15/10/21

Artificial intelligence

It is a technique of getting machines to works and behave like humans.
it is a science and engineering of making intelligent machines.
it is the theory and development of computer system so as to be able to perform tasks that normally require human intelligent such as visual perception, decision making and translation between languages.

* Computer would need to possess the following capabilities:

1. Natural language processing - to enable it to communicate successfuly in english.
2. Knowledge Representation - to store information provided before or during the interrogation.
3. Automated Reasoning - to use the stored info to answer questions and to draw new conclusions.
4. Machine learning - to adapt to new circumstance and to detect and extrapolate patterns.

Application Areas OF AI

1. Google Search engine
2. Healthcare
3. Social media eg Facebook, instagram, twitter
4. Self-driving cars
5. Netflix

Programming language For AI

1. R
2. LISP
3. Python
4. Java
5. PROLOG
6. MATLAB

three stages of AI

1. Artificial narrow intelligence also known as weak AI - because it has no genuine intelligence it involves applying AI to specific task e.g Google Search engine, self driving etc.
2. Artificial General Intelligence also known as strong AI - it involves machine that possess ability to perform any intellectual task that an human being can perform.

labelled dataset means, for each data set given, an answer or solution to it is given as well.

Machine learning

Machine learning is the science of getting computers to act without being explicitly programmed.

Machine learning techniques are used to train a model.

types/three subcategories of Machine learning

- Supervised
- Unsupervised
- Reinforcement

Supervised

Supervised machine learning models are trained with labelled data sets, which allows the models to learn and grow more accurate over time. it expose the model to a lot of training.

Unsupervised

In unsupervised machine learning, a program looks for patterns in unlabeled data. unsupervised machine learning can find patterns or trends that people aren't explicitly looking for.

Reinforcement

Reinforcement machine learning trains machines through trial and error to take the best action by estabi-

ishing a reward system.
it can train models to play games or train autonomous vehicles to drive.

Application of machine learning
- Recommendation algorithms
- image analysis and object detection
- fraud detection
- Automatic helplines or chatbots
- Self driving cars
- medical imaging and diagnostics.

Ass 3 two scenario that serves as examples of supervise, unsupervised and Reinforcement learning.

Supervise
1. House prices
You can use regression to predict the house price from training data. The input variables will be locality, size of a house, etc.
2. Who are the unhappy customer
unsupervise

Types of problem
single state contingency
multiple state exploration

problem consists of four parts
- initial state
- set of operators
- goal test
- path cost

Problem-solving

kind of goal-based agent called a problem-solving agent.

Problem-solving agents decide what to do by finding sequences of actions that lead to desirable states.

Goal formulation is the first step in problem solving.

Problem-formulation is the process of deciding what actions and states to consider, and follows goal formulation.

types of problems

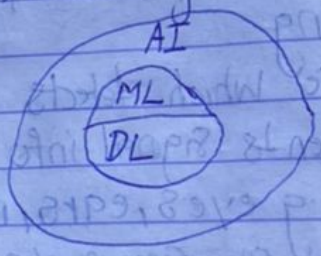
1. single state problems
2. multiple state problems
3. contingency problems
4. exploration problems

chapter 2 of part 1 intelligent agent

how AI evolves
Brief history of AI - page 16 & 30
Summary pg 51.5

3. Artificial super intelligence - This is a term refering to the time when the capability of computer will surpass that of human being.

* AI is a super set of machine learning and machine learning is a super set of deep learning



The evolution of AI started in 1940. its first attempt was in 1920.
- automate products
- Building intelligence into them

HISTORY. 1940-1950 the knowledge of the basic physiology and functions of reasons in the brain.
Revolution of AI occured in robotics, computer vision, machine learning (including neural networks) and knowledge representation.
AIs are generated from enormous features (
Turning Test (first to confirm AI)
John Mcharty was the father of AI

- Omniscience:
We need to be careful to distinguish between rationality and omniscience.
An omniscient agent knows the actual outcome of its actions, and can act accordingly; but omniscience is impossible in reality.

* In summary, what is rational at any given time depends on four things:
1. The performance measure that defines degree of success.
2. Percept sequence (Everything the agent has perceived so far)
3. What the agent's knows about the environment
4. The actions that the agent can perform.

- Ideal rational agent
An ideal rational agent is the one, which is capable of doing expected actions to maximize its performance measure, on the basis of
* its percept sequence
* its built-in knowledge base.

Autonomy
There is one more thing to deal with in the definition of an ideal rational agent: the "built-in knowl

$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

2·1 2·3 2·4
13-18
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Intelligent agents: is an autonomous entity which act upon an environment using sensors and actuators for achieving goals.
e.g thermostat, Siri

Rules of AI agent

Rule 1: An AI agent must have the ability to perceive the environment.
Rule 2: The observation must be used to make decision.
Rule 3: Decision should result in an action.
Rule 4: The action taken by an AI agent must be rational.

~~Rational agents~~

How agents Should act

- Rational agent: is one that does the right thing. The right action is the one that will cause the agent to be successful.

We use the term performance measure to determine how succesful an agent is.

Performance measure
- time
- energy
- amount of noise generated

performance measure of an agent that is supposed to vacuum a dirty floor

When and how of evaluating performance

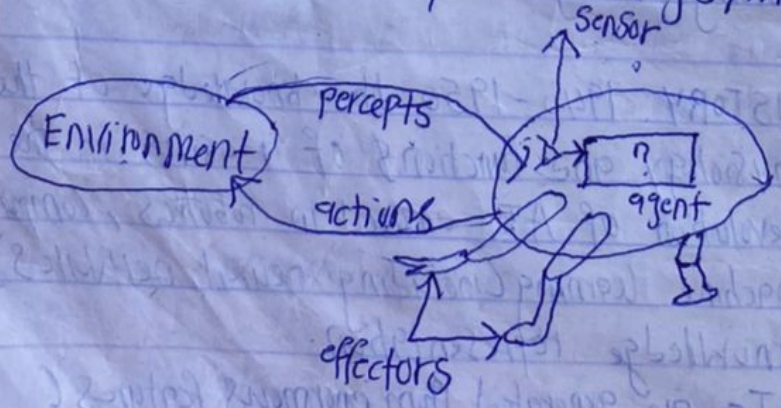
Intelligent Agents

An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors. A human agents has eyes, ears, and other organs for sensor. An agent runs in the cycle of percieving, thinking, and acting.

Sensor - a device which detects change in its environment and sends signal info to other electronic devices e.g eyes, ears, nose

Actuators - They are components of the machine that converts energy into motion. e.g hand, leg and mouth.

Effectors - These are devices that effects the environment. They can be legs, hand etc.



A generic Agent

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Four types of agent program

1. Simple reflex agent - These agents ~~takes decisions~~ choose actions only based on the current percepts.
2. Agents that keep track of the World - They use a table lookup model of the World to choose their actions. They maintain an internal state.
3. Goal-based agents - They choose their actions in order to achieve goals.
4. Utility-based agents - These agents are similar to goal-based agent, they act based on goals also but choose the best way to achieve the goal.

Properties of environment

- Accessible vs. inaccessible
- Deterministic vs nondeterministic
- Episodic vs nonepisodic
- Static vs dynamic
- Discrete vs continuous

percepts: An agent is said to be autonomous if its pay attention to its percepts.

ledge part. If the agent's action are based completely on built-in knowledge, such that it need pay no attention to its percept, then we say the agent lacks autonomy.
e.g clock

Structure of AI

The structure of an AI agent comprise of the architecture and agent program.

agent = architecture + Program

1. architecture - the machinery that an agent executes on
2. agent program - an implementation of an agent function.

Examples of agent types and their PAGE descriptions

P- Percepts A - Actions G - Goals E - Environment	Agent type	Percepts	Actions	Goals	Environment
	medical Diag system	symptoms, findings, patient answer	questions, tests, treatments	healthy patient, minimize costs	patient, hospital
	interactive english tutor	typed words	print exercises, suggestions, corrections	maximize student's score on text	set of students
	~~taxi driver~~ Taxi driver	cameras, GPS, sonar, microphone, speedometer	steer, accelerate, brake, talks to passenger	safe, fast, legal, maximize profits	Roads, other traffic, pedestrians
	Satelite image analysis system	Pixel of varying intensity, color	Print a categorization of scene	correct categorization	images from orbiting satellite