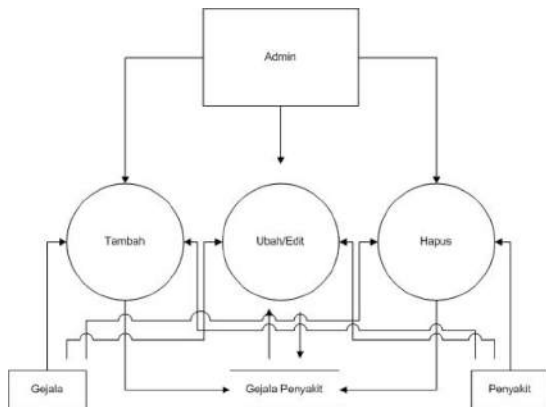symptom table, admin deletes symptom data through the process of removing symptoms to the symptom table.

Figure 7 Data Flow Diagram (DFD) Level 2 – Disease Symptoms

At DFD level 2 process 4 bellow, it can be explained that the admin enters disease symptom data through the process of selecting the choice of symptoms and disease when the symptoms of the disease, the admin changes the symptom data

through the process of changing the symptoms and diseases according to the choice of the symptoms of the disease, the admin deletes the symptom data through the process delete the symptoms of the disease to the symptom table.

3) Entity Relationship Diagram (ERD)

There are four entities in the ERD figure below, namely, disease entities; symptom entities; disease symptom entities; and admin entities. The following is the relationship of each entity:
1. A disease entity has many kinds of symptoms.
2. One symptom entity has many kinds of disease.
3. One disease symptom entity has many kinds of diseases.
4. One disease symptom entity has many kinds of symptoms.
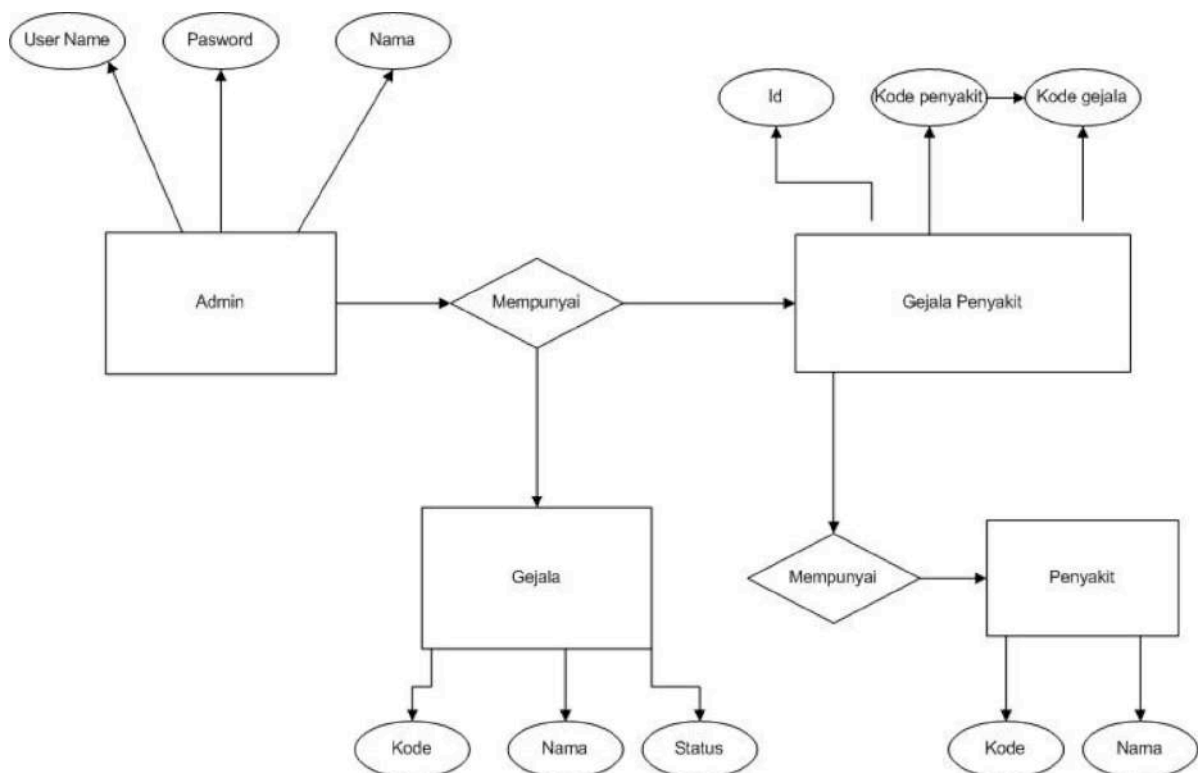5. One admin entity has all symptom, disease, and disease symptom data.

Figure 8 Entity Relationship Diagram (ERD)

C. Forward Chaining Method Design

The Forward Chaining method is a search method or forward tracking technique that starts with existing information and combines rules to produce a conclusion or purpose. Forward tracking is best when working with problems that start with the initial information record and want to reach a final solution, because the whole process will be worked in orderly forward. Forward chaining is an inference method that makes reasoning from a problem to its solution. If the premise clause matches the situation (value TRUE), then the process will declare a conclusion. Forward chaining can also be called forward chaining or data driven search. So the search starts from the premises or input information (IF) first then goes to conclusions or derived information (THEN). Forward Chaining means using the set of action-condition rules. In this method, data is used to determine which rules to run or by adding data to the working memory for processing in order to find a result.

Angga Kresna Dwiyanto [5] conducted a research on diagnosing skin diseases with the title Expert System for Diagnosing Web-Based Skin Diseases in Humans. This research focuses on a web application system using the php program only and an expert system that is generally diagnosed with all skin diseases.

Elfrida Metalia Manurung [10] conducted a research on breast cancer diagnosis with the title Expert System for Diagnosing Breast Cancer Using Forward Chaining and Depth First Seacrh Methods. In this study, researchers focused on how to treat breast cancer using the forward chaining method.

M. Abqori Diandra [4] conducted a research on diagnosing diseases caused by Aedes mosquito bites with the title Expert System for Diagnosing Diseases Due to Aedes Mosquito Bites Using the Forward Chaining Method. In this study, it focuses on how to deal with dengue fever from aedes mosquito bites using the forward chaining method.

Anindita Dhiaksa [3] conducted research on skin diseases with the title Expert System for Diagnosing Skin Diseases Using the Forward Chaining Method. This study only uses the forward chaining method to diagnose skin diseases.

D. System Implementation

This test aims to ensure that the application that has been made is in accordance with the wishes of the user and can be used by the user and operated by the system operator. The basic results of implementing this system are:
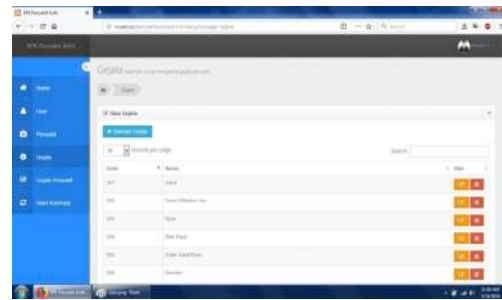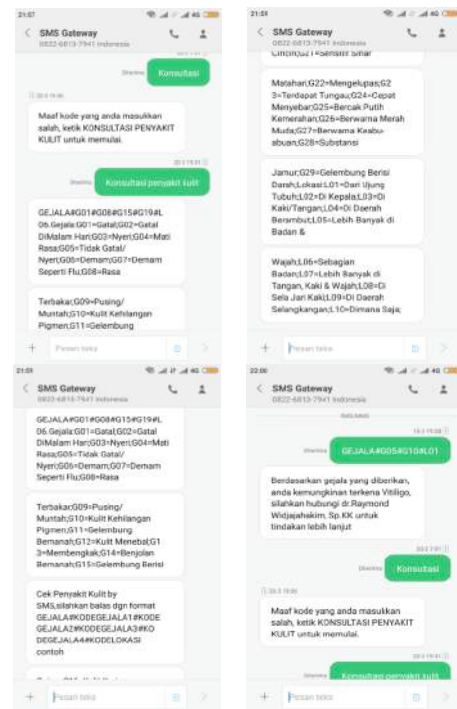

Figure 9 Data and Variables on the System

Figure 10 Short Text Messages Implementation

This display shows that the results of the SMS that have been sent are in the format of the symptoms that occur and a reply statement from the system that the patient is about a possible disease.

IV. CONCLUSION

This research showed that an expert system for the diagnosis of skin diseases was able to identify or consult the disease earlier and easily, using the forward chaining approach based on SMS. This device facilitates an efficient diagnosis procedure and is capable of reaching more users with the technologies used. This research still has many shortcomings and the further development of this expert system can use other methods that are more efficient.

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