Diagnose Disease Expert System Respiratory Tract Infection Method Using Certainty Factor

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Abstract—Respiratory tract infections are infectious diseases that interfere with the process of human breathing. When the breathing process takes place, there are often various kinds of diseases, most of which can only be treated by a lung specialist. The arrival of a pulmonary specialist for consultation can take hours and is expensive. Then we need an expert system that can quickly find out the type of disease in human breathing and how to handle it and the solutions that will be provided. Expert system is a system that uses human knowledge to find out the system that is entered into a computer and then is used to solve problems that usually require expertise or human expertise. One application of an expert system to diagnose respiratory tract infections is to use the certainty factor method. The certainty factor method is a method used to solve problems from uncertain answers, and also produce uncertain answers. This uncertainty is influenced by two factors, namely uncertain rules and uncertain user answers. The research aims to build an expert system application for handling respiratory tract infection problems with Visual Studio 2010 as a tool for designing applications and using Microsoft Access 2007 Database as a database. This expert system is able to calculate similarity in weight calculation based on symptoms of respiratory tract infection using certainty factor methods and provide reports using crystal reports.

Keywords: Respiratory tract infections, expert systems, certainty factor methods.

1. Introduction

ISPA or pernapasan merupakan tract infections, infections that interfere with human respiratory process. In general, the infection is caused by a virus that attacks the trachea (breathing tube), the nose, even the lungs. In this study the author discusses Disease pernapasan karena respiratory tract infection is a window that can assist and detect abnormalities or other diseases in the human body in because of problems that arise in Breathing can reflect the health condition of the human body. Therefore, it is better to recognize the symptoms and signs of illness through disease caused by respiratory tract infections in humans.

Therefore, for no fault to make diagnosis in humans, the authors make the application of expert systems to diagnose diseases of respiratory tract infections to simplify and to determine disease diderita oleh manusia. Oleh therefore order not too late to get treatment, because a doctor or specialists have limited time for consultation to the patient, to the authors build an expert system for diagnosing respiratory infections by using certainty factor that may help resolve the issue. Methods certainty factor (CF) is a method that can define the size of certainty and uncertainty of a fact or a rule set.

This research will be designed an expert system to detect the type of disease Ispa. Due to the existence of this system, the public can find out in detail the symptoms of disease in the human respiratory infection and ways to overcome them before consulting a doctor. The system is designed based expert system using the method of Certainty Factor dengan uses Visual Studio 2010, and data storage used is using Microsoft Access 2007. The end result of this application form types of illness based on the symptoms that have been selected. With the Ispa disease diagnosis expert system is expected to know in detail the symptoms of disease in humans Ispa and how to overcome them.

2. Theory

a. Expert system

The expert system is an artificial intelligence program that combines the knowledge base to base inference system to mimic an expert. The expert system is a system that tried to adopt human knowledge into a computer so that the computer can resolve the issue as was done by experts. It is expected that with this expert system, users can solve specific problems, without the help of experts in the field. An expert system is a computer system that sow (emulates) the ability of decision-making from an expert. Emulates berarti term expert system is expected to work in all respects like an expert. An emulation is much more powerful than a simulation only takes something that is evident in several fields or things. Part of the expert system is comprised of two main components which contain base yang knowledge Knowledge and Inference engine that draws conclusions. The conclusion of the expert system is in response to user requests. [1]

b. certainty Factor

Factor Metode Certainty proposed by Shortliffe in 1975 to mengkomodasikan uncertainty of thought (inexact reasoning) an expert. An expert such as a doctor often analyze the existing information with the phrase "may", "likely", "almost certainly". To mengkomodasikan it uses Certainty Factor (CF) in order to describe the level of confidence of experts on the matter at hand.

In expressing degrees of certainty, certainty factor untuk mengansumsikan degree of certainty an expert to the data. This concept was formulated in the following basic formula:

- $CF[H, E] = MB[H, E] - MD[H, E]$
- $MB(h, e1 \wedge e2) = MB[h, e1] + MB[h, e2] * (1 - MB[h, e1])$
- $MD(h, e1 \wedge e2) = MD[h, e1] + MD[h, e2] * (1 - MD[h, e1])$

The next calculation is a combination of two or lebih rule with different tetap dalam evidence of the same hypothesis.

- Rule 1 $CF(h, e1) = CF1 = C(e1) \times CF \text{ Rule1}$
- Rule 2 $CF(h, e2) = CF2 = C(e2) \times CF \text{ Rule2}$
- $CF \text{ kombinasi } [CF1, CF2] = CF1 + CF2 (1 - CF1)$.

To calculate the percentage of the disease, then use the equation:

- $Cf \text{ persentase} = Cf \text{ kombinasi} * 100\%$

Information:

- CF = Certainty
- MB = measure of believe.
- MD = measure of disbelieve.
- H = hypothesis (alleged).
- E = Evidence (events / facts)

TABLE 1
VALUES CERTAINTY FACTOR

Certainty factor	MB	MD
Not sure	0-0.2	0-0.2
bit unsure	0.3-0.4	0.3-0.4
sure enough	0.5-0.6	0.5-0.6
Sure	0.7-0.8	0.7-0.8
Very sure	0.9 to 1	0.9 to 1

c. Ispa disease

ISPA or respiratory tract infection is an infection that interfere with breathing humans in performing daily activities. In general, these infections are caused by a virus that attacks the trachea (breathing tube), lungs, and even count ISPA. The term is derived from three elements namely the infection, respiratory tract, where understanding as follows:

- a. Infeksi Adalah an incoming germs or microorganisms into the human body and multiply, causing the symptoms of respiratory tract infections.
- b. Respiratory tract is an organ from the nose to the alveoli along adneksanya organs such as the sinuses, middle ear and pleural cavity.

3. Analysis

a. table Disease

The following is a table of Diseases of the respiratory tract infections as well as solutions that can be done to overcome the attacks of respiratory tract infeksi respectively. [2]

Table 2
table illness

Code	Ispe Disease Type
P01	Pharyngitis
P02	Asthma
P03	tbc
P04	rhinitis
P05	Bronchitis
P06	pneumonia
P07	nasopharyngitis

b. Table Symptoms

On the table there are symptoms of the value of the MB, MD of symptom data. MB value is the value of the trust an expert, and the value MD is an expert on the value distrust diberikan disease symptoms.

Table 3
table symptoms

Symptoms code	Symptoms name
G01	Sneezing
G02	Headache
G03	Cough
G04	sore sore
G05	shiver
G06	Bedebar heart Debar
G07	difficulty speaking
G08	Terihat lips turned blue
G09	Seemed weak and listless
G10	face Pucak
G11	Fever
G12	Loss of appetite
G13	Urine that change color
G14	runny nose
G15	Itchy eyes
G16	Fatigue
G17	Cough accompanied by phlegm yellow
G18	sore throat
G19	Hard to breathe
G20	Nausea or vomiting
G21	There genjolan in the nose or throat
G22	Pain in the ear
G23	Blurred vision or double

c. Table Rule (Rule)

Table 4
table Rules

Disease	symptom	MB / MD	
Pharyngitis	Sneezing	0.8	0:02
	Headache	0.7	0:04
	Cough	0.6	0:08
	Aches	0.9	0:01
	shiver	0.8	0:02
Asthma	Heart pounding	0.8	0:01
	pounding		
	difficulty speaking	0.8	0:03
	Lips look bluish	0.9	0:02
	heart berdebar2	0.85	0:04
TBC	Pale face	0.8	0:03
	Cough	0.5	0:02
	Fever	0.8	0:03
	Loss of appetite	0.9	0:02
	Urine Changing Colors	0.8	0:02
rhinitis	runny nose	0.85	0:05
	Itchy eyes	0.9	0:03
	Fatigue.	0.8	0:02
Bronchitis	Cough with yellow mucus	0.8	0:01
	Sore throat	0.8	0:03
	Hard to breathe	0.9	0:02
	Runny or stuffy nose	0.8	0:01
Pneumonia	Sweating and shivering	0.7	0:03
	Hard to breathe	0.7	0:01
	Nausea or vomiting	0.95	0:05
nasopharyngitis	There bump in the nose or neck	0.95	0:02
	Sore throat	0.9	0:02
	Ear pain or ringing in the ears	0.95	0:02