ARTIFICIAL INTELLIGENCE CO 304

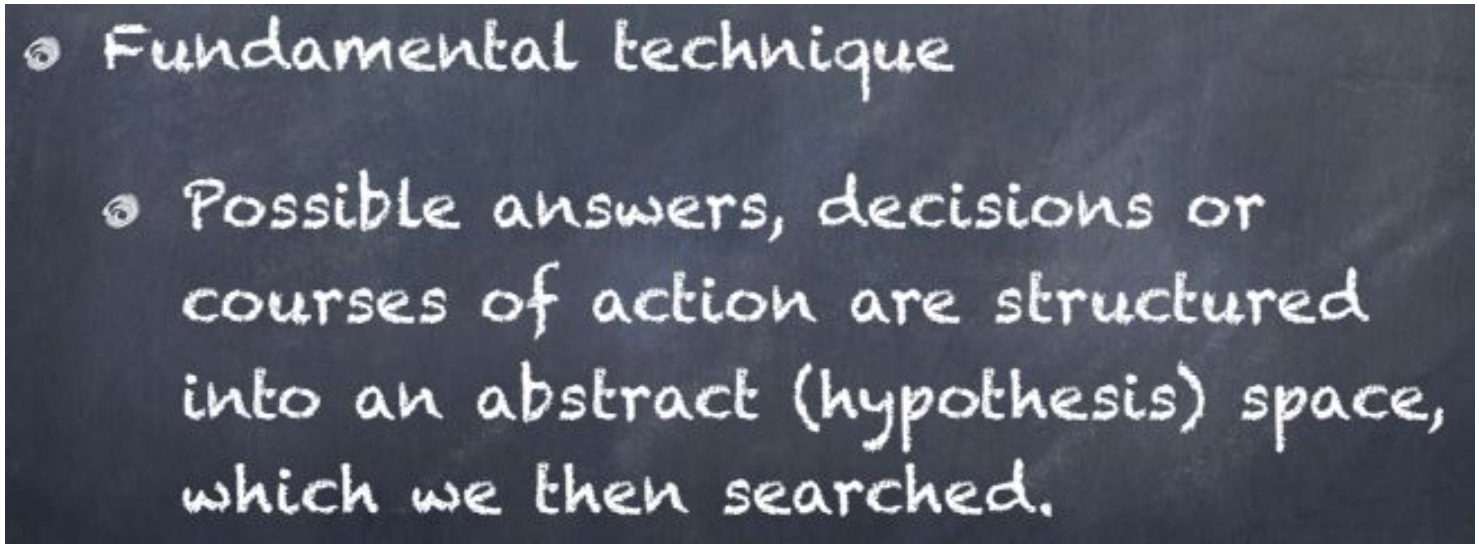
Even Semester 2021-22
Delhi Technological University

Applications of AI

- Problem Solving
- Search and Control strategies
- Speech Recognition
- Natural Language Processing
- Computer Vision
- Expert Systems

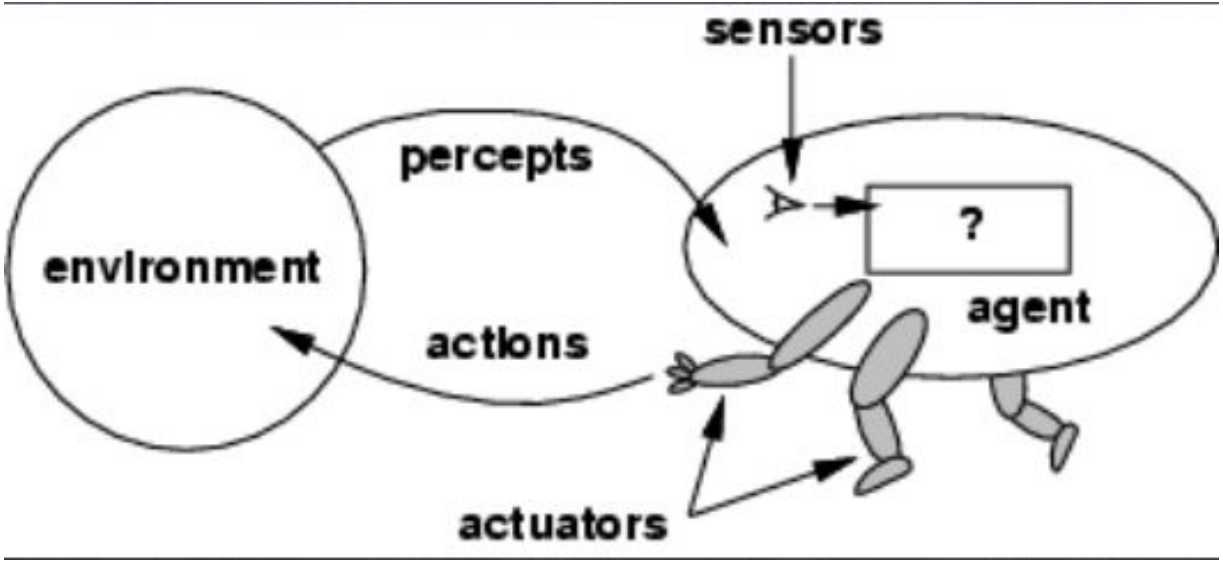
AI Techniques

- **Search**
- **Knowledge**
- **Abstraction**



Intelligent Agent

- An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators.



Types of Intelligent Agent

- **Human Agent:** Eyes, Ears and other organs for sensors; hands, legs, mouth and other body parts for actuators.

- **Robotic Agent:** Cameras and Infrared range finders for sensors; various motors for actuators

Rational Agents

An agent should strive to “do the right thing”, based on what it can perceive and the actions it can perform. The right action is the one that will cause the agent to be most successful.

Performance Measure: An object criterion for success of an agent’s behavior.

E.g. performance measure of a vacuum cleaner agent could be amount of dirt cleaned up, amount of time taken, amount of electricity consumed, amount of noise generated etc.

Rational Agents (contd..)

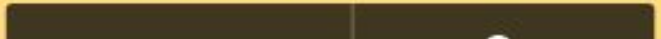
For each possible percept sequence, **a rational agent** should select an action that is expected to maximize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.

Autonomous Agent

- A system is autonomous to the extent that its own behavior is determined by its own experience.
- Therefore, a system is not autonomous if it is guided by its designer according to a priori decisions.
- To survive, agents must have:
  - Enough built-in knowledge to survive
  - The ability to learn

PEAS

- PEAS:
  - Performance Measures
    - used to evaluate how well an agent solves the task at hand
  - Environment
    - surroundings beyond the control of the agent
  - Actuators
    - determine the actions the agent can perform
  - Sensors
    - provide information about the current state of the environment

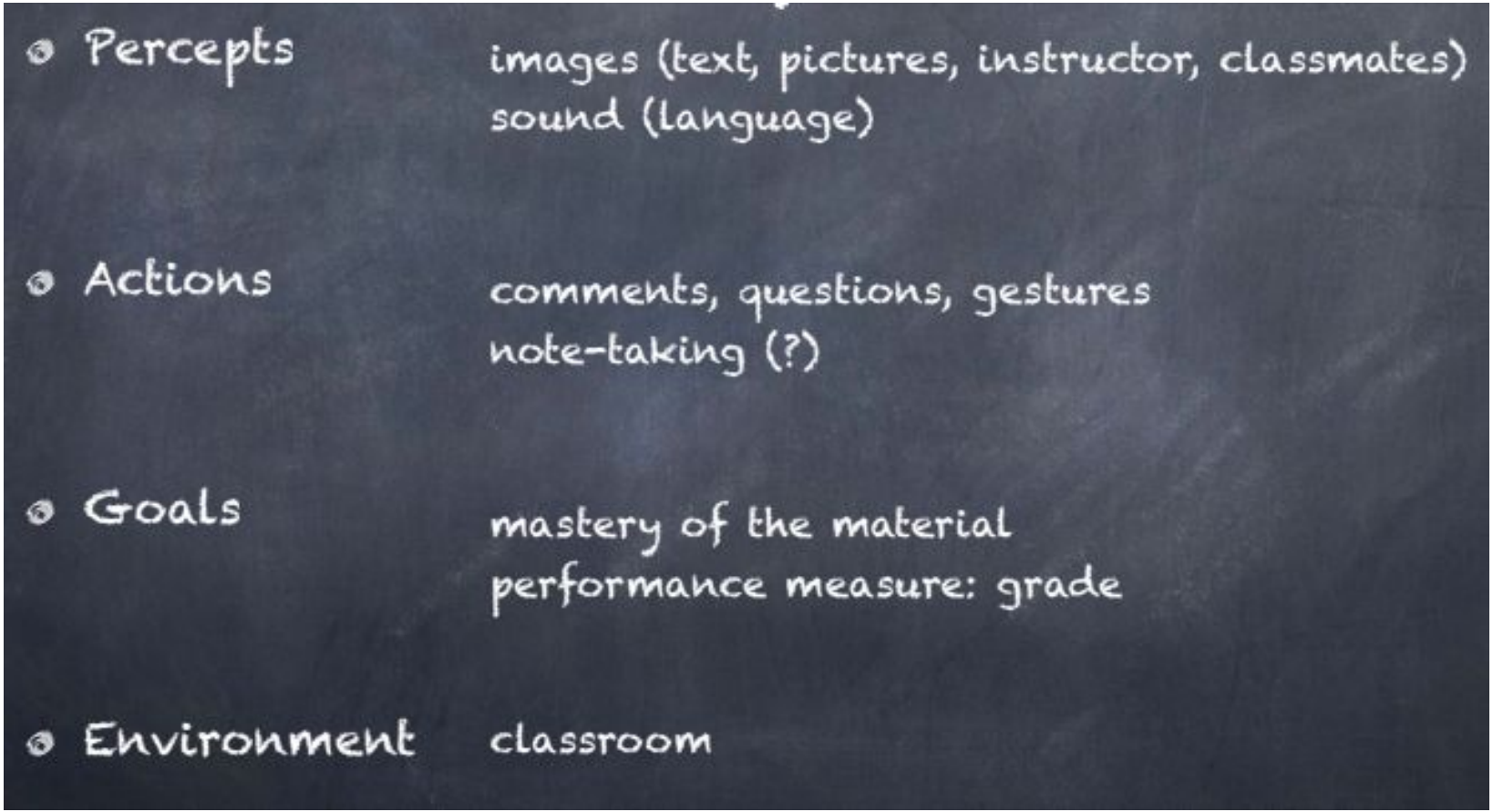


PAGE

- PAGE:
  - Percepts
    - information acquired through the agent's sensory system
  - Actions
    - operations performed by the agent on the environment through its actuators
  - Goals
    - desired outcome of the task with a measurable performance
  - Environment
    - surroundings beyond the control of the agent

StudentBot PEAS Description

StudentBot PAGE Description



Example: Automatic Taxi Driving System

Percepts: Video, sonar, speedometer, odometer, engine sensors, keyboard input, microphone, GPS, ...

Actions: Steer, accelerate, brake, horn, speak/display, ...

Goals: Maintain safety, reach destination, maximize profits (fuel, tire wear), obey laws, provide passenger comfort, ...

Environment: U.S. urban streets, freeways, traffic, pedestrians, weather, customers, ...

Different aspects of driving may require different types of agent programs!