

- In 1990s AI emerged as a science. In terms of methodology AI has finally come firmly under the scientific method. **In recent years approaches based on Hidden Markov Models (HMMS) have come to dominate the AI field. This model is based on two aspects one is rigorous mathematical model theory and second is, these models are generated by a process of training on a large corpus real speech data.**
- **Judea Pearl's (1988) Probabilistic Reasoning in Intelligent Systems led to a new acceptance of probability theory in AI.** Later Bayesian network was invented which can represent uncertain knowledge along with reasoning support.
- Judea Pearl, Eric Hovitz and David Hackerman in 1986 promoted the idea of normative expert systems that can act rationally according to the laws of decision theory.
- Similar but slow revolution have occurred in robotics, computer vision and knowledge representation.
- **In 1987 a complete agent architecture called SOAR was work out by Allan Newell, John Laired and Paul Rosenbloom.** Many such agents were developed to work in big environment "Internet". **AI systems have become so common in web based applications that the "- bot" suffix has entered in everyday language.**
- AI technologies underlie many Internet tools, such as search engines, recommender systems and website.
- While developing complete agents it was realized that previously isolated subfields of AI need to reorganize when their results are to be tied together.
- **Today, in particular it is widely appreciated that sensory systems (vision, sonar, speech-recogonition, etc.) cannot deliver perfectly reliable information about the environment. Hence reasoning and planning systems must be able to handle uncertainty.** AI has been draw in to much closer contact with other fields such as control theory and economics, that also deal with agents.

## **1.8 AI Terms**

### **1.8.1 Agents and it's Environment**

- An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators.
- For example consider human as agent. Human has eyes, ears and other organs which are sensors. Hands, legs, mouth and other body part work as actuators.
- Lets consider another example of agent - Robot. A Robotic agent might have cameras, infrared rangefinders as sensors. Robot can have various motors for actuators.

**More examples of agent**

1. Agent : Software agent  
Sensors : Keystrokes, file contents and network packets.  
Actuator : Screen, writing files, network packet.
2. Agent : Internet shopping agent  
Sensors : HTML, DHTML, pages (text graphics script)  
Actuators : Forms, display to user, follow URL.

**1.8.2 The AI Terminology****1) Percept**

The term percept refers to the agent's perceptual inputs at any given instant.

Examples -

- 1) A human agent perceives "Bird flying in the sky "through eyes and takes its snap (photograph)".
- 2) A robotic agent perceives "Temperature of a boiler" through cameras and takes the control action.

**2) Percept Sequence**

An agent's percept sequence is the complete history of everything the agent has ever perceived. Agent has choice of action at any given instant and it can depend on the entire percept sequence agent has recorded. The change in the perception forms a historical case.

For example -

A robotic agent monitoring temperature of a boiler will be sensing it continuously and keep on maintaining the percept sequence. This percept sequence will help robotic agent to know how temperature fluctuates and action will be taken depending on percept sequence for controlling temperature.

**3) Agent Function**

It is defined as mathematical function which maps each and every possible percept sequence to a possible action.

This function has input as percept sequence and it gives output as action.

Agent function can be represented in a tabular form.

Example -

ATM machine is a agent, it display menu for withdrawing money, when ATM card is inserted. When provided with percept sequence (1) A transaction type and (2) PIN number, then only user **gets cash**.