Homework 1

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1. Define in your own words:

    - **intelligence**: the ability to acquire and analyze information from the environment, infer a certain, appropriate action, and execute that action reasonably.
    - **artificial intelligence**: much like **intelligence**, but exercising those traits using a mechanical or electronic process.
    - **agent**: an agent is the entity possessing the traits above described as intelligent; artificial or otherwise. That is to say the agent is both the entity and the traits.
    - **logical reasoning**: ensuring that new configurations represent aspects of the world that actually follow from the aspects of old configurations

2. Read Turing's original paper on AI (Turing, 1950). In the paper, he discusses several objections to his proposed enterprise and his test for intelligence. **Which objections still carry weight? Are his refutations valid? Can you think of new objections arising from developments since he wrote the paper?** In the paper, he predicts that, by the year 2000, a computer will have a 30% chance of passing a five-minute Turing Test with an unskilled interrogator. **What chance do you think a computer would have today? In another 50 years?**

    I would say the only objections that *may* hold weight are Lady Lovelace's, the continuity of the nervous system, and the informality of behavior. It seems these particular objections remain relevant

because they are either still true or they keep relativity in mind. As mentioned in the text, Lovelace wasn't convinced that the technology of her time could do anything new. It can be expressed more generally that with X current technology, computers probably can do action Y; this might always be true. As for the nervous system and informality of behavior, our minds and the process by which they work is still very unexplored scientifically. We still have yet to create a system that has these properties. We might have Watson that can win on Jeopardy, but we also have (or had) a nazi twitter account that didn't have the rule of conduct most humans share.

Turing's refutations seem to be centered around logic and the idea that it's not about asking if computers can think the same way as humans. That's what the Turing Test is for; given that a machine can pass X Turing Test, it has the ability to perform a subset of actions Y.

If I were to have one objection as to if machines can think, I would object that even if machines could form new thoughts and be aware of them, it would be fundamentally different from how we have defined thought.

According to "the University's School of Systems Engineering in partnership with RoboLaw, an EU-funded organisation examining the regulation of emerging robotic technologies...Eugene [Goostman] managed to convince 33% of the human judges (30 judges took part) that it [a simulated 13-year-old boy] was human". With that I'd say we've already reached that milestone and that 30% probability will be a lot higher in the next 50 years.

citation: http://www.reading.ac.uk/news-and-

events/releases/PR583836.aspx

3. For each of the following activities, give a PEAS description of the task environment and characterize it in terms of the properties listed in Section 2.3.2

   Playing soccer:

   P: score, sportsmanship, timeouts, fouls

   E: school, park, backyard, generally a field

   A: legs, feet, torso, head, hands (goalie)

   S: eye sight, physical action between players

   Exploring the subsurface oceans of Titan:

   P: efficiency, distant, error in flight

   E: space, Saturn system, zero/low/different-gravity

   A: thrusters (directional, rotational)

   S: feedback video, radio scanning of surrounding, temperature gauges

   Shopping for used AI books on the Internet:

   P: price, savings, quality, year, version

   E: online, bookstore

   A: screen,

   S: keyboard/mouse

Playing a tennis match:

P: score, fatigue, sportsmanship

E: tennis court, home (practice), school

A: racket, feet

S: eyes, camera (for viewers, maybe also AI agent)

Practicing tennis against a wall:

P: sequential hits (without missing), pace

E: enclosed practice area, generally any public place

A: racket, feet

S: eyes, camera, range sensor (how far away ball is)

Performing a high jump:

P: timing out releasing chute, not hitting obstacles, timing

E: some high place (plane, bridge, dam), virtual reality setting

A: suit, body in general, helmet

S: eyes, maybe a map of the jump layout

Knitting a sweater:

P: uniformity of stitching, minimizing mistakes/stabbing oneself/breaking tools

E: home, factory

A: hands/robot arms, needles, yarn

S: eyes, maybe a sensor to test stitch uniformity

Bidding on an item at an auction:

P: lowest price paid, highest quality of item bought, strategy of bidding

E: formal auction setting; car show, housing center, etc

A: hands, bidding sign, voice/notification system

S: eyes, system for tracking pass bids and sales (seeing if high bidders have already reached their max)

4. run `python agents.py` 5. a) A simple reflex agent can **not** be perfectly rational. Consider the case where the default location is loc_B (in the middle). It can't make a perfectly rational decision because it can't see if loc_A or loc_C is dirty and it's forced to either make a random or a default/static choice.

   b) A reflex agent with state on the other hand can because it can see if loc_A or loc_C is dirty.

   c) Being able to see the state of other squares allows it to make the decision "loc_A is dirty, go Left" or "loc_C is dirty, go Right". Otherwise the choice is either random or static.