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Artificial Intelligence:

How humans understand/think perceive, understand, predict and manipulate.

The art of creating the machines which attempts to understand but also to built intelligent entities is Artificial Intelligence. AI is relevant to intellectual task. Rational system does right thing given what it knows, The thought processes and reasoning and behavior.

1. Acting Humanly: The turing test approach.
The art of creating machines that perform functions that require intelligence when performed by people.
The study of how to make computers do right things at which at the moment people are better.
Eg: Turing Machine, Wright brother proposed Aeroplane
- Capabilities.
  - Natural language processing - to communicate
  - Knowledge representation - to store what it knows or hears.
  - Automated reasoning - to use stored information to answer questions & to draw conclusion.
  - Machine learning - to detect patterns & to adopt to new circumstances

To pass total Turing test computer will need
- Computer vision: to perceive objects.
- Robotics: to manipulate objects & move.

2. Thinking humanly: The cognetive modeling approach.
- The exciting new effort to make machines / computers think (machine with minds) in the full & literal sense.
- Automation of activities associated with human thinking such as decision making, Problem solving, learning.
- To study how human brain works.
  - Through introspection - trying to catch our own thoughts as they go by.

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→ through psychological experiments - observing a person in action.
→ through brain imaging - observing the brain in action.
• Programs I/O behaviors matches corresponding human behaviorss, programs mechanisms could be operating in humans. Eg GPS - General problem solve (GPS).
They were concerned with comparing the trace of GPS reasoning steps to traces of human subjects solving problem(same) which is called cognitive science model.

3. Thinking Rationally : The laws of thought approach, The study of mental faculities through the use of computational models
→ The study of computation that make it possible to perceive reason & act.
→ Great philosopher Aristotle's syllogism provided patterns for argument structures that always yielded correct conclusion given correct premises.
→ This study initiated the field - logic.
→ The logicist tradition within AI hopes to build problems that can solve any problem described in logical notation to create intelligent systems.
→ 2 obstacles
• It is not easy to take informal knowledge & state it in formal terms required by logical notation (when knowledge is 100% certain)
• There is a big difference b/w solving a problem in principle & solving it in practice.

4. Acting Rationally : The rational agent approach.
→ An agent is something that acts
• computational intelligence is the study of design of intelligent agents.
• AI is concerned with intelligent behavior in artifacts.
• A computer agent is expected to operate autonomously Perceive their environment persist over a prolonged time period, adopt to change pursue goals.
• A rational agent is one that acts so as to achieve the best outcome or where there is uncertainity, the best expected outcome.
→ way to act rational - reason logically to the conclusion that a given action will achieve one's goals & then to act on

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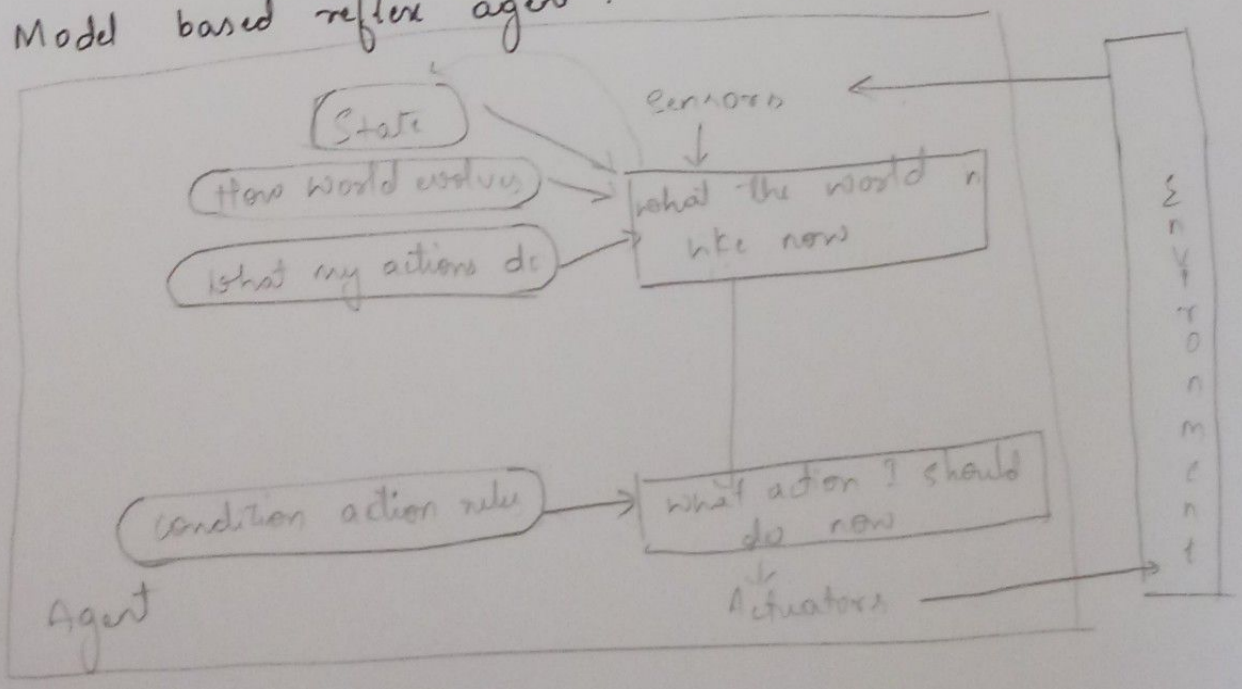
act on that conclusion, whereas the laws of thought approach emphasis was on correct inferences - it is not all of rationality :i.e in some cases there is no provably correct thing to do, but something must still be done.

- 2 advantages
  - more general approach than the laws of thought hence correct inference is just one of several possible mechanism for achieving rationality
  - more ammendable to scientific development than the approaches based on human behavior or thought.

2. PEAS for an automated taxies.

→ Agent type - Taxi driver.
→ Performance measure : Safe, fast, legal, maximum profit comfortable trip, minimize fuel consumption.
→ Environment : Roads, traffic, pedestrains and customers, stray animals, road works, puddles & potholes.
→ Actuators : steering, brake, signal, accelerator, horn
→ Sensors : Sonar, speedometers, camera, GPS, odometer accelerometer, keyboard, engine sensors.

3. Model based reflex agent.



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Keep track of part of the world it can't see now should be observed by agent. Agent should maintain some sort of internal state that depends on the percept history & hence reflects at least some of the unobserved aspect of the current state. Updating internal state information as time goes requires 2 kinds of knowledge to be encoded in the agent program. → we need some information about how the world evolves independly of agent, eg an overtaking car generaly will be closer behind than it was a moment ago. Second, we need some information about how the agent's own action affects the world. eg when the agent turns the steering wheel clockwise the car turns to right, after driving for 5 minutes northbound on the freeway one is usually about five miles north of where one was 5 minutes ago. This knowledge about 'how the world work' - whether implemented in simple Boolean circuits or in complete scientific theories is called model of world. An agent that use such model is called model based agent.