

Expert Systems

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Learning Objective

- Understand expert system as a fundamental concept in unlocking the power Artificial Intelligence (AI)



What is an Expert System?



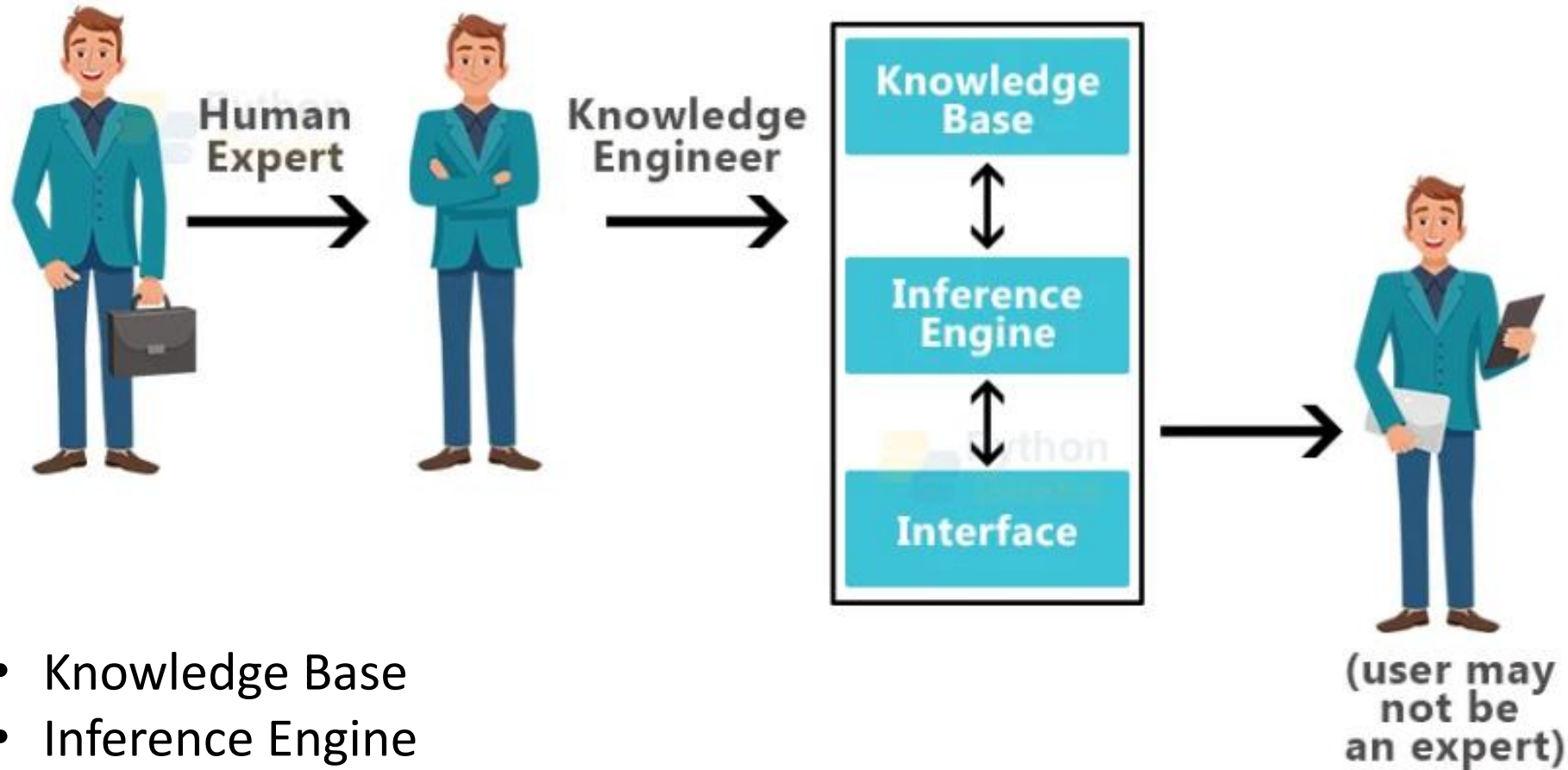
- **Definition**

An expert system is a computer program that is designed to solve complex problems and to provide decision-making ability like a human expert.

- **Brief history and evolution**

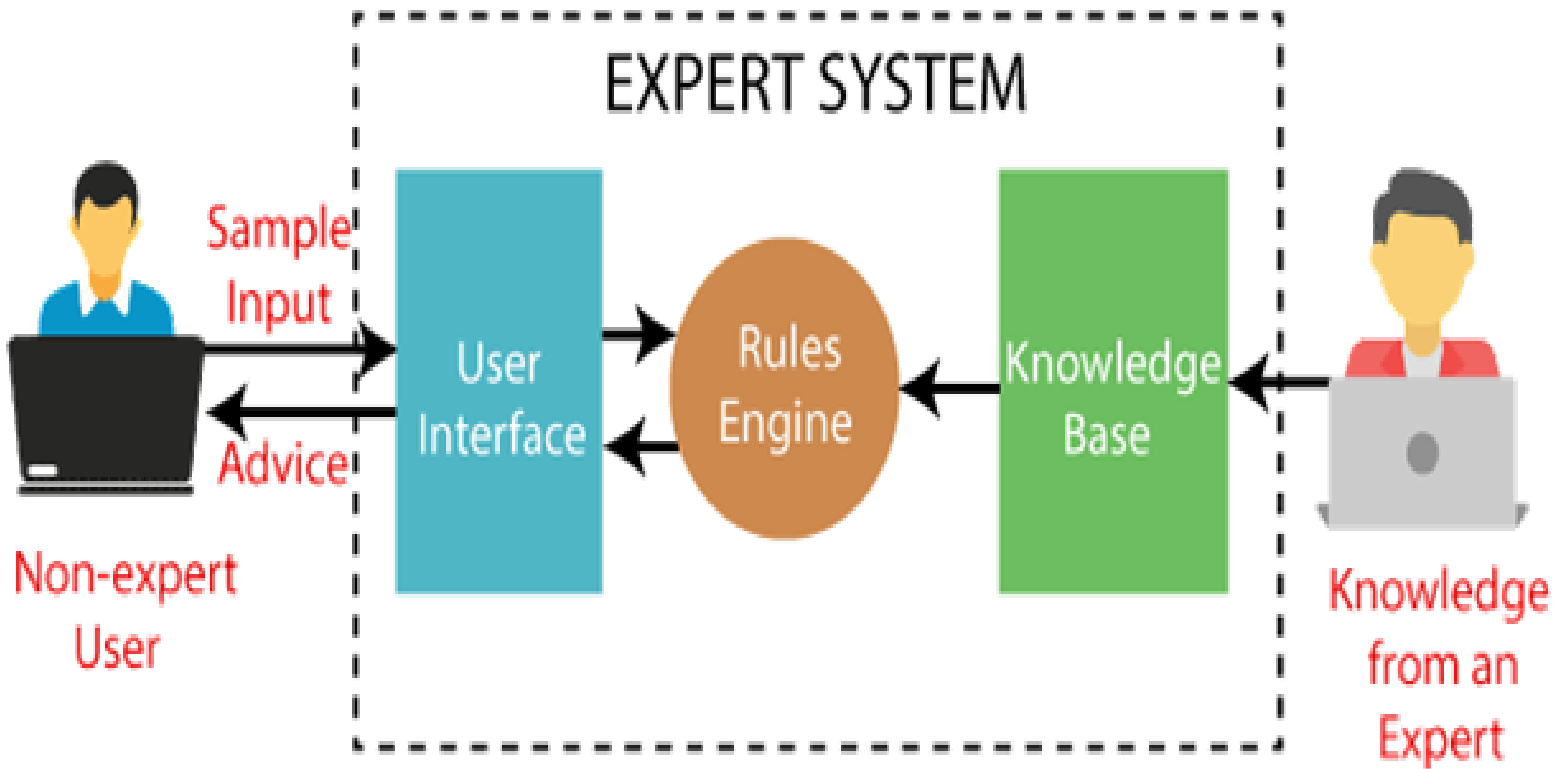
The evolution of expert systems began in the 1950s with early AI research, leading to symbolic AI in the 1960s. The birth of expert systems came in the 1970s with pioneering applications like Dendral and MYCIN. The 1980s saw rule-based systems and knowledge engineering techniques. Amidst an AI winter in the 1990s, a resurgence occurred in the 2000s, integrating expert systems with other technologies. The 2010s witnessed hybrid systems and cloud-based solutions, addressing challenges like ethics and transparency. In the 2020s, focus shifted to explainable AI and continuous learning. The future promises expanded applications and responsible human-AI collaboration.

Component of Expert Systems



Source: Python Geeks

Block diagram to represent expert system





Examples of Expert System

Dendral

Mycin

PXDES

CaDet

Why Expert System?

High Efficiency

No Emotion

Expertise in Doman

No Memory Restriction

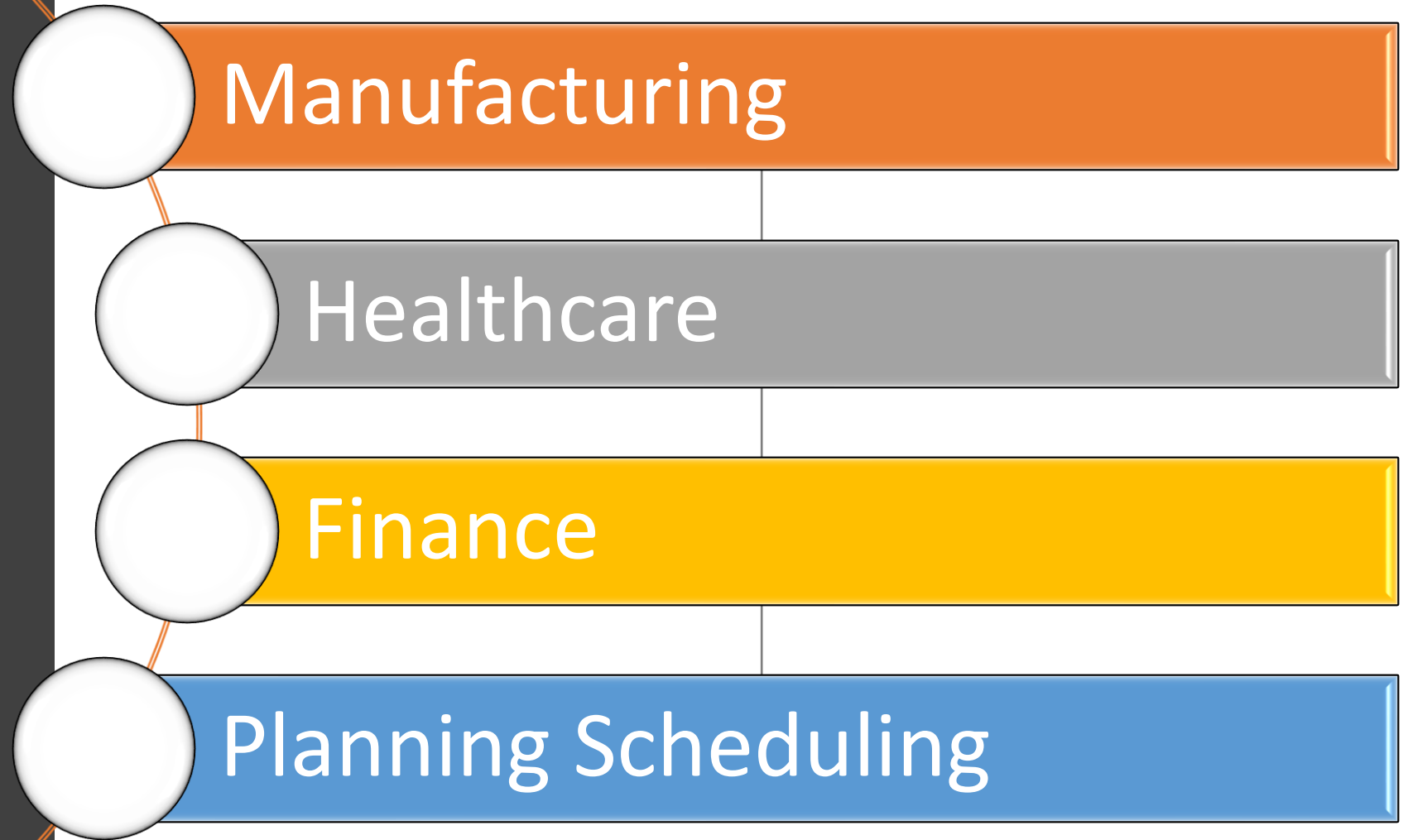
Regular updates for improved productivity

High Security

Consideration of Facts



Application
of
Expert
Systems



Capabilities of the expert system



Advising

Decision-making abilities

Problem-solving

Result Prediction

Diagnosis

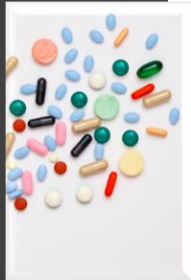
Advantages of Expert System



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.

Limitation of Expert System



The response of the expert system may get wrong if the knowledge base contains the wrong information.



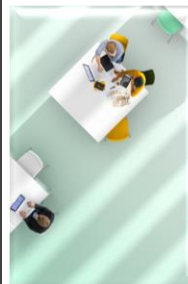
Like a human being, it cannot produce a creative output for different scenarios.



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.