



## AN EXPERT SYSTEM FOR DISEASES DIAGNOSIS IN PET

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**Abstract-** This paper presents an architectural framework of an Expert System in the area of ANIMAL HUSBANDARY and describes the design and development of the rule based expert system, The designed system is intended for the diagnosis of common diseases occurring in the animals. An Expert System is a computer program normally composed of a Knowledge base, inference engine and user-interface. The proposed expert system facilitates different components including decision support module with interactive user interfaces for diagnosis on the basis of response(s) of the user made against the queries related to particular disease symptoms. The system integrates a structured knowledge base that contains knowledge about symptoms and remedies of diseases in the animals appearing during their life span. An image database is also integrated with the system for making the decision support more interactive. The pictures related to disease symptoms are stored in the picture database and the intelligent system module prompts these with the interface based on rule based decision making algorithms. The system has been tested with domain dataset, and results given by the system have been validated with domain experts.

**Keywords-** Expert System, pet diseases, symptoms, knowledge base.

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### Introduction

Nowadays people are very conscious about their health as well as health of their pets. Pets are unable to speak, and express their problems regarding their health. Owner of the pet must have to observe the daily routine of pet and check any changes in their routine/behavior. Base on these observation owners decide, pets suffer from which disease and what treatment use for them. But most of the time owners are new and less experienced about healthcare of pet. For owner of the pet most of time it is difficult to take any action against the observation observed by him or her. User takes help of book or any other experienced pet owner. It is very time consuming and costly job.

At that time our system is useful for owner for healthcare of his/her pet. System is useful for Veterinary doctors to take the advice from this system as it is expert and knowledge based system. System is available to everyone and user check only symptoms

observed in his/her pet and disease name and treatment will easily available to him/her.

Finally, it is said that proposed web expert system can diagnose problems of individual User such diagnosing capability enables it to adapt instructions as per expert's decisions.

### Role of Expert System in Current System

An expert system is a computer system that emulates the decision-making ability of a human expert.[1]The idea behind creating an expert system is that it can enable many people to benefit from the knowledge of one person – the expert. Expert system simulates the judgment and behavior of a human that has expert knowledge and experience in a particular field. It consists of the inbuilt facilities to write the rules that build the knowledge base.

In an expert system development, knowledge base development is the most important part [2]. The quality of an expert system

depends on its knowledge base. Knowledge Base development with the help of domain specific expert in this expert system. The steps for developing knowledge base in this system are identification of the input problem, knowledge acquisition and representation of knowledge into the knowledge base. We present here a comprehensive description of each of them.

The first expert systems were created in the 1970s and then proliferated in the 1980s.[3] Expert systems were among the first truly successful forms of AI software.

As shown in fig,1 Expert system has two main blocks: expert system shell and stored knowledge base. Client interface of any expert system is acquired stored knowledge base through knowledge base editor, rule engine and rule transfer engine of system.

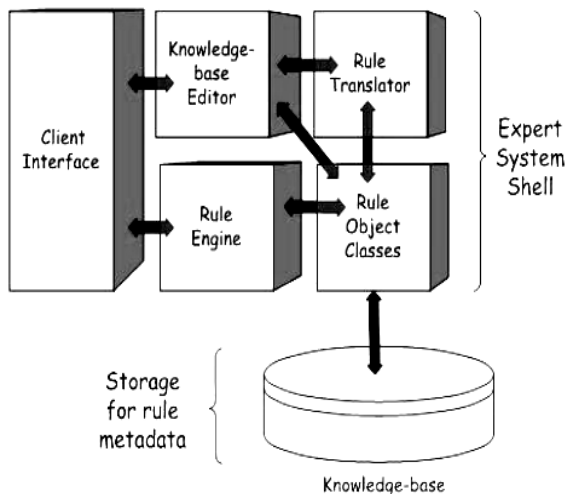


Fig. 1- Expert System Architecture

To develop an expert system, first we need to identify the problem and understand the major characteristics of the problem that we have to solve in the expert system [1]. The input problem for proposed system is regarding the diagnosis of diseases in the pet occurring during their life span. The input problem is structured for the system and the expert module recognizes as a pattern and forwards for processing for providing diagnoses and remedies if there is.

An expert system is a computer program that uses domain specific knowledge and inference techniques to simulate the problem solving behavior of a human expert of the same field [2]. The system allows the modeling of information and knowledge at higher level of abstraction to implement the human logic of problem solving. Rule based programming is one of the commonly used techniques to develop expert system and the same has been used in the present work too. The rule based expert system [8, 9] store large body of facts called declarative knowledge and rules i.e. procedural knowledge to manipulate the facts. The system is capable in using its internal knowledge and rules to formulate its own solution procedure based on problem definition. The proposed system, like the other rule-based system, has the following functional modules:

- i. Knowledge base (KB)
- ii. Inference engine
- iii. User's interface.

The interconnection and arrangement of these modules as shown in Fig. 2.

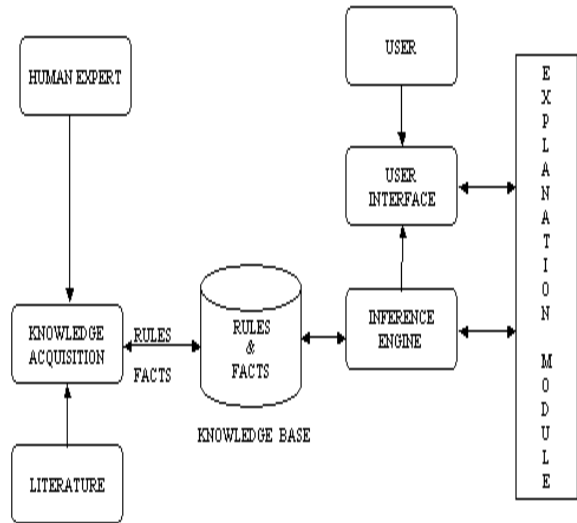


Fig. 2- Components of Expert System

The present system has been developed in the ASP.Net and database in MS-SQL environment, which works as an inference engine in backward chaining. The development process of the expert system is very systematic and can be carried out in different stages [9]. The KB of the present system consists of two modules. First module of the knowledge base for identification of symptoms and other is for recommending appropriate disease name and related treatment. Each module consists of two parts namely rule base and dynamic database. Dynamic database is common for each module.

The rule base of first module contains the self-standing statements and rules related with symptoms and identification of lacking nutrients. The second module contains facts and rules for selection of disease and treatment.

The dynamic database is used by the system during the consultation period to store the information supplied by the user and decisions reached by any of the two modules. The dynamic databases are automatically cleared when the consultation is over. The whole process of KB development has been carried out in the following way.

**A. Knowledge Acquisition**

In this phase of expert system development cycle, domain specific knowledge is transferred to the knowledge engineer. The acquisition of knowledge for the proposed system has been obtained from two sources namely human expert and by gleaning the useful knowledge from the standard references.

Efforts have been made to collect more and more heuristic knowledge to identify the symptoms.

**B. Knowledge Representation:**

The proposed system is a rule-based system and makes inferences.

Rules provide a formal way of representing recommendations, directives, or strategies [5]. Rules are expressed as IF-THEN statements, as shown below:

1. If symptoms 1. Mid-line cleft of the lip
  2. Edges of the ulcer are hard
  3. Rough tongue,
- Then disease is chronic ulcerative.

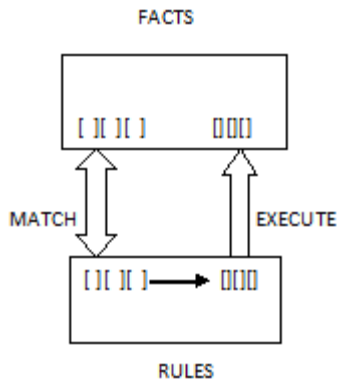


Fig. 3- Combination of Facts and Rules

The rules are in the format of If – Then statement i.e. If C then A which implies if the condition part C is evaluated to be true then the action part A should be performed. For example the deficiency symptom of cat, as represented in the knowledge base, is given below using two predicates deficiency and symptom in compliance. If symptom1, symptom2 are checked then disease name and treatment related to that disease will display on screen. Similarly, the deficiency symptoms of all other essential elements have been placed in the knowledge base.

**C. User's interface**

This module provides way for interaction between the user and the expert system .In the proposed system, query based user interface in which user select proper category of pet, then select subcategory and according to this symptoms are display. User select group of symptoms which observed in pet and treatment is displayed as a result of the query. The logical sequence of symbols has been arranged such that the system is capable in making right questions at the right moment during the consultation.

**Stages involved in construction of system**

**A. Identification**

To develop an expert system, we need to spot out the problem and understand the major characteristics of the problem, by using this we solve in the expert system very easily [2]. Identification involves problem & its scope, required resources, goal and objective.

Healthcare is serious problem among the pets because pets are unable to express their health problem.pet owner are less experienced and have no time to refer a books related to healthcare of pets. Most of the time experts are not available near pet's host. To overcome this problem, user requires a system which is based on specialist advice from health care professionals.

Our approach to this problem is to provide an intelligent expert system to be used by persons in his or her home. The system provides recommendations of suitable treatment regarding the symptoms, taking into account the advice of care givers.

The required resources can be taken from symptoms of different

pets are built by a domain expert during his or her practices. Finally this system can be used anywhere at anyplace.

**B. Conceptualization**

This involve concept, control mechanism, constraints.

Here we have used the concept of symptoms checking system. The most commonly occur symptoms are gathered in a one symptom group. User can check any one symptom group which contains symptoms observed by him/her in his/her pet. According to that symptoms and category of animal disease name, description of that particular disease and treatment required by pet is displayed.

If the pet is suffered by more than one disease and user is not satisfied by clicking on only one symptom group then system have provision to check two symptoms at a time. According to that symptoms diseases and treatment will displayed respectively.

The interconnection of the modules in the proposed system shown in following fig.4.

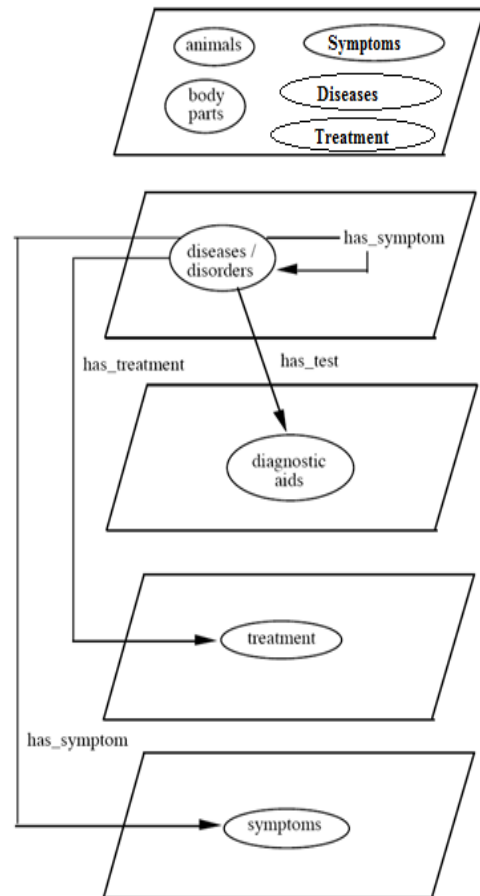


Fig. 4- Level of Modules in System

**C. Formalization**

Formalization involves knowledge representation.

In our project we have used frame based knowledge representation. Information is stored in the table format which contains animal category, symptoms list, disease name, description and treat-

ment.

Information is retrieved by using the simple expert system's 'If - then' rule. If subcategory of particular pet is selected then display the list of all symptoms of that subcategory. User selects symptoms from the symptom list and disease and treatment is display from data table.

#### D. Implementation

To be able to take these requirements into account, the system has a hybrid design in the sense that it makes use of both collaborative filtering and a content-based approach.

In the collaborative filtering the information is taken from the expertise and saves in the data bases as per the requirement. According to Knowledge from expert and the requirements of user knowledge based system is created to solve the health problems of pets like cat, dog, cow etc. In the content based approach, the contents in the data bases are retrieved as per user requirement and result in the well format displayed on screen.

The front end is designed in ASP.net and back end is designed in MS-SQL. The execution goes as follows

- Taking pet category from user
- As per the category selected new page display contains subcategory like Mouth, Skin and foot.
- As per the subcategory selection symptoms related that, are displayed with check box.
- User checks one or more check boxes according to symptoms observed in user's pet.
- On the selection of symptoms result will displayed in the form of disease description and proper treatment for that disease.

#### Conclusion

The proposed web expert system is a disease diagnosis system and menu management expert system based on the internet. The friendly user interface was considered. It also useful for new pet owner who have no experienced and have no more resources for pet healthcare. It is composed of recommended menus. As per the user's symptoms observation of his/her pet system displayed the disease and treatment for that disease.

We expect that the web expert system will contribute to healthcare counseling and expert menu planning.

#### References

- [1] Jackson Peter (1998) *Introduction to Expert Systems 3rd edition*, Addison Wesley, 2.
- [2] Shikhar Kr. Sarma, *An Expert System for diagnosis of diseases in Rice Plant*.
- [3] Leondes C.T. (2002) *Expert systems: the technology of knowledge management and decision making for the 21st century*, 1-22.
- [4] Rajkishore Prasad, *Department of Electronics*, B.R. Ambedkar Bihar University, Muzaffarpur, Bihar, India.
- [5] Donald A. Waterman, *A Guide to Expert Systems*.
- [6] N.S.R. Sastry, *Farm Animal Management and poultry Production*.
- [7] Clancy W.J. (1983) *A Framework of Explanation*, *AI*, 20, 215-225.
- [8] Durkin J. (1994) *Expert System: Design and Development*.

- [9] Weis S.M. and Kulikowasaki C.A. (1984) *A practical guide to designing expert system*.