

Spring Semester 2021

Teacher: Mr. Rohban

1TH GRADE

Intelligent agents

Notes

What is AI?

- The science of making machines that:
 - A. Think like people
 - B. Act like people
 - C. Think rationally
 - D. Act rationally
- Being rational means **maximizing** your **exempted utility**.
- In this course we will talk about acting rationally.

What can AI do nowadays?

- ✓ Play a decent game of table tennis
- ✓ Play a decent game of jeopardy
- ✓ Drive safely along a curving mountain road
- ✓ Buy a week's worth of groceries on the web
- ✓ Perform a surgical operation
- ✓ Put away the dishes and fold the laundry
- ? Drive safely along telegraph avenue
- ? Discover and prove a new mathematical theorem
- ? Perform a surgical operation
- ! Buy a week's worth of groceries at berkeley bowl
- ! Converse successfully with another person for an hour
- ! Write an intentionally funny story

Rational Agent

- An agent is an entity that **perceives** and **acts** or it is a function from percept histories to actions ($f: P^* \rightarrow A$)
- For any given class of environments and tasks, we seek the agent with the best performance

Now we have to know what is rationality and what is not!

- A rational agent chooses whichever action maximizes the **expected value** of the performance measure given the **percept sequence to date**
- Rational precepts may not supply all relevant informations(≠omniscient)
- Rational action outcomes may not be as expected(≠clairvoyant)

Hence, rational \Rightarrow exploration, learning, and autonomy(≠successful)

Modeling the world

We know task environment as PEAS

- Performance measure(sometimes with constraints)(Utility function)
- Environment
 - Fully observable or partially observable(do you have all the environment datas and can you update all of your datas at a sec or not!)
 - Single agent or multiagent(are there other agents or not!)
 - Deterministic or stochastic(can you predict all things or not!)
 - Episodic or sequential (it mean do your actions have any affect on your next actions or they are independent)
 - Discrete or continuous (we show precepts discrete or continuous)
- Actuators(the actions that agent can do)
- Sensors(sensors or inputs your agent has)

Types of agents

- **Reflex agents:**
 - Choose actions based on past datas
 - Choose actions based on **current percept**
 - Do not consider the future consequences of their actions

Hence \rightarrow Act on how the world is

This agent is not good on some worlds(like chess that you need to predict your opponent actions)

- **Goal-based Agents:**

- Plan ahead
- Ask “what if”(try to think about future and make better decisions)
- Decisions based on consequences of actions (in sequential environments the goal-based agents are better because we need to think about future and make good decisions)
- Uses a model of how the world evolves in response to actions

Hence → Act on how the world **would be**

- **A kind of Goal-based Agents are Utility-based Agents**

- Trade off multiple goals (try to maximize the utility function)
- Reason about probabilities of outcomes

Hence → Act on how the world **likely be**



