



SNS COLLEGE OF ENGINEERING

(Autonomous)

DEPARTMENT OF CSE-IoT ENGINEERING



Artificial Intelligence & Natural Language Processing

Expert system Limitations, Applications

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Expert Systems

No technology can offer easy and complete solution.

Large systems are costly, require significant development time, and computer resources. ESs have their limitations which include –

- ☐ Limitations of the technology
- ☐ Difficult knowledge acquisition
- ☐ ES are difficult to maintain
- ☐ High development costs



Applications of Expert System

Application	Description
Design Domain	Camera lens design, automobile design.
Medical Domain	Diagnosis Systems to deduce cause of disease from observed data, conduction medical operations on humans.
Monitoring Systems	Comparing data continuously with observed system or with prescribed behavior such as leakage monitoring in long petroleum pipeline.
Process Control Systems	Controlling a physical process based on monitoring.
Knowledge Domain	Finding out faults in vehicles, computers.
Finance/Commerce	Detection of possible fraud, suspicious transactions, stock market trading, Airline scheduling, cargo scheduling.



Expert System Technology

There are several levels of ES technologies available. Expert systems technologies include –

Expert System Development Environment – The ES development environment includes hardware and tools. They are –

- Workstations, minicomputers, mainframes.
- High level Symbolic Programming Languages such as **LIS**t Programming (LISP) and **PRO**grammation en **LOG**ique (PROLOG).
- Large databases.

Tools – They reduce the effort and cost involved in developing an expert system to large extent.

Powerful editors and debugging tools with multi-windows.

They provide rapid prototyping

Have Inbuilt definitions of model, knowledge representation, and inference design.



Expert System Technology

•**Shells** – A shell is nothing but an expert system without knowledge base. A shell provides the developers with knowledge acquisition, Expert system Limitations, Applications, user interface, and explanation facility. For example, few shells are given below –

- Java Expert System Shell (JESS) that provides fully developed Java API for creating an expert system.
- *Vidwan*, a shell developed at the National Centre for Software Technology, Mumbai in 1993. It enables knowledge encoding in the form of IF-THEN rules.



Development of Expert System

The process of ES development is iterative. Steps in developing the ES include –

Identify Problem Domain

- ☐ The problem must be suitable for an expert system to solve it.
- ☐ Find the experts in task domain for the ES project.
- ☐ Establish cost-effectiveness of the system.

Design the System

- ☐ Identify the ES Technology
- ☐ Know and establish the degree of integration with the other systems and databases.
- ☐ Realize how the concepts can represent the domain knowledge best.



Development of Expert System

Develop the Prototype

From Knowledge Base: The knowledge engineer works to –

- ☐ Acquire domain knowledge from the expert.
- ☐ Represent it in the form of If-THEN-ELSE rules.

Test and Refine the Prototype

- ☐ The knowledge engineer uses sample cases to test the prototype for any deficiencies in performance.
- ☐ End users test the prototypes of the ES.

Develop and Complete the ES

- ☐ Test and ensure the interaction of the ES with all elements of its environment, including end users, databases, and other information systems.
- ☐ Document the ES project well.
- ☐ Train the user to use ES.

Maintain the System

- ☐ Keep the knowledge base up-to-date by regular review and update.
- ☐ Cater for new interfaces with other information systems, as those systems evolve.



Benefits of Expert System

- ❑ **Availability** – They are easily available due to mass production of software.
- ❑ **Less Production Cost** – Production cost is reasonable. This makes them affordable.
- ❑ **Speed** – They offer great speed. They reduce the amount of work an individual puts in.
- ❑ **Less Error Rate** – Error rate is low as compared to human errors.
- ❑ **Reducing Risk** – They can work in the environment dangerous to humans.
- ❑ **Steady response** – They work steadily without getting emotional, tensed or fatigued.



Thank
you