Expert System for Early Diagnosis of Diseases in Pet Cats Using the Forward Chaining Method

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Abstract

Cats are one of the animals that are popular and liked by the public. However, when their pet cat is sick, many cat owners are confused in finding information about the initial treatment, technical handling of the disease and the right medicine for the disease their cat is suffering from, so many cat owners give natural treatment. Therefore, the author creates an expert system that can assist cat owners in dealing with sick cats by using the forward chaining based on applicable rules according to the decision of an expert. This expert system can produce information on the initial diagnosis of a disease as well as initial solutions that can be carried out by cat owners in the technical handling of diseases suffered by their cats.

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INTRODUCTION

Information technology is developing rapidly and can improve the efficiency of public and health services through the internet and available experts so that people can more easily get solutions faster.

Technological developments produce intelligent systems such as artificial intelligence, where one example is an expert system. This system mimics human thinking ability and knowledge that solves certain problems, and can be applied in the medical field in diagnosing diseases.

Expert systems are needed in the health sector, especially for the handling of animals by veterinarians. However, there are still many pet owners who have difficulty finding information about their pet cat's illness and choose to self-medicate based on online drug reviews or pet shop recommendations without considering the risks of using inappropriate or dangerous drugs.

The aim in compiling this thesis is to produce an expert system for diagnosing early disease in pet cats and provide explanations and suggestions from the results of the diagnosis.

LITERATURE REVIEWS

In general, a system is a collection of objects or elements that have different meanings that are related to each other, influence each other and have a relationship to the same plan or plan in achieving a certain goal in a complex environment.

Artificial intelligence is the science that studies how to make computers work like humans. The goal of artificial intelligence is to make computers smarter, understand intelligence, and make machines more useful. Artificial intelligence is

studied in several fields of research, such as formal tasks, mundane tasks, and expert tasks. Some of the important concepts in artificial intelligence are intelligence testing, symbolic processing, heuristics or new discoveries, inferences, and pattern matching.

An expert system is a computer system that has the ability to match the decision making of an expert in a field. This system uses AI or artificial intelligence to process specific knowledge that is used to solve problems at the human expert level. At first, expert systems only contained limited proprietary knowledge, but over time, expert system technology developed and included expert system languages, programs, and hardware used to assist the development and manufacture of expert systems.

Rule-based expert systems generally use the modus ponen inference strategy. If the rule "IF A THEN B" is true and A is proven to be true, then it can be concluded that B is also true. There are two approaches to controlling inference in rule-based expert systems, namely backward chaining and forward chaining. The choice of tracking method depends on the problem to be solved by the expert system.

Forward Chaining Method

Forward chaining is an inference multiplication that connects the problem with the solution through a chain or reasoning from the bottom up, that is, from facts to conclusions based on these facts. Forward chaining can be described as reasoning from facts to conclusions. Facts are the basic units of the knowledge-based paradigm because they cannot be broken down into smaller units.

RESEARCH METHODS

This thesis research was conducted at the Royal Purple Vet Animal Clinic which is located at Jl. Raya Bojongsoang No. 117, Bojongsoang, Kec. Bojongsoang, Bandung. Data collection methods in cat disease expert system research include interviews with experts, problem observations, and literature studies from sources such as books, documents, and internet media. The data collected is used as a basis for developing application systems.
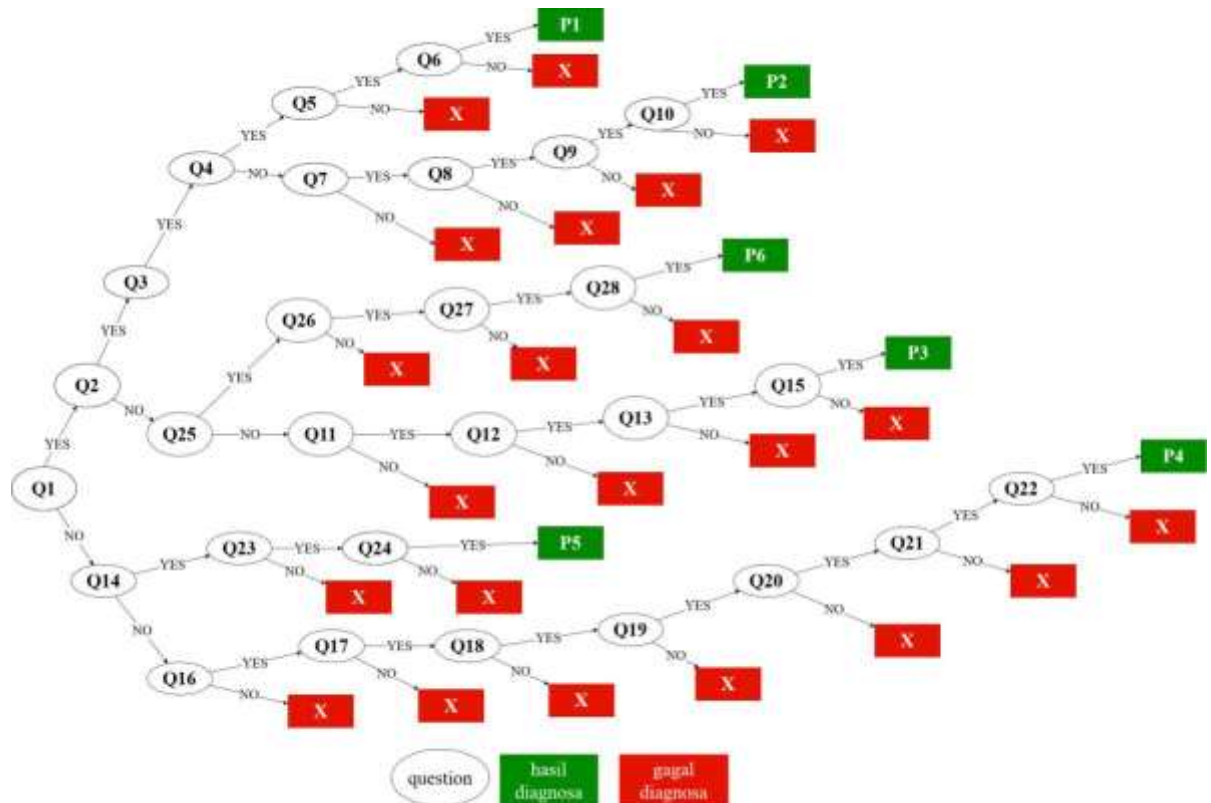
Picture description 1
P1 = worms
P2 = VIRUS PARVO (Canine Parvovirus)
P3 = Cat Flu (Feline Rhinotracheitis)
P4 = Cat Flu (Feline Calicivirus)
P5 = Eye Pain (Chlamydophila Felis)
P6 = Vomiting clumps of hair (HairBall)
Q1-Q22 = questions covering the symptoms of the disease

Usecase

The use case diagram for this Expert System shows the interaction between the user (pet owner) and the system in diagnosing cat diseases. Users can diagnose diseases by answering questions displayed by the system according to the symptoms experienced by their pet cat. Meanwhile, the system carries out the forward chaining process by tracking the answers from the user and processing predetermined decision tree rules so that it can finally conclude or make a diagnosis by displaying the results of the diagnosis to the user.
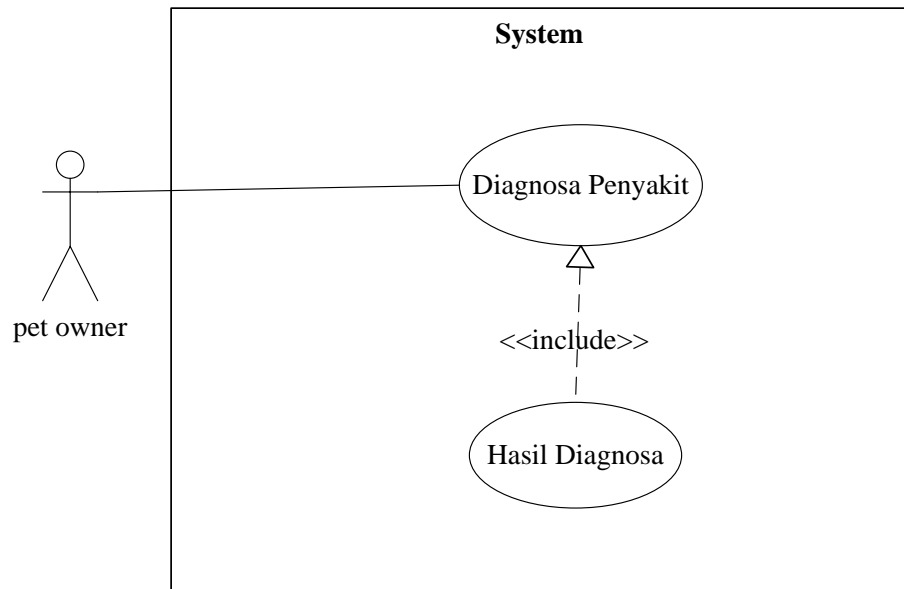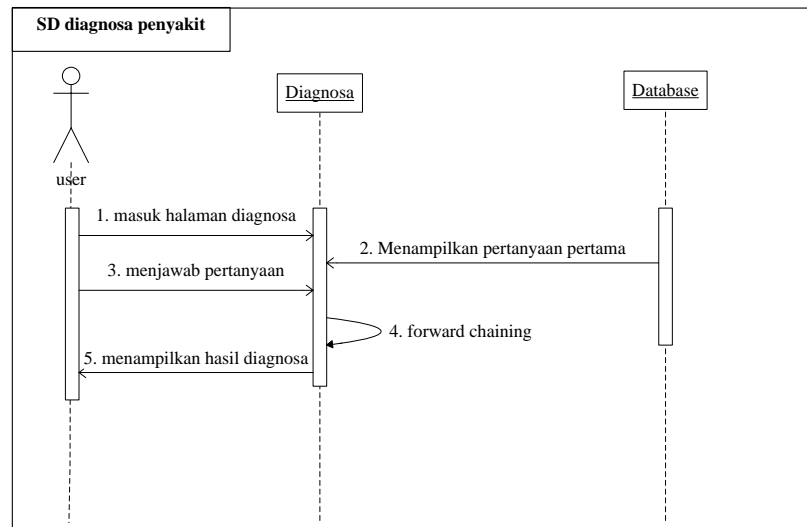
Activity Diagrams

The proposed activity diagram for each part of the proposed system will be described as follows:
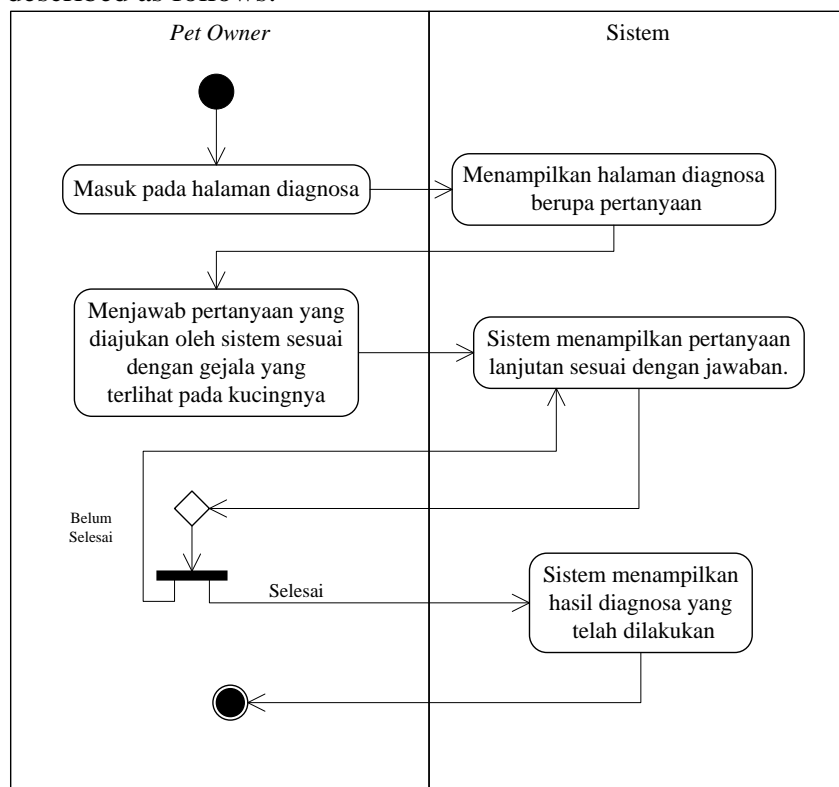
Sequence diagrams

The proposed sequence diagram as an illustration of the system stages is as follows

Class Diagrams

Class diagrams are used to display the classes in the system. By looking at the characteristics of the system and the processes that occur, class diagrams can be made as follows:
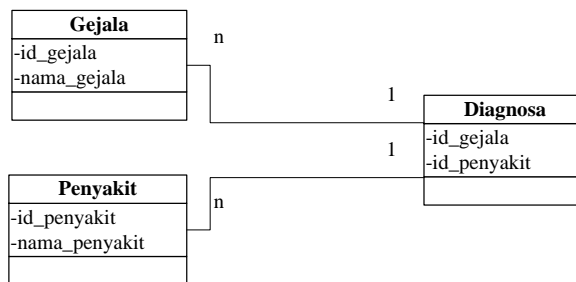
RESULTS AND DISCUSSION
System Testing

Based on the results of the tests that have been carried out, the following are some of the conclusions that have been obtained, including:

1. The system is error free and can produce the expected results.
2. This system can carry out rules or rules by displaying questions according to the decision tree.

To show whether the rules in the system are in accordance with the logic of an expert, the following are examples of cases that were resolved manually and using the developed application system.

1. Case 1: Worms

Symptoms: lethargy, weight loss, dull fur, distended stomach, vomiting food, there are worms in the feces

Manual results: Worms

Results using the system: Worms

2. Case 2 : PARVO VIRUS (Canine Parvovirus)

Symptoms: lethargy, weight loss, dull fur, decreased appetite, diarrhea, depression, dehydration

Manual results: Parvo virus

Results using the system: parvo virus
3. Case 3 : Cat Flu (Feline Rhinotracheitis)
      Symptoms: lethargy, sneezing, runny nose, anosmia, closing eyes
      Results Manual: Feline Rhinotracheitis
      Results using the system: Feline Rhinotracheitis
4. Case 4 : Cat Flu (Feline Calicivirus)
      Symptoms: difficulty walking, wounds between the claws, sores in the mouth, canker sores, flu, tightness, hoarseness
      Manual results: Feline Calicivirus
      Results using the system: Feline Calicivirus
5. Case 5 : Eye Pain (Chlamydophila Felis)
      Symptoms: eye discharge, frequent blinking, excessive blinking
      Manual results: Chlamydophila Felis
      Results using the system: Chlamydophila Felis
6. Case 6 : Vomiting hairball (HairBall)
      Symptoms: coughing, choking, vomiting empty, constipation
      Manual results: HairBall
      Results using the system: HairBall

CONCLUSION

Based on the results obtained in the research and implementation of the system that has been made, the following conclusions are obtained:
1. The system that runs in handling the initial diagnosis is still done manually.
2. This application was designed using the OOP system approach using a prototype system development method to facilitate data collection and observations made at the Royal Purple Vet Clinic.
3. Tests carried out on the expert system for diagnosing cat diseases that have been built using the black box testing method. From the results of the tests that have been carried out, it shows that this expert system has functioned properly and can display results that are as expected.
4. Implementation in this expert system focuses on diagnosing the symptoms entered by the pet owner, as well as providing knowledge or information about the initial treatment of diseases that have been diagnosed by the system.

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