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Computer Troubleshooting Expert System Damage Certainty Factor Method Using Web Based

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Abstract*-The problems are most common in essence PT.Sinar Blessings Prosperity is still much work to be done manually, as is the case particularly in the logistics department of administration calculations using a single computer, use the computer that is still its own random origin are still common will of computer technology , where if there is damage to require a long time to fix his computer. Therefore, in this study using expert system troubleshooting computer malfunction with the methods certanty factor to help PT. Sinar Inti Sejahtera Blessing in detecting damage to the computer, so as to minimize the company's performance, minimize expenditures on computer repair, thus better able to improve the performance of employees in PT.Sinar Inti Sejahtera Blessing.*

Keywords*: Damage to the computer, Expert System, Certainty Factor*

1. Introduction

When this computer is a powerful tool helping people work. Almost all areas use the computer to complete the work of man. In line with that required a good enough computer knowledge to anticipate the computer damage due to computer malfunction problem is a fairly complex problem. This may be because the number of users who are less knowledgeable in computers, particularly in addressing damage to the computer. The lack of sufficient knowledge in the handling of damage hardware.mengakibatkan most of the general public or an institution can not identify the location of the damage that occurs in computer hardware. So that many institutions yangmengeluarkan considerable cost just to repair the damage done to computer hardware specialist hardware troubleshooting. For that felt the need to build a software that can help solve the problem of damage to computer hardware. Software to be built would have to be able to present a solution that is precise, accurate, reasonable and efficient. Believed denganpembangunan and use the right software, each institution may save time and money that should be spent for purposes that are far more penting.Software in question is a web-based expert system software that adopt the knowledge that comes from an expert in the field of diagnosis and how handling computer hardware damage. With the construction of an expert system troubleshooting hardware damage web-based computer is expected to provide freedom of access anywhere in assisting computer users in addressing the problems that exist in the hardware computer by presenting an accurate solution, so it can reduce the time and cost to resolve the problems of damage to computer hardware. In the study conducted by Munandar et al (2012), entitled "The Use of Certainty Factor with Multiple Rules for Diagnosing Internal Disease" explaining that the search results of expert system indicates if found concordance between symptoms and diseases, the system will calculate the value of CF combination in accordance with the rules which exists. Highest level of trust will make the final decision,

2. Theory

2.1. Methods Certainty Factor (Factor Certainty)

According Zulfian Azmi, ST, and Verdi Yasin M. Kom, Kom., M.Kom: 2019: 91) explains that, according to David McAllister Centainty Factor (Certainty Factor) is a method to prove whether a fact that definitely or uncertain shaped metric that is usually used in an expert system.

In expressing degrees of certainty, Certainty Factor to mengansumsikan degree of certainty an expert to the data. Certainty Factor introduced the concept of belief / belief and disbelief / incertitude. This concept was formulated in the following basic formula:

CF [H, E] = MB [H, E] - MD [H, E]..... (2.1)

Information:
CF = Certainty Factor (Certainty Factor) in hypothesis H which is influenced by the fact E.
MB = Measure of Belief (Confidence level), an increase in the size of the trust hypothesis H is affected by the fact E.

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MD = Measure of Disbelief (Level Unbelief), an increase of distrust hypothesis H is affected by the fact E.
E = Evidence (events or facts)
certainty Factor to the rules of the single premise (single premise rules)

CF [H, E] 1 = CF [H] CF [E]..... (2.2)

certainty Factor for a similar rule (Similiary Concluded Rules)

CFcombineCF [H, E] 1.2 = CF [H, E] 1 + CF [H, E] 2 * (1CF [H, E] 1)..... (2.3)
CFcombineCF [H, E] old3 = CF [H, E] old + CF [H, E] 3 * (1CF [H, E] old).... (2.4)

The incorporation of trust and uncertainty into a single number that has two functions, namely first certainty factor is used to level the hypothesis in order of importance.

Table 1.
value CF

uncertainty Term	**CF**
definitely Not (Definitely not)	-1.0
Almost Certainly Not (Almost certainly)	-0.8
Probably Not (Unlikely)	-0.6
maybe Not (probably not)	-0.4
unknow (do not know)	-0.2 to 0.2
maybe (maybe)	0.4
Probably (Probably correct)	0.6
Almost Certainly (Almost certainly)	0.8
definitely (certainly)	1.0

Source: T. Sutojo, Edy Mulyanto, Vincent Suhartono (2011: 196)

3. Research Methods

3.1. Framework Research

Research framework in question is a way that the researchers used in research and collect data compared to a standard or predetermined size on Damage diangnosa Computer expert system using the method of Certainty Factor:

3.2. Stage Data Collection

The next stage in this research is data collection. This stage is divided into two, namely the study of literature and rugged data collection.

a) Study of literature

The literature study is done in two ways surf the internet and read books to get information on relevant research object is studied in order to obtain the precision step in the implementation of the study. In addition, to gather resource materials to do research like material on a computer malfunction and methods Centainty Factor

b) Data collection

Initial data collection is a step to obtain data to be processed in the implementation process. This data is data of diseases and symptoms as well as the rule used in the expert system.

c) Interview

Once the process is started, the research data obtained by two ways, namely: exploration or literature studies and interviews. Interviews were conducted directly to the area concerned about the damage that this computer is a computer IT who understand about the symptoms and disease in a computer malfunction that happened.

d) analysis

In this analysis phase conducted two phases include:

1) Research data
The point of this study is to collect data that is already in the analysis made as submissions in solving problems.
2) Symptoms and Disease
Symptoms and disease in question is data that a computer malfunction symptoms occur that will be processed on the method used.

e) Selection Symptoms

This stage the election of the symptoms and rules that have been defined from the point of research consistent with the results obtained from the interviews that have been the object of research that has been conducted by researchers, based on the data that is found necessary damage symptoms.

f) development System

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Development of this system is carried out starting from system design up to manufacture the system in accordance with the purposes of the object of research conducted in which already applied methods Centainty Factor.

g) Implementation Method Factor Centainty

The next step is to apply the method has been determined that the methods Centainty Factor in memecehakan problems of the troublehosting damage to the computer.

In applying such methods do several steps in accordance with the method to produce a result of damage by the symptoms of damage incurred.

h) testing Systems

In this phase is done is testing the system that has been created, the purpose of system testing is to determine whether the system that has been made is in conformity with the wishes of the use in diagnosing damage to the computer.

4. Analysis And Design

4.1. Analysis

Analysis is useful to know the needs of the software needs of Expert System built. In this phase, the search and collection of data and knowledge required by Expert System. So in the end analysis of the results obtained in the form of a system whose structure can be defined well and clearly. The purpose of the analysis system in the development of expert systems is to get the various needs of the user and the system, namely regarding the inputs and outputs must be supplied by the user as well as the needs of the system. The process will be input for the overall system design process. The contents of the list of rules based on the sequence or pattern. During the consultation process between the system and the user, the inference mechanism to test the rules one by one until the conditions of the rule is true.

a. Data analysis

Before the diagnosis of damage to a computer first data obtained the symptoms of damage and the type of damage that exist on the computer, contained in the following table.

Table 2.
Troublehosting Symptoms Information Computer Damage

No.	symptom	Symptoms code
1	Can not be in Charger battery	G01
2	Adapter indicator light blinks	G02
3	There is no indicator of incoming power	G03
4	When turned on there is the POST but paused not directly enter the operating system	G04
5	Shown monitored message "Hard Error" or "Hard Faillur"	G05
6	CPU speed is slow / bad sectors	G06
7	CD / DVD is not detected	G07
8	CD / DVD can not read / write / only be read	G08

Table 3.
Damage Type Computers

No.	Damage	Damage Codes
1	Damage Adapter Charger	K01
2	damage Notebook	K02
3	Damage to CD / DVD ROM	K03
4	Damage Motherboa rd	K04
5	damage RAM	K05
6	damage to the LCD	K06
7	damage Speaker	K07
8	USB damage	K08
9	damage Kyboard	K09
10	damage Touchpad	K10
11	damage Batteries	K11
12	Damage Screen Inverter	K12
13	Starup Damage Problem	K13

b. Certainty Factor Analysis Method

The analysis of the Expert System built the (rule-based expert systems) which apply the method of Certainty Factor, Certainty Factor method is one method used to calculate the certainty factor in overcoming the difficulties in determining the symptoms Troublehosting Computer Damage.

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Here is the formula method of Certainty Factor to mengansumsikan degree of certainty an expert to the data.

CF [H, E] = MB [H, E] - MD [H, E]
CF [H, E] = CF [H] CF [E]
CFcombine CF [H, E] 1.2 = CF [H, E] 1 + CF [H, E] 2 * (1CF [H, E] 1)
CFcombineCF [H, E] old3 = CF [H, E] old + CF [H, E] 3 * (1CF [H, E] old)

The logic of the method of Certainty Factor on system consulting sessions, consulting users are given the option each has a weight as follows:

Table 3.
Confidence weights CF Expert

Term certainty	value CF
Very confident	1
Sure	0.7
Not sure	0.5
Not sure	0.1

The first step, Experts determine the value of CF for each of the following symptoms:
CFpakar (blue screen monitor) = 0.4
CFpakar (No beep after the laptop is turned on) = 0.4
CFpakar (laptop speaker does not ring) = 0.3

Then proceed with the determination of the weight of the user. Suppose the user selects an answer as follows:

Table 4.
Weight of CF User Confidence

Code	Symptoms name	answer	CF user
G1	Screen monitor blue screen	Very confident	1
G2	No beep sound after the laptop is turned on	Sure	0.7
G3	Laptop speaker does not ring	Not sure	0.5

rule 1: IF monitor blue screen = Very Confident = 1.0
AND There is no beep sound after the laptop is turned = Confident = 0.7
rule 2: IF monitor blue screen = Very Confident = 1.0
AND There is no beep sound after the laptop is turned = Confident = 0.7
AND Speaker laptop does not ring = Less Confident = 0.5
rule 3: IF No beep after the laptop is turned on = Confident = 0.7

Step two rules are then calculated its value by multiplying CF CFuser with CFpakar be:

rule 1: $CF [H, E]_1 = CF [H (user)] 1 * CF [E (expert)] 1$
= 1.0 * 0.4
= 0.4
CF [H, E] 2 = CF [H] 2 * CF [E] 2
= 0.7 * 0.4
= 0:28

rule 2: $CF [H, E]_1 = CF [H] 1 * CF [E] 1$
= 1.0 * 0.4
= 0.4
CF [H, E] 2 = CF [H] 2 * CF [E] 2
= 0.7 * 0.4
= 0:28
CF [H, E] 3 = CF [H] 3 * CF [E] 3
= 0.5 * 0.3
= 0:15

rule 3: $CF [H, E]_1 = CF [H] 1 * CF [E] 1$
= 0.7 * 0.4
= 0:28

Thus has been the result of any rule of the symptoms experienced by the user, namely:

Table 5.
Results of Value Every Rule

rule	Score	Information
1	56%	Less Confident Experiencing Troublehosting Computer Damage

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rule	Score	Information
2	63%	Very Confident experienced Troublehosting Computer Damage
3	28%	Not Sure experienced Troublehosting Computer Damage

It can be concluded from the above data that is based on the presenting symptoms are experienced Troublehosting K04 Computer Damage to the percentage value of 63%.

c. Use Case Diagram

*Use-case*is a picture of the scenario of interaction between user and the system. A use-case diagram illustrates the relationship between actors and activities that can be done to applications like Figure 1 below.

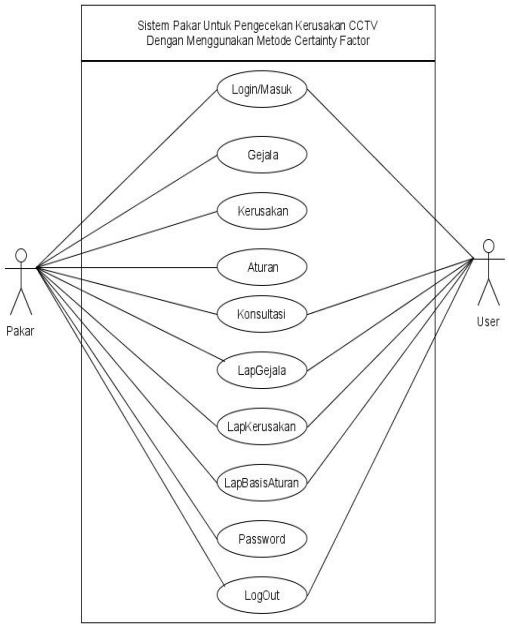

Fig 1. Use-Case

5. Conclusion

From the analysis and discussion that has been presented, it can be concluded some conclusions as follows:

a) From this research produced a new software on an expert system that is able to support the decision-making to diagnose troublehosting computer damage by providing solutions of diagnosis.
b) Troublehosting diagnose expert system computer damage in this study using a certainty factor for determining the level of certainty of a damages based on data selected symptoms, then the data in the process, then the output is in the form of advice or control given based on symptoms inputted.
c) The accuracy of the calculation method is influenced by the selection of certainty factor symptom data available on the consultation page.
d) Make it easy for the community particularly with troublehosting damage computer to search for information more detailed and accurate information on computers and troublehosting damage control.

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