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Expert System To Diagnose Beengal Cat Disease With Case Based Reasoning Method

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A R T I C L E I N F O

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ABSTRACT

At this time, many animal lovers keep pets. Cat or cattery owners sometimes find it difficult to diagnose pet cat diseases because cat diseases are not the same as human diseases, which are easy to diagnose and provide visible symptoms. Horas Cattery is a breeding ground and provider of pet cat adoption services, including Bengal cats. From the observations of the authors at Horas Cattery, understanding of the symptoms of cat diseases is still lacking, so they still rely on the expertise of experts manually, in addition, the cost for treatment to a veterinarian is very expensive and there are still few veterinarians. In this case, the research conducted at Horas Cattery uses the Case Based Reasoning method which is one of the methods of the expert system to diagnose Bengal cat disease because the method is based on knowledge from previous cases. Based on the research conducted, it was found that the case with the lowest weight was case 13, which was 0.2. Case 2 produces a high weight of 0.6667. So the results of calculations with weights show a confidence level of more than 60%.

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1. INTRODUCTION

Bengal cat is a cat that is prone to disease. Horas Cattery is a breeding ground and provider of pet cat adoption services, including Bengal cats. From the author's observations at Horas Cattery, understanding of the symptoms of cat diseases is still lacking, so they still rely on the expertise of experts manually, in addition, the cost for treatment to the veterinarian is very expensive and the presence of veterinarians is still small (Kurniati et al., 2017). Based on the above case, an expert system is needed to develop knowledge from an expert into technology.

Expert System is a specially designed software based on Artificial Intelligence (AI), which functions to record and duplicate expert abilities (Broussard, 2015). According to S Suprapto (2018), the basic concept of an expert system contains expertise, expertise, transfer of expertise, inference, rules, and the ability to explain (Liao, 2005). An expert system (expert system) is a system that seeks to adopt human abilities or knowledge into computers to solve problems like an expert (Muktar et al., 2020). One of the methods in the expert system is Case Based Reasoning (CBR), in which case the author chooses to apply this method in diagnosing Bengal cat disease, because the CBR (Case Based Reasoning) method is an artificial intelligence approach that focuses on problem solving based on knowledge (Kamal, 2006). Based on research conducted by

(Fidyaningsih et al., 2016) entitled "Expert System for Diagnosing Cat Diseases Using the Case Base Reasoning Method" the results obtained from the use of the Case-Based Reasoning Method can be implemented in the application of an expert system for diagnosing cat diseases with an accuracy rate of 90 % and generates cat disease diagnosis output along with solutions and prevention based on 5 cat diseases (Setiawan et al., 2020), (Sutrisna et al., 2021). This study diagnoses cat diseases in general, while in this study the authors diagnose cat diseases specifically in Bengal cats. While the research conducted by (Purnomo et al., 2020) with the title "Expert System for Diagnosing Gastric Disease Using the Web-Based Case Based Reasoning Method" the results obtained are decision making from new cases based on solutions from previous cases to diagnose gastric disease, as well as provide solutions and ways of prevention based on the symptoms of the disease experienced (Salat et al., 2021), (Anggilina & Eviyanti, 2021).

2. METHOD

The research framework is the stages carried out in the research.

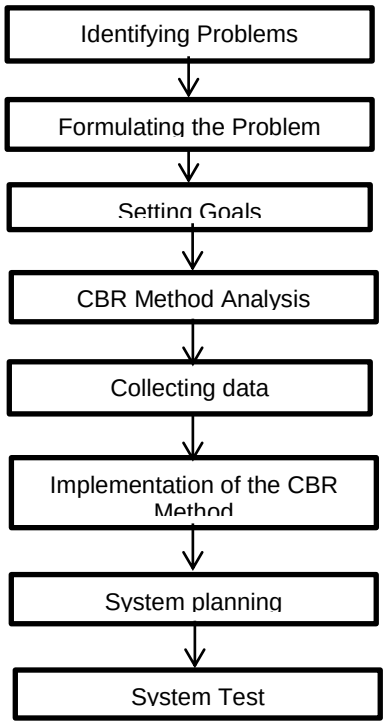

Figure 1. Research Framework

a. Identification of problems
   This stage is the stage to identify the symptoms that occur in diagnosing Bengal cat disease by observing the phenomena that cause these symptoms.
b. Formulation of the problem
   In this stage the author analyzes the problem by conducting a survey of previous studies that have been done regarding diagnosing cat diseases.
c. Goal Setting
   This stage aims so that in this research get the final results in accordance with the goals that have been set. Before reaching the final result, the goal will be divided into sub-objectives that cause the research not to arrive at the final result or even deviate, then by setting the goal will direct and measure the level of success in this research.

d. CBR Method Analysis
In this stage the method analysis is carried out by studying and analyzing the method used, the CBR (Case Based Reasoning) method to find out how to apply it in diagnosing Bengal cat disease (De Paz et al., 2009), (Hadj-Mabrouk, 2020), (Fernandez-Riverola et al., 2006).

e. Collecting data
In this study, the authors collect data by document study, where the data obtained is not directly from the object under study, but analyzes from various sources about Bengal cat disease and previous studies.

f. CBR Method Implementation
In this stage, the implementation of the CBR method is carried out to obtain the results of the diagnosis of Bengal cat disease (Masethe et al., 2021), (Jiang et al., 2020).

g. System planning
In this stage the author designs the system using the CBR (Case Based Reasoning) method and the system will be designed using PHP

h. System Test
In this stage the system will be tested whether it is in accordance with the objectives set in the previous stage or not, also to determine the level of success of the system.

3. RESULTS AND DISCUSSIONS

Data analysis is an analysis of all the data needed to build an expert system to diagnose diseases in Bengal Cats. Analysis of data requirements in the manufacture of this expert system is as follows:

a. Disease data

TABLE 1.
DISEASE DATA

CODE	DISEASE
P01	Ear lice
P02	Scabies
P03	Diarrhea due to food changes
P04	Clamedia
P05	Ring Worm
P06	Flu
P07	Panleukopenia
P08	Worms
P09	Kidney failure
P10	Calici Virus
P11	Flu Rhino
P12	Have a cold
P13	Lice on the body
P14	Pyometra/Inflammation of the uterus
P15	Difficult BAB
P16	Dehydration
P17	Food poisoning
P18	Apoplexy/Epilepsy

b. Symptom Data

TABLE 2.
SYMPTOM DATA

CODE	SYMPTOM
G01	Pale Tongue
G02	Pale Gums
G03	Pale Eyes
G04	Cold Ears
G05	Earwax like coffee grounds
G06	Itchy skin

CODE	SYMPTOM
G07	When the ear drops are put on, the ears will foam
G08	Reddish skin
G09	Hair loss
G10	Dry skin
G11	Swelling of itchy skin
G12	Excessive self-licking
G13	Thin body
G14	Wet ass
G15	The eyes are getting bigger
G16	Eyes turn white, one or both
G17	Fever
G18	Infected skin looks circular & scaly with a reddish side
G19	Watery eyes and nose
G20	Excessive saliva
G21	Sneeze
G22	Cough
G23	Gingivitis
G24	Sore throat
G25	Throw up
G26	Diarrhea
G27	Enlarged belly

c. Cause and solution data

TABLE 3.
DISEASE CAUSES AND SOLUTIONS

Disease Code	Disease	Symptom Code	Symptom	Solution
P1	Ear lice	G01	Pale tongue	Clean the ears 3 days in a row with surolan ear drops
		G02	Pale gums	
		G03	Pale eyes	
		G04	Cold ears	
		G05	Earwax like coffee grounds	
		G07	When the ear drops are put on, the ear will be foamy	
P2	Scabies	G06	Itchy skin	Inject WormEchh according to a dose based on body weight. Apply antifungal medication (Ketoconeszole or natural VCO), and bathe with sebazole shampoo 2x a week.
		G08	Reddish skin	
		G09	Hair loss	
		G10	Dry skin	
		G11	The occurrence of swelling of the itchy skin	
		G12	Excessive self-licking and grooming	
P3	Diarrhea due to food changes	G03	Thin body	Change food composition (old food 75% new food 25% after 3 days change again 50%-50%, after a week all new food. Give diarrhea medicine TMO 21 (1X2 capsules) + Pedialet) stop the diarrhea mental medicine has stopped.
		G14	Wet ass	
		G15	Eyes look enlarged	
		G16	Eyes become white, bias one or both	
		G17	Fever	
P4	Clamedia			

d. Symptom rule

After knowing the disease data and symptoms, the researcher can make a truth table. The table of rules can be seen in the following table.

TABLE 4.
CASE STUDY

Num	Disease Symptom Rules
1	**IF** (pale tongue) **AND** (pale gums) **AND** (pale eyes) **AND** (cold ears) **AND** (ear wax like coffee grounds) **AND** (When you put ear drops, your ears will foam) **THEN** Ear lice.
2	**IF** Itchy skin **AND** Reddish skin **AND** Hair loss **AND** Dry skin **AND** Swelling of itchy skin Excessive licking and self-care **THEN** Scabies
3	**IF** Thin Body **AND** Wet Ass **AND** Enlarged Eyes **THEN** Diarrhea Due to Changes in Food
4	**IF** Eyes turn white, it can be one or both **AND** Fever **THEN** Clamedia
5	**IF** Itching & rash on the skin **AND** Infected skin looks circular & scaly with reddish sides **AND** Dry skin **THEN** Ring Worm
6	**IF** Running eyes & nose **AND** excessive saliva **AND** sneezing **AND** Thrush **AND** Gingivitis **THEN** Flu
8	I**F** Watery eyes **AND** Dirty ears **AND** Diarrhea **AND** Enlarged stomach **THEN** Worms
9	**IF** Increased frequency of urination **AND** difficulty in CHAPTER **AND** Shortness of breath **AND** Decreased appetite **AND** dehydration **AND** diarrhea and vomiting **THEN** Kidney failure

The following are examples of old cases and new cases to test the stages case based reasoning.

Table 5.
Comparison of old cases with new cases

Num	New Case
1	Itchy skin
2	Dry skin
3	Pale Eyes
4	Reddish Skin
5	Excessive self-licking

In the diagnosis of new cases above, the results are based on old cases of 18 types of cat diseases. The results of the calculations can be seen in the following table:

Table 6.
New Case Count

Case	Symptom Suitable	Symptom Case	Symptom Chosen	Divider	Results
01	1	6	5	6	1 / 6 = 0.1667
02	4	6	5	6	4 / 6 = 0.6667
03		3	5	5	/ 5 = 0
04		2	5	5	/ 5 = 0
05	2	3	5	5	2 / 5 = 0.4
06		4	5	5	/ 5 = 0
07		4	5	5	/ 5 = 0
08		3	5	5	/ 5 = 0
09		5	5	5	/ 5 = 0
10		4	5	5	/ 5 = 0
11		2	5	5	/ 5 = 0
12		4	5	5	/ 5 = 0
13	1	2	5	5	1 / 5 = 0.2
14		1	5	5	/ 5 = 0
15		1	5	5	/ 5 = 0
16		1	5	5	/ 5 = 0
17		5	5	5	/ 5 = 0
18		4	5	5	/ 5 = 0

In the new case above, there were 4 old cases that matched the symptoms in the new case, namely, cases 01,02,05,13.

Case 01 = Matched Symptoms / Max Value (Case Symptoms, Selected Symptoms) *100
= (1 / (max 5,6) *100
= 0.1667 *100
= 16.67%
Case 02 = Matched Symptoms / Max Value (Case Symptoms, Selected Symptoms) *100
= (4 / (max 5,6) *100
= 0.6667 *100
= 66.67%
Case 05 = Matched Symptoms / Max Value (Case Symptoms, Selected Symptoms) *100
= (2 / (max 3.5) *100
= 0.4 *100
= 40 %

From the results of the above calculations obtained analysis and percentage as follows.

Table 6.
Analysis and Percentage

No	Kasus	Penyakit	Persentase
1	02	Scabies	66.67 %
2	05	Ring Worm	40 %
3	13	Lice on the body	20 %
4	01	Ear lice	16.67 %
5	17	Food poisoning	0 %
6	16	Dehydration	0 %
7	15	Difficult BAB	0 %
9	12	Have a cold	0 %
10	10	Calici Virus	0 %
11	11	Flu rhino	0 %
12	09	Kidney failure	0 %
13	08	Worms	0 %
14	07	Panleukopenia	0 %
15	06	Flu	0 %
16	04	Clamedia	0 %

4. CONCLUSION

The Bengal Cat Disease Expert System application has been successfully created. This application has successfully implemented the Case base reasoning method which is used in the disease diagnosis process to provide a level of confidence in the symptoms of a disease. Features of the Paddy Disease Doctor application include: disease data, symptom data, knowledge data. Consultation. And this expert system application has been able to diagnose diseases in cats based on the symptoms entered by the user, using the Case Base Reasoning method. This application has the following facilities: data entry, addition, editing, and deletion of existing data on the system. The program will displays all values of the symptoms entered by the user, but only the highest value will be displayed.

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