Expert System Diagnose Disease Persian cat with Bayes Theorem Method

Yustrida Yanti¹, Sulindawaty²

¹²Informatics Engineering Program, STMIK Pelita Nusantara, Jl. St. Iskandar Muda No. 1 Medan, Nort Sumatra, Indonesia, 20154

E-mail:yustridayanti.27@gmail.com

Abstrak-Lack of knowledge of the disease and the limitations Pesia cat disease management is often experienced by the owners of Persian cats. Therefore it is necessary to act / respond quickly to prevent infection with the disease more serius. Teorema Bayes is a method used to predict the probability. Therefore, in this study will be analyzed Persian cat disease data using Bayes theorem using four diseases are Feline Leukemia Virus, Worms, Cat Flu and Mushrooms Cryptococcus. Based on these descriptions, we need a system that can represent an expert who has the knowledge base and experience of the Persian cat disease, which is an expert system. Developments in information technology more widely and rapidly. So much in use in various fields. That accompanied the information technology internet support each other resulting in increased web-based technologies.

Keywords: Disease, Persian cat, Bayes Theorem, Expert Systems, Web Applications

1. Introduction

Pet for the owner is like his own child. Caring, nurturing and attention to its development is very important suatuhal. Even pet owners are willing to spend lots of money just to treat their pets to avoid various diseases. There are many types of cats are commonly used as pets, one of which is a Persian cat. Persian cat owner will experience problems when pets infected with the disease. Given the number of staff veterinarian at the Animal Health Center (Clinic) Lubukpakam slightly and the number of animals that are controlled by the instansi, it is becoming less effective in dealing with animal disease. Along with the development of technology, not only human experts, specialists can be implemented into a system called expert system. Artificial intelligence is a field of computer science that enable computers to act like humans (mimicking the human brain). In general, expert systems (expert systems) is a system that is trying to adopt human knowledge into a computer so that the computer can resolve the issue as was done by experts. (Shinta: 2016). The method used in this research is by using Bayes Theorem. In a previous study conducted by Almuiini and Miftachuniam (2015) on "Applications Determination of Diseases That Allows treatable With Red Onion Method Using Naive Bayes", and research conducted by Healtho Brilliant Argario, Nurul Hidayat, and Ruth Kartika Dewi (2018 ) on "Implementation of Bayes' theorem method for Goats Disease Diagnosis". Bayes theorem is a machine learning using a probability calculation that uses the concept of a Bayesian approach. The use of more efficient methods of Bayes Theorem in training and use, because they can be assumed to be independent. So this method can be implemented with a variety of datasets.

2. Theory

A. Cat

Cats (Felissilvestricatus) is one of the most popular pet in the world. Cats are carnivores kind. The word "cat" generally refers to "cat" that has been tamed, tetapibisa also merujukkepada "kucingbesar" seperisinga, harimaudan others. Cats have mingled with human life at least since the year 4000 BC. In the year 7500 BC found a cat skeleton on the island of Cyprus. The ancient Egyptians of 4000 BC has used cats to keep the rats or other rodents from barns that menyimpanhasil harvest (Alex, 2012).

Several types of disease that often affects cats (Prayogo, 2013):

1. cat flu
2. Feline Infectious Peritonitis
3. panleukopeniaparvovirus atauFeline
4. wormy
5. Scabies
6. ringworm
7. Diarrhea

B. Expert system

Expert systems or expert systems is a branch of computer science that is based on kecerdasan buatan (artificial intelligence) AI dikembangkan oleh komunitas Sistem pakar pertama times pada pertengahan tahun 1960. Sistem pakar pertama times adalah General Purpose Problem Solver (GPS) dikembangkan oleh Newel and Simon (Ahmad, 2018).

C. Method of Bayes Theorem

Bayes theorem is one method of classification that is rooted in the Bayes theorem. Bayes Theorem combined with "Naive" which means that each attribute / variable is free (Novianto et al, 2012).

\[ P(H|E) = \frac{P(E|H)P(H)}{P(E)} \]

Where:
- \( P(H|E) \): the probability of the hypothesis H if given evidence E
- \( P(E|H) \): the probability of the emergence of evidence E if known hypothesis H
- \( P(H) \): the probability of the hypothesis H regardless of any evidence
- \( P(E) \): the probability of evidence E

3. Results and Discussion

A. Data analysis

This section will be explained in general how to determine the outcome of a Persian cat disease diagnosis based on data and results of calculation using Bayes theorem.

| Code | Name                  |
|------|-----------------------|
| P001 | Cat flu               |
| P002 | Feline Infectious Peritonitis |
| P003 | panleukopenia         |
| P004 | wormy                 |
| P005 | Scabies               |
| P006 | ringworm              |
| P007 | Diarrhea              |
| P008 | Flea                  |
| P009 | Feline Leukemia Virus |
| P010 | JamurCryptococcus     |

| Code | Name                        | Weight |
|------|-----------------------------|--------|
| G001 | Sneezing                    | 0.3    |
| G002 | Fever                       | 0.3    |
| G003 | Cold                        | 0.5    |
| G004 | Eye inflammation            | 0.6    |
| G005 | excessive belekan           | 0.2    |
| G006 | Decreased appetite          | 0.6    |
| G007 | Dehydration                 | 0.4    |
| G008 | Excessive saliva            | 0.6    |
| G009 | Wound in cornea             | 0.8    |
| G010 | Out of breath               | 0.4    |
| G011 | Coughs                      | 0.3    |
| G012 | Inflammation of the mucus membranes on one eyelid | 0.9 |
| G013 | great Perutmem              | 0.8    |
| G014 | Depression                  | 0.5    |
| G015 | Looks like jaundice         | 0.9    |
| G016 | Weight loss                 | 0.6    |
| G017 | Limp                        | 0.3    |
| G018 | Throw up                    | 0.3    |
| G019 | Diarrhea                    | 0.7    |
| G020 | Exit worms in dirt          | 0.7    |
| G021 | blood Diareber              | 0.6    |
| G022 | Notwithstanding the meager meal | 0.7    |
B. Diagnose Disease Expert System Rule Persian Cats

Table 3. Facts and Rules Disease Symptoms

| No. rule | Rules Symptoms and Disease |
|----------|----------------------------|
| R001     | IF Sneezing AND Fever AND Runny nose AND Sore eyes AND bekelan excessive AND Appetite down AND Dehydration AND Excessive saliva AND wound in cornes of the eye AND blown AND Cough-cough AND Inflammation of the mucous membranes in one eyelid THEN Cat Flu |
| R002     | Enlarged Abdominal Depression IF AND AND Looks like jaundice, weight loss AND THEN Female dull fur Infectious Peritonitis |
| R003     | Depression IF AND Weakness AND Appetite down AND Vomiting AND Diarrhea excessive saliva AND Cough-cough AND THEN Panleukopenia |
| R004     | IF Keluarcacing on dirt AND Bloody diarrhea AND Petite despite eating a lot AND Watery eyes swollen belly AND Bulu Bulu dull AND THEN loss Worms |
| R005     | Itching IF AND scab in the ears or feet or face THEN Scabies |
| R006     | IF hairs fall out circular AND Skin dandruff AND Itching skin AND THEN Ringworm |
| R007     | IF Diareencer / CUER AND Appetite down AND Weakness AND THEN Dehydration Diarrhea |
| R008     | Itching IF AND THEN Flea Fur Loss |
| R009     | IF Fever AND Anemia AND Swollen glands and spleen AND THEN Immunity down Feline Leukemia Virus |
| R010     | IF AND Runny nose AND Luka swollen nasal swelling AND Sounds heavy breathing AND Exfoliation around the face and head AND Swollen lymph nodes AND THEN nerve disorders and eye Mushrooms Cryptococcus |

C. Analysis Methods

The method used so that users’ needs can be met is by using Bayes theorem. Bayes theorem method is one way to cope with the uncertainty of data is constructed from a probabilistic theory.

D. CASE STUDY

1) Cat Flu (P001)

a. Symptoms and weights for this disease is as follows:
   - G001 = 0.3 (E | H1)
   - G002 = 0.3 (E | H2)
   - G003 = 0.5 (E | H3)
   - G004 = 0.6 (E | H4)
   - G005 = 0.2 (E | H5)
   - G006 = 0.6 (E | H6)
   - G007 = 0.4 (E | H7)
   - G008 = 0.6 (E | H8)
   - G009 = 0.8 (E | H9)
   - G010 = 0.4 (E | H10)
   - G011 = 0.3 (E | H11)
b. Determining the value of the universe from the sum of the above hypothesis
\[
\sum_{i=1}^{12} = G1 + G2 + G3 + G4 + G5 + G6 + G7 + G8 + G9 + G10 + G11 + G12 = 0.3 + 0.3 + 0.5 + 0.2 + 0.6 + 0.4 + 0.6 + 0.8 + 0.4 + 0.3 + 0.9 = 5.9
\]
c. To calculate the value of the universe
\[
P(H1) = \frac{H1}{\sum_{i=1}^{12}} = \frac{0.3}{5.9} = 0.05
\]
\[
P(H2) = \frac{H2}{\sum_{i=1}^{12}} = \frac{0.3}{5.9} = 0.05
\]
\[
P(H3) = \frac{H3}{\sum_{i=1}^{12}} = \frac{0.5}{5.9} = 0.08
\]
\[
P(H4) = \frac{H4}{\sum_{i=1}^{12}} = \frac{0.6}{5.9} = 0.10
\]
\[
P(H5) = \frac{H5}{\sum_{i=1}^{12}} = \frac{0.2}{5.9} = 0.03
\]
\[
P(H6) = \frac{H6}{\sum_{i=1}^{12}} = \frac{0.6}{5.9} = 0.10
\]
\[
P(H7) = \frac{H7}{\sum_{i=1}^{12}} = \frac{0.4}{5.9} = 0.06
\]
\[
P(H8) = \frac{H8}{\sum_{i=1}^{12}} = \frac{0.6}{5.9} = 0.10
\]
\[
P(H9) = \frac{H9}{\sum_{i=1}^{12}} = \frac{0.8}{5.9} = 0.13
\]
\[
P(H10) = \frac{H10}{\sum_{i=1}^{12}} = \frac{0.4}{5.9} = 0.06
\]
\[
P(H11) = \frac{H11}{\sum_{i=1}^{12}} = \frac{0.3}{5.9} = 0.05
\]
\[
P(H12) = \frac{H12}{\sum_{i=1}^{12}} = \frac{0.9}{5.9} = 0.15
\]
d. Calculating the probability value H regardless of any evidence
\[
\sum_{i=1}^{12} = (P(H_i) * P(E|H_i)) = (0.05 * 0.3) + (0.05 * 0.3) + (0.08 * 0.5) + (0.10 * 0.6) + (0.03 * 0.2) + (0.05 * 0.6) + (0.06 * 0.4) + (0.10 * 0.6) + (0.13 * 0.8) + (0.06 * 0.4) + (0.05 * 0.4) + (0.15 * 0.9)
\]
\[
= 0.015 + 0.015 + 0.04 + 0.06 + 0.006 + 0.03 + 0.02 + 0.06 + 0.10 + 0.24 + 0.02 + 0.135
\]
\[
= 0.749
\]
e. Determine the outcome of \( P(H_i|E) \) or the probability of the hypothesis \( H_i \) is true if given evidence \( E \)
\[
P(H1|E) = \frac{0.3 * 0.015}{0.749} = 0.006
\]
\[
P(H2|E) = \frac{0.3 * 0.015}{0.749} = 0.006
\]
\[
P(H3|E) = \frac{0.5 * 0.04}{0.749} = 0.026
\]
\[
P(H4|E) = \frac{0.6 * 0.06}{0.749} = 0.048
\]
\[
P(H5|E) = \frac{0.2 * 0.006}{0.749} = 0.001
\]
\[
P(H6|E) = \frac{0.6 * 0.03}{0.749} = 0.024
\]
\[
P(H7|E) = \frac{0.4 \times 0.024}{0.749} = 0.012
\]
\[
P(H8|E) = \frac{0.6 \times 0.06}{0.749} = 0.048
\]
\[
P(H9|E) = \frac{0.8 \times 0.104}{0.749} = 0.111
\]
\[
P(H10|E) = \frac{0.4 \times 0.24}{0.749} = 0.128
\]
\[
P(H11|E) = \frac{0.3 \times 0.02}{0.749} = 0.008
\]
\[
P(H12|E) = \frac{0.9 \times 0.135}{0.749} = 0.162
\]
f. Summing up the entire value of \( P(H_i | E) \)
\[
\sum_{i=1}^{12} \text{Bayes} = \text{bayes1} + \text{bayes2} + \text{bayes3} + \cdots + \text{bayes12}
\]
\[
= (0.3 \times 0.006) + (0.3 \times 0.006) + (0.5 \times 0.026) + (0.6 \times 0.048) + (0.2 \times 0.001) +
\]
\[
(0.6 \times 0.024) + (0.4 \times 0.012) + (0.6 \times 0.048) + (0.8 \times 0.111) + (0.4 \times 0.128) +
\]
\[
(0.3 \times 0.008) + (0.9 \times 0.135)
\]
\[
= 0.0018+ 0.0018+ 0.0288+ 0.0002+ 0.0144+ 0.0048+ 0.0888+ 0.0512+ 0.0024+ 0.1215
\]
\[
= 0.4457 \times 100\% = 44.57\%
\]
Based on the calculations above, the rate of disease probability is 44.57% cat flu.

2) Worms (P004)

\[\text{a. Gejaladanbobotuntukpenyakitiniadalahsebagai}\]
\[\begin{align*}
G020 &= 0.7 (E | H1) \\
G021 &= 0.6 (E | H2) \\
G022 &= 0.7 (E | H3) \\
G023 &= 0.6 (E | H4) \\
G024 &= 0.4 (E | H5) \\
G025 &= 0.5 (E | H6) \\
G032 &= 0.5 (E | H7)
\end{align*}\]

\[\text{b. Determining the value of the universe from the sum of the above hypothesis}\]
\[\sum_{i=1}^{7} \text{bayes} = G020 + G021 + G022 + G023 + G024 + G025 + G032\]
\[= 0.7 + 0.6 + 0.7 + 0.6 + 0.4 + 0.5 + 0.5\]
\[= 4\]

\[\text{c. To calculate the value of the universe}\]
\[P(H1) = \frac{H1}{\sum_{i=1}^{7} H2} = \frac{0.7}{4} = 0.17\]
\[P(H2) = \frac{H2}{\sum_{i=1}^{7} H3} = \frac{0.6}{4} = 0.15\]
\[P(H3) = \frac{H3}{\sum_{i=1}^{7} H4} = \frac{0.7}{4} = 0.17\]
\[P(H4) = \frac{H4}{\sum_{i=1}^{7} H5} = \frac{0.6}{4} = 0.15\]
\[P(H5) = \frac{H5}{\sum_{i=1}^{7} H6} = \frac{0.4}{4} = 0.10\]
\[P(H6) = \frac{H6}{\sum_{i=1}^{7} H7} = \frac{0.5}{4} = 0.12\]
\[P(H7) = \frac{H7}{\sum_{i=1}^{7} H7} = \frac{0.5}{4} = 0.12\]

d. Calculating the probability value H regardless of any evidence
\[
\sum_{i=1}^{7} = P(H_i) \times P(E \mid H_i)
\]
\[
= (P(H_1) \times P(E \mid H_1)) + \cdots + (P(H_7) \times P(E \mid H_7))
\]
\[
= (0.17 \times 0.7) + (0.15 \times 0.6) + (0.17 \times 0.7) + (0.15 \times 0.6) + (0.10 \times 0.4) +
\]
\[
(0.12 \times 0.5) + (0.12 \times 0.5)
\]
\[
= 0.119 + 0.09 + 0.119 + 0.09 + 0.04 + 0.06 + 0.06
\]
\[
= 0.578
\]

**e.** Determine the outcome of \( P(H_i \mid E) \) or the probability of the hypothesis \( H_i \) is true if given evidence \( E \)

\[
P(H1\mid E) = \frac{0.7 \times 0.119}{0.578} = 0.144
\]
\[
P(H2\mid E) = \frac{0.6 \times 0.09}{0.578} = 0.093
\]
\[
P(H3\mid E) = \frac{0.7 \times 0.119}{0.578} = 0.144
\]
\[
P(H4\mid E) = \frac{0.6 \times 0.09}{0.578} = 0.093
\]
\[
P(H5\mid E) = \frac{0.4 \times 0.04}{0.578} = 0.027
\]
\[
P(H6\mid E) = \frac{0.5 \times 0.06}{0.578} = 0.051
\]
\[
P(H7\mid E) = \frac{0.5 \times 0.06}{0.578} = 0.051
\]

**f.** Summing up the entire value of \( P(H_i \mid E) \)

\[
\sum_{i=1}^{7} Bayes = bayes1 + bayes2 + bayes3 + \cdots + bayes7
\]
\[
= (0.7 \times 0.144) + (0.6 \times 0.093) + (0.7 \times 0.144) + (0.6 \times 0.093 + (0.4 \times 0.027) +
\]
\[
(0.5 \times 0.051) + (0.5 \times 0.051)
\]
\[
= 0.1008+0.0558+0.1008+0.0588+0.0255+0.0255
\]
\[
= 0.375 \times 100\%
\]
\[
= 0.375 \times 100\%
\]
\[
= 37.50\%
\]

Based on the calculations above, the level of the possibility of disease worms adalah 37.50%.

3) **Feline Leukemia Virus (P009)**

**a.** The symptoms and weights for this disease are as follows:

\( G002 = 0.3 (E \mid H1) \)
\( G033 = 0.9 (E \mid H2) \)
\( G034 = 0.7 (E \mid H3) \)
\( G035 = 0.8 (E \mid H4) \)

**b.** Determining the value of the universe from the sum of the above hypothesis

\[
\sum_{i=1}^{4} bayes = G002 + G033 + G034 + G035
\]
\[
= 0.3 + 0.9 + 0.7 + 0.8
\]
\[
= 2.7
\]

**c.** To calculate the value of the universe

\[
P(H1) = \frac{H1}{\sum_{k=1}^{4} H1} = \frac{0.3}{2.7} = 0.11
\]
\[
P(H2) = \frac{H2}{\sum_{k=1}^{4} H2} = \frac{0.9}{2.7} = 0.33
\]
\[
P(H3) = \frac{H3}{\sum_{k=1}^{4} H3} = \frac{0.7}{2.7} = 0.25
\]
\[
P(H4) = \frac{H4}{\sum_{k=1}^{4} H4} = \frac{0.8}{2.7} = 0.29
\]

**d.** Calculating the probability value H regardless of any evidence
\[
\sum_{i=1}^{4} = P(H_i) \times P(E|H_i)
\]
\[
= (P(H_1) \times P(E|H_1)) + (P(H_2) \times P(E|H_2)) + (P(H_3) \times P(E|H_3)) + (P(H_4) \times P(E|H_4))
\]
\[
= (0.11 \times 0.3) + (0.33 \times 0.9) + (0.25 \times 0.7) + (0.29 \times 0.8)
\]
\[
= 0.033 + 0.297 + 0.175 + 0.232
\]
\[
= 0.737
\]

d. Determine the outcome of \( P(H_i | E) \) or the probability of the hypothesis \( H_i \) is true if given evidence \( E \)

\[
P(H1|E) = \frac{0.3 \times 0.033}{0.737} = 0.013 \\
P(H2|E) = \frac{0.9 \times 0.297}{0.737} = 0.362 \\
P(H3|E) = \frac{0.7 \times 0.175}{0.737} = 0.166 \\
P(H4|E) = \frac{0.8 \times 0.232}{0.737} = 0.251
\]

f. Summing up the entire value of \( P(H_i | E) \)

\[
\sum_{i=1}^{4} \text{Bayes} = \text{bayes1} + \text{bayes2} + \text{bayes3} + \text{bayes4}
\]
\[
= (0.3 \times 0.013) + (0.9 \times 0.362) + (0.7 \times 0.166) + (0.8 \times 0.251)
\]
\[
= 0.0039 + 0.3258 + 0.1162 + 0.2008
\]
\[
= 0.6467 \times 100%
\]
\[
= 64.67%
\]

Based on the above calculation, then the probability of developing the disease Feline Leukemia Virus is 64.67%.

4) Cryptococcus mushroom (P010)

a. Symptoms and weights for this disease is as follows:

\[
\text{G036} = 0.7 \text{ (E | H1)} \\
\text{G003} = 0.5 \text{ (E | H2)} \\
\text{G037} = 0.6 \text{ (E | H3)} \\
\text{G010} = 0.4 \text{ (E | H4)} \\
\text{G038} = 0.8 \text{ (E | H5)} \\
\text{G039} = 0.6 \text{ (E | H6)} \\
\text{G040} = 0.8 \text{ (E | H7)}
\]

b. Determining the value of the universe from the sum of the above hypothesis

\[
\sum_{i=1}^{7} \text{bayes} = \text{G036} + \text{G003} + \text{G037} + \text{G010} + \text{G038} + \text{G039} + \text{G040}
\]
\[
= 0.7 + 0.5 + 0.6 + 0.4 + 0.8 + 0.6 + 0.8
\]
\[
= 4.4
\]

c. To calculate the value of the universe

\[
P(H1) = \frac{\text{H1}}{\sum_{i=1}^{4} H2} = \frac{0.7}{4.4} = 0.15
\]
\[
P(H2) = \frac{\text{H2}}{\sum_{i=1}^{4} H3} = \frac{0.5}{4.4} = 0.11
\]
\[
P(H3) = \frac{\text{H3}}{\sum_{i=1}^{4} H4} = \frac{0.6}{4.4} = 0.13
\]
\[
P(H4) = \frac{\text{H4}}{\sum_{i=1}^{4} H5} = \frac{0.4}{4.4} = 0.09
\]
\[
P(H5) = \frac{\text{H5}}{\sum_{i=1}^{4} H6} = \frac{0.8}{4.4} = 0.18
\]
\[
P(H6) = \frac{\text{H6}}{\sum_{i=1}^{4} H7} = \frac{0.6}{4.4} = 0.13
\]
\[
P(H7) = \frac{\text{H7}}{\sum_{i=1}^{4} H7} = \frac{0.8}{4.4} = 0.18
\]

d. Calculating the probability value H regardless of any evidence
\[
\sum_{i=1}^{7} = P(H_i) * P(E|H_i)
\]

\[
= (P(H_1) * P(E|H_1)) + \cdots + (P(H_7) * P(E|H_7))
\]

\[
= (0.15 * 0.7) + (0.11 * 0.5) + (0.13 * 0.6) + (0.09 * 0.4) + (0.18 * 0.8) +
\]

\[
(0.13 * 0.6) + (0.18 * 0.8)
\]

\[
= 0.105 + 0.055 + 0.078 + 0.036 + 0.144 + 0.144
\]

\[
= 0.64
\]

e. Determine the outcome of \( P(H_i | E) \) or the probability of the hypothesis \( H_i \) is true if given evidence \( E \)

\[
P(H1|E) = \frac{0.7 * 0.105}{0.64} = 0.11
\]

\[
P(H2|E) = \frac{0.5 * 0.055}{0.64} = 0.04
\]

\[
P(H3|E) = \frac{0.6 * 0.078}{0.64} = 0.07
\]

\[
P(H4|E) = \frac{0.4 * 0.036}{0.64} = 0.02
\]

\[
P(H5|E) = \frac{0.8 * 0.144}{0.64} = 0.18
\]

\[
P(H6|E) = \frac{0.6 * 0.078}{0.64} = 0.07
\]

\[
P(H7|E) = \frac{0.8 * 0.144}{0.64} = 0.18
\]

f. Summing up the entire value of \( P(H_i | E) \)

\[
\sum_{i=1}^{7} Bayes = bayes1 + bayes2 + bayes3 + \cdots + bayes7
\]

\[
= (0.7 * 0.11) + (0.5 * 0.04) + (0.6 * 0.07) + (0.4 * 0.02 + (0.8 * 0.18) +
\]

\[
(0.6 * 0.07) + (0.8 * 0.18)
\]

\[
= 0.077 + 0.02 + 0.042 + 0.008 + 0.144 + 0.042 + 0.144
\]

\[
= 0.477 * 100%
\]

\[
= 47.70%
\]

Based on the calculations above, the level of the possibility of disease fungus Cryptococcus is 47.70%.

4. Conclusion

Based on the description that has been done on the disease diagnosis Persian cat with Bayes theorem, then pennulis able to draw some conclusions as follows:

a. Expert System generated in this study is the result of the analysis of knowledge and scientific experts to provide information and data on Persian cat disease which was acquired in the form of rules that can later be traced and identified the possibility of illness Persian cat who implemented into computerized systems or intelligent applications.

b. Development of Expert System was preceded by collecting some information and expert knowledge relating about the detection of clinical symptoms found in disease manifestations Persian cat who subsequently formed into the base or body of knowledge, then do the calculation and application of Theorem Bayes who have the aim to produce a level of the possibility of disease from the symptoms identified.

c. Expert systems are designed to implement Bayes theoremin the process mendidagnosis Persian cat diseases that have been carried out in accordance with the steps and algorithms methods Bayes Theorem, so that the system can be applied as a consultancy and reference animal health officials in making early diagnosis results in conducting face-detection another Persian cat.

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