

**WARM UP EXERCISE 1**

**ARTIFICIAL INTELLIGENCE**

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**Exercise 1**

1. **Intelligence** refers to the capacity to learn and use knowledge, work through issues, adjust to novel circumstances, and acquire difficult ideas.
2. **Artificial Intelligence** refers to a field of computer science that focuses on developing man-made systems and machines that are capable of behaving, thinking and reasoning like human beings.
3. **Agent** refers to any artificial system with the ability to sense its surroundings using sensors, and decide on how to act upon its environment using actuators to accomplish objectives.
4. **Rationality** refers to the ability to use reason and evidence to guide decisions and actions and get the best results feasible given the circumstances and objectives at hand.

**Exercise 2**

**The objections that are still commonly used are:**

* Consciousness objection that machines can't feel emotions in the same way as humans
* Lady Lovelaces objection that machines can only do what they are programmed
* His refutations are valid but they work by clarifying what it means to be intelligent
* New objections may include things like that computers are designed to be sequential rather than parallel and whether it's possible to have computer based parallel cores operate quickly enough to simulate a brain
* Chat-bots are quite widely used (often for scamming people). This shows that if a person assumes they are talking with a human that they can be quite easily fooled.

**Exercise 3**

**The Loebner Prize**was an annual competition in [artificial intelligence](https://en.wikipedia.org/wiki/Artificial_intelligence" \o "Artificial intelligence) that awarded prizes to the [computer programs](https://en.wikipedia.org/wiki/Computer_program" \o "Computer program) considered by the judges to be the most human-like. **The latest winner of the Loebner Prize** is Mitsuku, which is a chatbot that was developed by Steve Worswick and the Prize was won in 2019.

**Techniques it uses**

* **Natural Language Processing (NLP)**: Mitsuku employs NLP to understand and generate human language, allowing it to comprehend user input and respond in a conversational manner.
* **Machine Learning:** It uses machine learning algorithms to continuously improve its responses based on user interactions and feedback.
* **Contextual Understanding:** The chatbot is designed to understand and remember context within a conversation, enabling it to provide more coherent and relevant responses.

**Advancements in AI**

* **Conversational Ability:**Mitsuku's ability to engage in natural and contextually relevant conversations showcases advancements in natural language understanding and generation.
* **Emotional Intelligence:**The chatbot's ability to recognize and respond to emotions in user input.
* **User Engagement:**It’s engaging and human-like interactions illustrate advancements in creating AI systems that can interact with and assist users.

**Exercise 4**

Reflex actions, like flinching from a hot stove, are rational as they help protect the body from harm through evolutionary adaptation. They can also be considered intelligent since they involve embedded logic and reasoning, though they occur automatically without conscious thought.

**Exercise 5**

No. It means that AI systems should avoid trying to solve intractable problems. Usually, this means they can only approximate optimal behavior. Notice that humans don’t solve NPcomplete problems either. Sometimes they are good at solving specific instances with a lot of structure, perhaps with the aid of background knowledge. AI systems should attempt to do the same.

**Exercise 6**

If Evans’s SYSTEM program scores 200 on an IQ test, it wouldn’t be more intelligent than a human. The program is specialized to excel at IQ tests, but this doesn’t equate to general intelligence. Its high score reflects its design, not adaptability or broader reasoning like human intelligence.

**Exercise 7**

Cycle time for human brain : 10^-3 s

N neurons for human brain : 10^11 neurons

N synapses for human brain : 10^11 \* 1000 = 10^14 synapses

Computational power for human brain : 10^14/10^-3 = 10^17 operations/sec Cycle time for sea slug : roughly human brain cycle time

N neurons for sea slug : 2\*10^4 neurons

N synapses for sea slug : 2\*10^4 \* 1000 = 2\*10^7 synapses Computation power for sea slug : 2\*10^7/10^-3 = 2\*10^10 operations/sec 2\*10^10 operations/sec for the sea slug. It is thus roughly twice a personal computer computational power.

**Exercise 8**

Introspection can be inaccurate due to cognitive bias, which makes thoughts subjective rather than objective. You could misinterpret your thoughts because they are shaped by automatic, unconscious processing. Overcoming bias is possible by engaging in controlled, deliberate processing.

**Exercise 9 & 10**

**Supermarket bar code scanners** are not typically considered artificial intelligence systems. They rely on database look-ups and basic pattern recognition to match bar-codes with product information but lack the ability to reason, learn, or adapt.

**Web Search Engines** are clear examples of artificial intelligence. They use natural language processing (NLP) and machine learning to interpret queries, rank results, and improve performance based on user interactions.

**Voice-Activated Telephone Menus** basic systems use speech recognition and pre-programmed scripts, which are not AI. However, advanced systems with machine learning and natural language understanding (NLU) qualify as instances of AI, as they can process and respond to diverse user inputs.

**Internet Routing Algorithms**  dynamically adapt to network conditions but are rooted in optimization and traditional computing. While they utilize real-time data, they operate based on predefined rules and lack true AI characteristics.

**Spelling and Grammar Correction Features in Microsoft Word** utilize natural language processing (NLP) and machine learning to identify and suggest corrections for spelling and grammatical errors. While they are not fully intelligent, they are examples of artificial intelligence applied in a limited and specific domain.

**Exercise 11**

I think that most of our behaviour and thoughts are controlled by our unconsciousness. I would say that we don't know how it works because it is part of unconsciousness

**Exercise 12**

I believe we should explore all aspects of intelligence. While using AI for tasks like playing games may seem trivial, such research often leads to breakthroughs in other fields. For instance, DeepMind's development of AlphaGo and AlphaZero has contributed valuable advancements in areas like healthcare.

**Exercise 13**

Evolution tends to result in systems that act rationally because it decreases the chance of the system dying or something irreparable occurring to it. The goals of these systems are to survive and grow.

**Exercise 14**

AI is both science and engineering. Observing and experimenting, which are at the core of any science, allows us to study artificial intelligence. From what we learn by observation and experimentation, we are able to engineer new systems that encompass what we learn and that may even be capable of learning themselves.

**Exercise 15**

No the latter statement is false. It does not imply the former statement because computers can adapt and evolve to their environment without the programmer telling them what to do.

**Exercise 16**

No the latter statement is false. It does not imply the former statement because animals adapt to what kind of situation they are in. Survival of the fittest happens with animals and who ever can adapt and change lives on and the other animals that cannot adapt to survive disappear.

**Exercise 17**

No the latter statement statement is false. It does not imply the former statement because animals, humans and computers can all learn from situations that they are in and learn to adapt and figure out a way to survive.

**Exercise 18**

Playing a decent game of table tennis (Ping-Pong). Yes.

Driving in the center of Cairo, Egypt. No, it is currently too hard and there is too much people in the center.

Driving in Victorville, California. Yes it is easier than driving in the center of Cairo. Buying a week's worth of groceries at the market. No robot can currently move in a crowded market.

Buying a week's worth of groceries on the Web. Yes.

Playing a decent game of bridge at a competitive level. Yes.

Discovering and proving new mathematical theorems. Yes.

Writing an intentionally funny story. No it can be funny but it won't be really intentional.

Giving competent legal advice in a specialized area of law. Yes.

Translating spoken English into spoken Swedish in real time. Yes.

Performing a complex surgical operation. Yes robots assists surgeons**.**

**Exercise 19**

Driving in the center of Cairo, Egypt. It will be possible once we solve complete autonomous driving. We are close to it. Buying a week's worth of groceries at the market. It is hard for a robot to move in a crowded market because it has to predict humans movements. We are probably close to it too. Writing an intentionally funny story. We don't know if an AI will one day be able to have emotions, consciousness etc. We are currently far from it.

**Exercise 20**

AI contests like the DARPA Grand Challenge, Robocup, TREC, and machine translation competitions have driven major advancements, from autonomous urban navigation to near-flawless language translation. While they push innovation, they may sometimes shift focus away from exploring new ideas.