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Health Of Dental and Mouth Based Forward Chaining Method

Muhammad Ali Syakur, Devie Rosa Anamisa
Engineering Faculty, University of Trunojoyo Madura, Jl. Raya Telang, PO.BOX.2, Telang, Kamal, Bangkalan, Indonesia

Information from the dental and mouth health is now urgently needed by the people, this usually occurs in areas far from clinic of health, particularly dental and mouth. In addition, the shortage of experts or specialists that exist in the environment also trigger levels declining health caused by an illness. With these limitations it is necessary to build an expert system whose data obtained from experts. In this research develops, an expert system is a forward chaining method. With this application can build media consulting for health, especially for dental and mouth so that it is able to diagnose such an expert skilled in the art regarding dental and mouth disease based on the symptoms of the disease. The test results of this expert system be noted that the method of forward chaining able to do a search to determine the disease dental and mouth so that media consulting is able to provide information about related diseases can be more easily obtained with the making of an expert system to diagnose the symptoms of dental disease and mouth based on multimedia and easily understood by the public.

Keywords: Expert System, Dental and Mouth Health, Multimedia, Method, Forward Chaining.

1. INTRODUCTION

Health is a very important thing in life, because it will determine the future health of humanity. One is the dental and mouth health. If we do not pay attention to health, then the disease will come and certainly interfere with our daily activities. But most people still ignore the overall health condition because minimum their knowledge of the dangers that will arise as a result of the lack of health care, this usually occurs in areas far from health clinics, especially the dental and mouth health. In addition, the shortage of health specialists in the environment also trigger rate of decline in health due to disease and how to prevent the danger of disease that would interfere with their dental and mouth health. The dental and mouth is an organ that plays an important role in the chewing of food, and also helps smooth talk. Therefore, oral health is very important. In general, people often forget about dental and mouth health problems, they are more concerned about the health of other organs. In fact, a disease that attacks the teeth if not treated immediately will harm other organs.

Expert systems are computer-based systems that use knowledge, facts and reasoning techniques in solving problems that normally can only be solved by an expert in the field. By using an expert system, community or society if patients want to consult a doctor then no longer need to come to the health clinic directly to determine the illness. simply enter the patient's disease symptoms are felt then processed by a computer and displaying the results of the diagnosis. In this research apply expert systems to diagnose oral disease using forward chaining method. Forward chaining method is a method of tracking techniques search or fore starting with existing
information and incorporation of rule to produce a conclusion or goal\(^3\). In this research, forward chaining method performs a search where it is known that there are facts to support decision-making. Facts that are used in the form of symptoms experienced by the patient, while the conclusion is the result of diagnosis of the disease.

The purpose of this research explores to create a media application consultation capable of diagnosing the symptoms of dental and mouth diseases based on multimedia and easily understood by the public so that the application can provide information to patients or the public about the possible causes as a result of the diagnosis, guide to seek medical help and advice own actions that can be done to address possible causes.

2. FORWARD CHAINING METHOD

In general, the expert system is one of the field of artificial intelligence, the definition of an expert system itself is a computer program designed to take a decision taken by an expert, which the expert system using knowledge (knowledge), facts and techniques of thinking in solving problems -Problem which normally can only be resolved by an expert from the concerned field\(^4\). In the development of an expert system, knowledge (knowledge) may be derived from an expert, such as magazines, books, journals and others. Besides, the knowledge of an expert system is specific to the problem domain only. The more knowledge that is inserted into an expert system, then the system would be better to act, so it is almost like the real expert, shown in Figure 1. There are several techniques of knowledge representation used in the development of a system of fuel, such as rule-based knowledge is knowledge represented in a form of facts (facts) and the rules (rules), frame-based knowledge, where knowledge is represented in a form of hierarchical or network frames and object-based knowledge is knowledge that is represented as a network of objects, whereas the case-based reasoning is knowledge represented role in the form of conclusions, a rule based on the forward and backward chaining the search mechanism\(^5\).

Forward chaining is a chain that is searched or passed or crossed from a problem to obtain a solution. Reasoning from the fact to the conclusion that there is real\(^6\). Forward chaining is a group of multiple inference who do search of a problem to the solution. Forward chaining is a process that begins tracing display collection of data or facts that convincingly towards of final conclusion. So the forward chaining method starting from the input information (if) first and then to conclusion (then) or can be modeled as follows: IF (information input) THEN (conclusion) Information feedback can be data, evidence, findings or observations, while the conclusion may be of interest, explanation, or diagnosis, shown in Figure 3\(^9\). A typical production rule is given below:

\[
\begin{align*}
A &= 1 & \text{IF } A = 1 & \text{AND } B = 2 \\
B &= 2 & \text{THEN } C = 3 & \text{D = 4} \\
& \text{IF } C = 3 & \text{THEN } D = 4
\end{align*}
\]

The statement of the rule above Feed back focused on the data that must be available before the outputs can
be obtained. Conditions were on the conditions that must apply before action can be taken. Centralized data on the information that must be provided so that a result can be obtained\(^{10,11}\). While the action refers to activities that must be done before the results can be expected. Clause is a kind of a sentence consisting of a subject, verb and object stating some facts. At each clause there is one and one clause. Then, if the rules section may contain more than one premise, and each containing clause. Every rule that has more than one premise called clause compound and linked by connecting words AND or OR. The premise refers to the fact that must be true before certain conclusions can be obtained.

4 EXPERIMENTAL RESULT

In the system of Forward Chaining, doing work ahead to get what solutions follow the facts. There are several steps that must be performed, such as collecting data on dental and oral diseases through direct interviews with an expert, the medical literature books and other information media. After that designing the rules, designed the interface and implementation, as in Figure 3. At the design stage with the aim that the rules do not exist the same rules and that connectivity between clear rules. In this research, formed 14 types of rules created by 29 symptoms of dental and oral diseases of 14 kinds of diseases, such as in Table 1. In forward chaining method, reasoning approach starting from a set of data in the form of disease symptoms to get to a conclusion that is the illness. In this expert system, this application provides a list of questions about any symptoms suffered by the patient so that the forward chaining method will be able to diagnose and infer what diseases suffered.

![Fig 4. Draft a Model](image)

![Table 1. Type of Diseases And Symptoms.](image)

<table>
<thead>
<tr>
<th>No</th>
<th>Name</th>
<th>Symptom</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Splint</td>
<td>Pain when opening the mouth, sore tooth, red swollen gums, difficulty chewing, gum cut, chewing difficulty</td>
<td>Absent Periodontal</td>
</tr>
<tr>
<td>2</td>
<td>Topic</td>
<td>The mouth shows the mouth that is red, easy to chew, swollen and cut, gums and pain, a pimple opening the mouth</td>
<td>Absent Periodontal</td>
</tr>
<tr>
<td>3</td>
<td>Pathosis</td>
<td>Canker, toothache, brown teeth, gum pain and thickening, sensitive teeth, cracked</td>
<td>Cavities</td>
</tr>
<tr>
<td>4</td>
<td>Loss</td>
<td>loss of teeth, sensitivity, teeth, cracked</td>
<td>Pain</td>
</tr>
<tr>
<td>5</td>
<td>Root</td>
<td>Pain on chewing, chewing, chewing difficulty</td>
<td>Absent Periodontal</td>
</tr>
<tr>
<td>6</td>
<td>Root</td>
<td>Canker teeth and gums, black, sensitive, sensitive teeth, cracked</td>
<td>Cavities</td>
</tr>
<tr>
<td>7</td>
<td>Rootosis</td>
<td>Gum bleed easily, there are pimple between gums and teeth</td>
<td>Gingittis</td>
</tr>
<tr>
<td>8</td>
<td>Bacterial</td>
<td>Bacterial teeth, cavity, gum thickening, sensitive teeth, cracked</td>
<td>Shallow cavities</td>
</tr>
<tr>
<td>9</td>
<td>Lister</td>
<td>Cavities, toothache, brown teeth, gum pain and thickening, sensitive teeth, cracked</td>
<td>Cavities</td>
</tr>
<tr>
<td>10</td>
<td>White</td>
<td>Brown tooth cavities, gum thickening, sensitive teeth, cracked</td>
<td>Shallow cavities</td>
</tr>
<tr>
<td>11</td>
<td>Ice</td>
<td>Bacterial tooth cavities, gum thickening, sensitive teeth, cracked</td>
<td>Shallow cavities</td>
</tr>
<tr>
<td>12</td>
<td>Acid</td>
<td>Bacterial gums, there are pimple between gums and teeth</td>
<td>Gingittis</td>
</tr>
<tr>
<td>13</td>
<td>Tooth</td>
<td>Canker, toothache, brown teeth, gum pain and thickening, sensitive teeth, cracked</td>
<td>Cavities</td>
</tr>
<tr>
<td>14</td>
<td>Loss</td>
<td>Loss of teeth, sensitivity, teeth, cracked</td>
<td>Pain</td>
</tr>
<tr>
<td>15</td>
<td>Loss</td>
<td>Loss of teeth, sensitivity, teeth, cracked</td>
<td>Pain</td>
</tr>
</tbody>
</table>

Results of forward chaining method in the research was conducted on 15 patients who come to the dentist with two trials conducted by displaying the menu that can be accessed by the user, with a few menu options, as shown in Figure 5 and Table 2.
Experiments conducted to test the accuracy of the application of expert system analysis of the user to enter the data on the facts and the application of this research in the form of symptoms of the disease. This application can generate diagnosis be the name of diseases that attack the teeth and mouth, are shown in Figure 6.

Fig 6. Result of Diagnosis System With Forward Chaining Method

5. CONCLUSIONS

Application of expert system of dental and oral forward chaining method can produce a multimedia-based diagnosis be the name of a disease that attacks the mouth and teeth making it easier for the public or for the diagnosis of the patient's teeth and mouth disease as well as a media consulting intelligent enough for experts in their field. With media of consulting, these applications can be also deliver material about dental and oral health care, how to brush teeth correctly, and some dental and oral diseases and their causes, symptoms and treatment. Each is supported by multimedia learning materials so that sufficient material can be easily understood by officers and participants extension. We have tested 15 patients using the real test that we collect from doctors and test the system by using this application. And the results obtained, the results of the application in accordance with the results of the doctor, it’s just that there are some diseases that we do not use in this application.

REFERENCES