Introduction to Artificial Intelligence – Exercise Sheet 1

Exercise 1.1 – AI Systems/Technology

1. An A I can write weather forecast reports much more accurately than a human, since forecasting already requires some of the most powerful computation to calculate all the necessary calculations. There is a recent paper published 12 August 2020 That applied deep convolutional neural networks to Global weather data which already shows much promise.

Article : https://www.washington.edu/news/2020/12/15/a-i-model-shows-promise-to-generate-faster-more-accurate-weather-forecasts/

Paper: <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2020MS002109>

1. Currently there is an AI named AlphaStar that was developed by DeepMind that managed to get into the top 200 Players list in the official online game server Battle.net Source <https://www.newscientist.com/article/2221840-deepminds-starcraft-playing-ai-beats-99-8-per-cent-of-human-gamers/> Given that there are still a few humans that rank higher although the amount of people beating it is rather low, there are still a small amount of choices that the AI still has to learn to be on top but it can be considered automatic.
2. Machine Learning can be used to prove a mathematical theorem or even to suggest a possible new conjunction, by looking for patterns in a large amount of available data. https://innovationorigins.com/en/selected/mathematicians-use-ai-to-prove-new-theorems/

Mathematicians already use AI to discover new theorems, but it is stated that machine learning is used in a more helping way rather than be fully automatic. <https://www.sciencealert.com/ai-is-discovering-patterns-in-pure-mathematics-that-have-never-been-seen-before>

Exercise 1.2 – Rationality

It depends if the goal of that taxi-agent is defined as taking the most scenic Routes, and how this can be measured. A taxi usually has the Goal to get a person from Location A to Location B. So the self-driving taxi has to receive input on its current location, it needs input on possible turns it can take. Given a nice thought-out mapping of scenic places a self-driving taxi should be able to rationally decide on the most scenic Route. In many cases the rational behavior depends on the given information that is available, which in this case could be realizable using time goals for example.

Exercise 1.3 – Task Environments

1. Tetris is fully observable, although the order of the “blocks” is somewhat random since the agent only has control over the active block. Also, this is a single agent because it is a single player game, the state of the environment is fully observable and can be changed by the agents’ actions, so the problem is deterministic. The problem is sequential since the actions consist of turning, shifting, and letting the block fall also previous set blocks have to be set up in a sensible fashion. The environment can be considered dynamic since the block is usually falling by itself if no action is taken so the state of the world does not stay the same. The problem can be considered discrete, there is a limited possibility to make turns or to shift a block.
2. The problem seems partially observable the robots have to keep track of each other so be synchronous, also there are multiple agents (every robot), the environment seems to be nondeterministic since the sequence possibilities of movements are rather unlimited. Dancing is usually a sequence of certain movements, so the robot has to take different actions. As previously mentioned, movements possibilities are rather unlimited, fluid motion needs rather continuous data over so it appears more organic.

Exercise 1.4 – Reflexive Agent

1. A possible Implementation is a Model-based reflexive agent that keeps states of the visited cells saved. Maybe by implementing a randomized turn mechanic given a choice the agent should be able to find the exit.
2. As it keeps track of its state it would still “know” if it has moved to the next cell or not given that the wall sensors still work although slower and with perhaps more unnecessary movement depending on if the agent takes the combined action. Failing wall sensors are much more limiting since the agent now has no way knowing if it can move into a direction or not.