

# Design and Build an Expert System in the Diagnosis of Ear, Nose and Throat Diseases by Using the Certainty Factor Method

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## Article Info

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## ABSTRACT

Symptoms of ENT disease (Ear, Nose and Throat) are often underestimated by some people. Even though these symptoms may refer to a serious ENT disease. Therefore, this final project aims to implement an expert system with the Certainty Factor (CF) method in cases of early diagnosis of ENT disease. The ENT diseases in question are otitis externa, otitis media, pharyngitis, tonsillitis, sinusitis and allergic rhinitis. odor, headache / swallowing, decreased hearing function, coughing, fever, sore throat and snoring sleep. Furthermore, for each of these symptoms, an expert CF value was searched. After that, rules are formed according to the symptoms of ENT diseases that refer to certain ENT diseases. Then the user test will produce the user's CF value, so that the final CF value will be used as a value in making decisions from sequential CF calculations between user CF and expert CF and knowing the level of diagnosed disease, namely the level of symptoms or the acute level.

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## 1. Introduction

One of the diseases that are often found in the community is ENT (Ear, Nose and Throat) disease. This disease affects all ages. The number of complaints and symptoms that exist as well as various types of ENT diseases causes the identification of ENT diseases to be more complicated. This type of disease involves three parts of the human body that are interconnected with one another.

An expert system (expert system) is a system that seeks to adapt human knowledge (experts) to computers, so that computers can solve problems as is usually done by experts. A good expert system is designed to be able to solve a certain problem by imitating the work of experts (Sridadi, 1990). One of the things studied in artificial intelligence (Artificial Intelligence) is the theory of certainty using the Certainty Factor (CF) theory. Because this ENT disease has various types and symptoms, then an expert or doctor needs to examine more deeply the symptoms experienced by patients so that they can determine the disease suffered by using the Certainty Factor method as a solution in helping to solve health problems and can also be used as a support in health sciences, especially in the ENT field as well as for the needs of the community and individuals in general (Budiman, 2008). The expert system that will be built takes references from doctors who are experts in ENT diseases, modern health books, and the internet. So that the taking of this expert system method is appropriate for disease problems,

because with this expert system, humans seem to consult with experts / experts in the health field, in this case an expert in ENT diseases.

Based on the problems above, an expert system will be built in the diagnosis of ENT diseases using the Certainty Factor method. The system is expected to help medical practitioners and ordinary people to find out the type of disease and its treatment. The results of this study are expected to later be used to help users to find out the type of ENT disease suffered and its treatment. Expert system is one part of artificial intelligence (Artificial Intelligence) which has recently experienced very rapid development. This system is designed to be able to imitate the expertise of an expert in answering questions and solving problems well in the fields of health, business, economics, finance and so on. (Arhami, 2005)

An expert system is a system who are trying adopting human knowledge to computers, so that computers can solve problems as experts usually do. A good expert system is designed to be able to solve a particular problem by imitating the work of experts. So expertise is transferred from an expert / expert (or other source of expertise) to a computer, existing knowledge is stored in the computer, and the user (humans who use expert system applications) can consult the computer for advice, then the computer can take inferences (conclude, deduce, etc.) like an expert, then explain it to the user, if necessary with the reasons.

## 2. Method

In this study, several stages of work will be carried out to achieve the purpose of writing by implementing the Certainty Factor method. The work steps in this research will be explained as follows.

**Problem Identification** The problem faced in building an expert system that can diagnose ENT (Ear, Nose and Throat) diseases is how to design the expert system application so that it can provide these solutions efficiently.

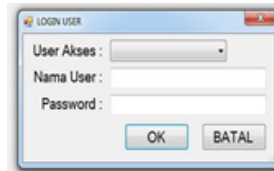
**Literature Study and Information Gathering** Literature study was conducted to complete basic knowledge about the problems and methods used so that they can support in solving these problems. At this stage, information is collected including the following: Interview Method (Interview) Interview or direct question and answer with related parties in this case is a specialist in the field of ENT (Ear, Nose and Throat) and several samples of users who are willing to the symptoms of the disease are identified. Library Research Methods Data obtained by collecting data through books, scientific journals and other sources (internet) that are relevant to the problem.

## 3. Results and Discussion

### 3.1 Disease Diagnosis Inference

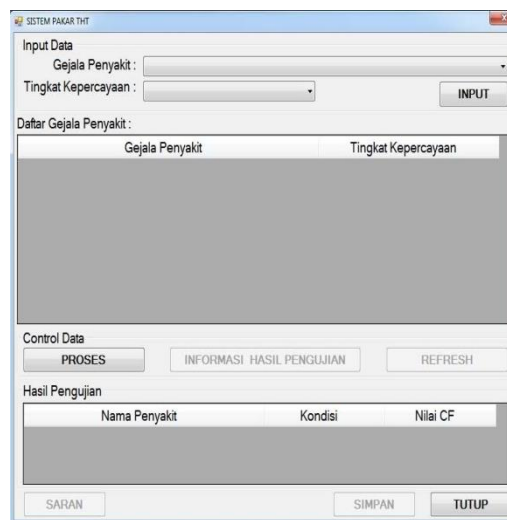
Disease diagnosis inference is reasoning that is carried out in determining the type of disease from a user who has carried out tests using the forward chaining method, which is a search method based on the final CF results which is then followed by an appropriate and fulfilling disease description.

The first process in this disease diagnosis expert system is the answer input procedure. This procedure aims to store the confidence level in decimal form. The following picture is an expert system form where in this form the user will answer several questions about what symptoms are felt and how much confidence the user has in these symptoms.



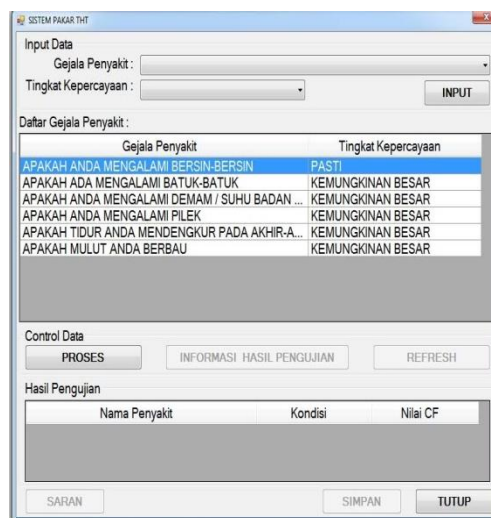
**Figure 1.**User Login Form

In this initial form there are 2 kinds of User access. Namely as admin and as user. Admin or in this case as an authorized expert in terms of updating the knowledge contained in this program. The user in this case is a user who only uses the program as a consultation medium. The user writes the name of the user if he is a user/user/patient first, then presses the OK button.



**Figure 2.** Consultation Form

Then the user begins to enter the consultation form, namely the expert system form. In this form the user begins to be faced with several questions that do not have to be answered all of them. But must give a value of certainty level on each question. After selecting the symptom and level of certainty, the user can press the input button so that later it can be stored in the disease symptom column along with the level of confidence in each symptom. The following is an example of a form when the user has provided input on this expert system form.



**Figure 3.** Form that contains User Input

It can be seen that several choices of symptoms felt by the user have been selected along with the level of confidence in each symptom. The next step is to switch to data control, which is to process several inputs that have been entered by the user. It can be seen that in the test results, the user has been sentenced by the system to be affected by Tonsillitis with a CF value or confidence level of 0.86304 or rounded up to 0.86 with an acute condition or severity. Because the final CF confidence value is more than 0.5. The following is an example of the display form of the results of the testing process.

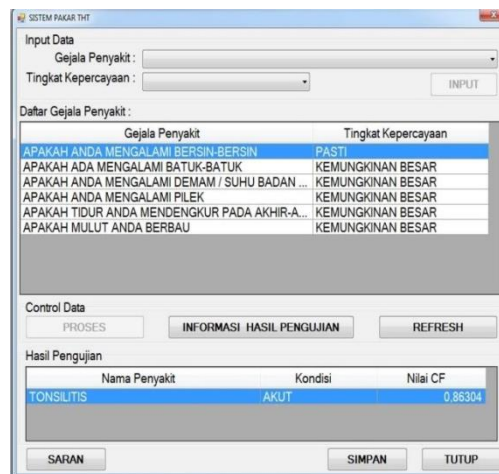


Figure 4. Result Form

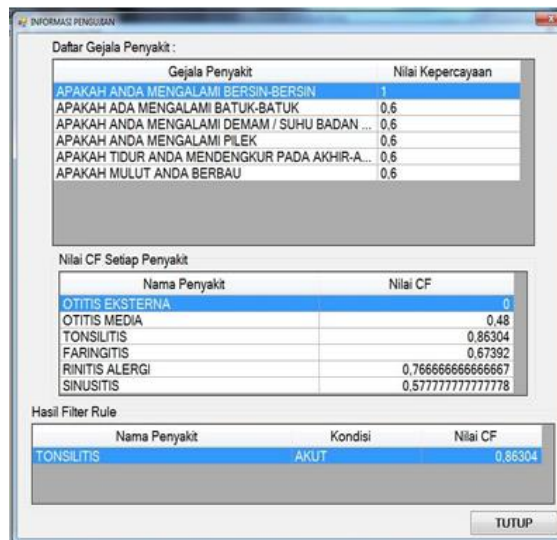


Figure 5. Result Information Form

#### 4. Conclusion

This ENT disease diagnosis system using the Certainty Factor method was built through several stages. The initial process of this stage is to determine the type of disease in the ENT and its symptoms that will be used in the system. Then will be consulted with ENT experts regarding the certainty value (Certainty Factor) of each disease regarding the expert CF value of each disease. This process is then continued by determining the rules for ENT disease according to the input of symptoms. From this rule, the type of disease suffered by the patient / user will be obtained. This ENT disease diagnosis

program that has been made is used to simplify calculations. From the calculation results, the program success rate has been obtained by 90%.

The Certainty Factor method in an expert system for diagnosing ENT diseases can be made using the Visual Basic.Net programming language and produces the desired output target.

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