Experiment No.: 06

Aim:- Implement any one of the following Expert system

I. Information management
II. Hospitals and medical facilities
III. Help desks management
IV. Employee performance evaluation
V. Stock market trading
VI. Airline scheduling and cargo schedules

Operating System recommended:- 64-bit Windows OS and Linux

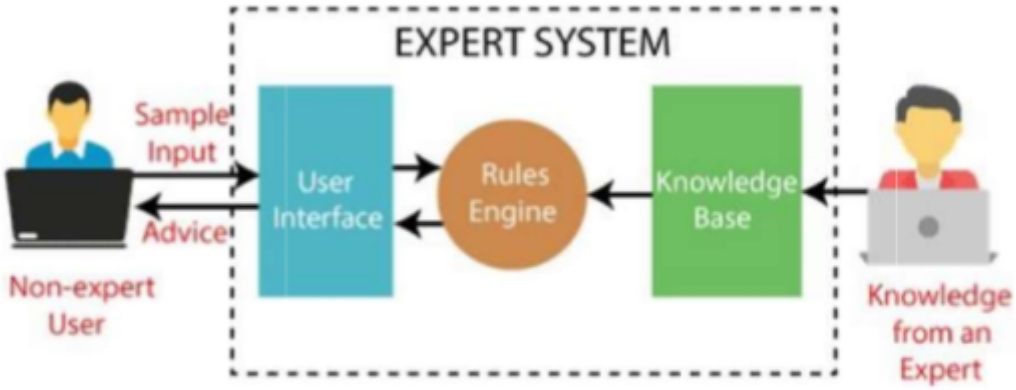
Programming tools recommended: LISP, PROLOG.

Theory:

What is an Expert System?

An expert system is a computer program that is designed to solve complex problems and to provide decision-making ability like a human expert. It performs this by extracting knowledge from its knowledge base using the reasoning and inference rules according to the user queries. The expert system is a part of AI, and the first ES was developed in the year 1970, which was the first successful approach of artificial intelligence. It solves the most complex issue as an expert by extracting the knowledge stored in its knowledge base. The system helps in decision making for complex problems using both facts and heuristics like a human expert. It is called so because it contains the expert knowledge of a specific domain and can solve any complex problem of that particular domain. These systems are designed for a specific domain, such as medicine, science, etc. The performance of an expert system is based on the expert's knowledge stored in its knowledge base. The more knowledge stored in the KB, the system improves its performance. One of the common examples of an ES is a suggestion of spelling errors while typing in the Google search box.

Below is the block diagram that represents the working of an expert system:



Below are some popular examples of the Expert System:

o DENDRAL: It was an artificial intelligence project that was made as a chemical analysis expert system. It was used in organic chemistry to detect unknown organic molecules with the help of their mass spectra and knowledge base of chemistry.

o MYCIN: It was one of the earliest backward chaining expert systems that was designed to find the bacteria causing infections like bacteraemia and meningitis. It was also used for the recommendation of antibiotics and the diagnosis of blood clotting diseases.

o PXDES: It is an expert system that is used to determine the type and level of lung cancer. To determine the disease, it takes a picture from the upper body, which looks like the shadow. This shadow identifies the type and degree of harm.

o CaDeT: The CaDet expert system is a diagnostic support system that can detect cancer at early stages.

Characteristics of Expert System:-

o High Performance: The expert system provides high performance for solving any type of complex problem of a specific domain with high efficiency and accuracy.

o Understandable: It responds in a way that can be easily understandable by the user. It can take input in human language and provides the output in the same way.

o Reliable: It is much reliable for generating an efficient and accurate output.

o Highly responsive: ES provides the result for any complex query within a very short period of time.

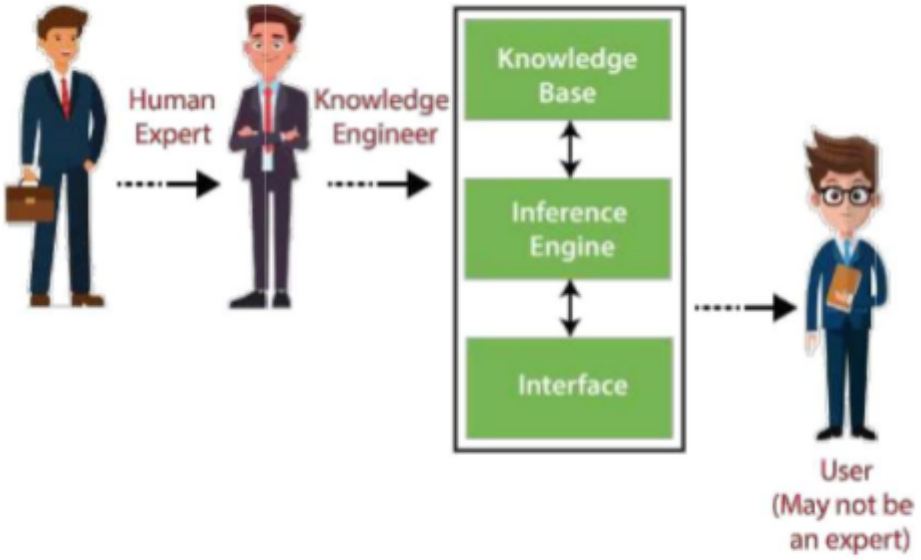
Components of Expert System:-

An expert system mainly consists of three components:-

o User Interface

o Inference Engine

o Knowledge Base



Participants in the development of Expert System:-

There are three primary participants in the building of Expert System:

1. Expert: The success of ES much depends on the knowledge provided by human experts. These experts are those persons who are specialized in that specific domain.
2. Knowledge Engineer: Knowledge engineer is the person who gathers the knowledge from the domain experts and then codifies that knowledge to the system according to the formalism.
3. End-User: This is a particular person or a group of people who may not be experts, and working on the expert system needs the solution or advice for his queries, which are complex

Advantages of Expert System:-

- These systems are highly reproducible.
- They can be used for risky places where the human presence is not safe.
- Error possibilities are less if the KB contains correct knowledge.
- The performance of these systems remains steady as it is not affected by emotions, tension or fatigue.
- They provide a very high speed to respond to a particular query.
- Limitations of Expert System
- The response of the expert system may get wrong if the knowledge base contains the wrong information.
- Like a human being, it cannot produce a creative output for different scenarios
- Its maintenance and development costs are very high.
- Knowledge acquisition for designing is much difficult.
- For each domain, we require a specific ES, which is one of the big limitations.
- It cannot learn from itself and hence requires manual updates

Applications of Expert System:

- In designing and manufacturing domain It can be broadly used for designing and manufacturing physical devices such as camera lenses and automobiles.
- In the knowledge domain These systems are primarily used for publishing the relevant knowledge to the users. The two popular ES used for this domain is an advisor and a tax advisor.
- In the finance domain and finance industries, it is used to detect any type of possible fraud, suspicious activity, and advise bankers that if they should provide loans for business or not.
- In the diagnosis and troubleshooting of devices in medical diagnosis, the ES system is used, and it was the first area where these systems were used.
- Planning and Scheduling The expert systems can also be used for planning and scheduling some particular tasks for achieving the goal of that task.

Conclusion: In this way design the expert system for real world application.