IN5480 assignment 1

1. Give three definitions on AI

Russell & Nordwig believe that the term should be defined in relation to its goals[1]. They've created a two by two matrix placing four different goals along two dimensions.

	Human mimicry	**Ideal rationality**
Reasoning based	Systems that think like humans	Systems that think rationally
Behaviour based	Systems that act like humans	Systems that act rationally

Many definitions divide AI into two categories, weak (or narrow AI), and strong (or AIG – artificial general intelligence). Weak Ai refers to systems that are made for a specific purpose which simulate aspects of human cognition or behavior[2]. Strong AI does not simulate human intelligence, but rather equals it in problem solving, communication, learning and other cognitive capabilities. It further mimics our ability to develop a stronger intelligence through adaptive learning by itself. As of today, strong AI's do not exist[3].

Some see AI's as functioning in a continuum. At the start of it, you've got **Assisted intelligence** that mechanize and automate relatively simple, human tasks. At the midpoint, you've got **Augmented intelligence** where humans and machines learn from each other and improve and expand on the area in which they interact. At the tail end, you've got **Autonomous intelligence** which exhibits significant or total autonomity with the ability learn adaptively and continuously[4].

2. Give three definitions on robotics

Merriam-Webster define robotics as following[5]:

> Technology dealing with the design, construction, and operation of <u>robots</u> in automation

Russian-American author Isaak Asimov is often referred to as the father of robotics. He first used the term in his short story *Liar!*, as a conjunction of the word robot and the suffix –ics (from disciplines such as phys**ics** for example)[6]. Additionally, he established

three rules in regards to how robots should behave. They've been dubbed "Asimov Three Laws of Robotics"[7], and are as following:

1. Robots must never harm human beings.
2. Robots must follow instructions from humans without violating rule 1.
3. Robots must protect themselves without violating the other rules.

A more detailed definition on the matter adds that "(…) robots are programmable machines which are usually able to carry out a series of actions autonomously, or semi-autonomously"[8]. The author further mentions three factors he believes constitutes a robot:

1. Robots interact with the physical world via sensors and actuators.
2. Robots are programmable.
3. Robots are usually autonomous or semi-autonomous.

3. Give three definitions on machine learning

Stanford University define machine learning as following[9]:

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

SAS elaborate further by stating[10]:

Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention.

Forbes Magazine define the topic in relation to AI as they are often used interchangeably in colloquial and popular contexts[11].

Artificial Intelligence is the broader concept of machines being able to carry out tasks in a way that we would consider "smart".

And,

Machine Learning is a current application of AI based around the idea that we should really just be able to give machines access to data and let them learn for themselves.

4. My understanding of the relationship between AI and robotics

There seem to be different accounts on whether AI is a superdiscipline in which robotics fall under[12], or whether robotics and AI are separate fields intersecting in what is known as artificially intelligent robots[8]. The definition on what a robot is can be rather fleeting, as some believe that robots in some way have to interact with the physical world. While I don't

necessarily agree with the sentiment that robots have to be tangible in some way or another, I believe AI and robotics to be separate multidisciplinary fields that can intersect, but not necessarily so as AI's in some way simulate intelligence, while robots can be remotely controlled and fully lacking in autonomy.

5. My definition on AI

My personal definition of AI is as the name implies, intelligence that is artificially simulated by computers. The level of sophistication can of course vary, but at a bare minimum, I believe all AI's should have some degree of autonomy (I.E, something that is completely controlled by a human I would not consider AI, like a remote driven toy with no autonomy).
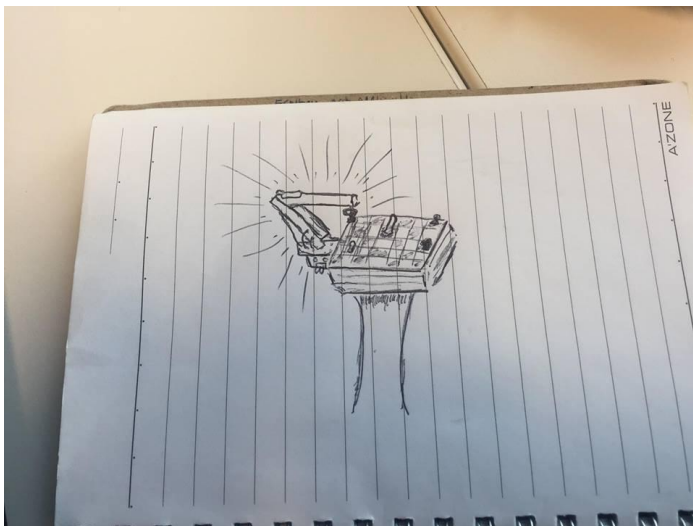
6. Drawing

Figure 1: A chess bot

7. On the subjects of objects: Four views on object perception and tool and use

Uexkull believes that each animal ascribes meaning to the physical objects it encounters and fits it into the world it sees (a subjective universe known as *Umwelt* – which consists of a perceptual and physical world). Uexkull believes that objects have no intrinsic properties that decide their quality. The objects meaning is decided by the relationship the subject gets into with object which is determined by the subjects context-specific mood.

Heidegger believes that equipment are used to get things done, and are defined in relation to their use. Furthermore, their relevance is also defined in how they refer and are involved with other equipment or processes. He also that our understanding of equipment \ derives from "manipulation".

Gibbson believes that animals are afforded opportunities by its environments that are neither purely subjective nor objective, but a specific combination of a thing and its surface in relation to the animal at hand. He believes we see the environment as surfaces, and how light interacts with surfaces is how we extract information about the world around us. When looking at an object, we see its affordances that inherently invariant to the subjects mood, but how some affordances are perceived is subjective. Tools are a class of objects that are graspable, and augments our ability to act upon our environment.

Kisch conception of an entry point is – as he has admitted – quite similar to that of affordances. Unlike Gibbson, Kisch's perspective is more focused on modern contexts such as offices, and how people adapt the environment around them to achieve tasks. Entry points are "invitations" or cues in the work place that attracts one to an information space or office task. Entry points can be things like stacks of paper on a desk that organizes ones work. Entry points – Kisch believes – achieves what he has dubbed cognitive congeniality. Cognitive congeniality refers to an environments hospitability for restructuring to improve performance and efficiency. This is done through simplifying work and cognitive load.

8. Humans and Automation: Use, misuse, disuse and abuse

Heidegger perspective on equipments focused to a larger extent on humans than Uexkull and what it means to be or exist. Heidegger believed in two categories of "being", Dasein (human-being), and non human being (equipments). Equipment are used to get things done, and are defined in relation to their use. Furthermore, their relevance is also defined in how they refer and are involved with other equipment or processes inside a prefigured total relevance. I.E how a fork is needed for eating, and eating is needed for nutrition and energy. Heidegger also believes that equipment don't have intrinsic an intrinsic context-free quality, but rather that our understanding of its use derives from "manipulation". In some instances, our knowledge about

how something is used is also determined by the social norms and conventions on how equipment are used.

9. Humans and Automation: Use, misuse, disuse and abuse

In the aforementioned text, the authors details the different types of –uses of automation, what characterizes them, the potential connection between them and how better understanding better understanding can lead to ways of improving ways of designing systems.

10. Ghost in the shell (1997) – Movie

Ghost in the Shell is set in a futuristic world where people have upgraded their bodies with cybernetic technology, and augmented their brains to the extent that they have an interface with the world's equivalent of the internet (known as cyberbrains). What remains most people have of their humanity is their conciseness (ghosts) which might be synthetic memories that are transferable to other cyberbrains. What constitutes AI's or humans in this world is deliberately left diffuse. The central antagonist known as the Puppet master was an initial AI, who claims to have reached sentiency after roaming the networks of the world. This can be seen in light of concepts such as strong AI and machine learning.

11.Autonomy

I believe autonomy to be the ability to make, independent, un-coerced decisions based on independent thinking. I believe machine autonomy – while defined by a pre programmed algorithm – to be able to act free from remote control and update the algorithm based on context without external interference.

12. AI term first coined

The term AI was first coined by John McCarthy in 1956 at the Dartmouth Conference, although ideas around thinking machines had circulated earlier from notable figures such as Vannevar Bush and Alan Turing[13].

13. Context

With the constant renegotiation of what context means made available to the user through "embodied interaction", is it possible that systems might be too complicated to design?

14. Designing robots with movement in mind[15]

Are there any motions within the animal world that is/has been of interest for designing robot movements?

1. https://plato.stanford.edu/entries/artificial-intelligence/#WhatExacAI

2. https://www.techemergence.com/what-is-artificial-intelligence-an-informed-definition/

3. https://www.investopedia.com/terms/s/strong-ai.asp

4. https://www.voxcreative.com/sponsored/11895802/what-artificial-intelligence-really-means-to-business

5. https://www.merriam-webster.com/dictionary/robotics

6. https://www.definitions.net/definition/robotics

7. https://whatis.techtarget.com/definition/robotics

8. https://blog.robotiq.com/whats-the-difference-between-robotics-and-artificial-intelligence

9. https://www.coursera.org/lecture/machine-learning/what-is-machine-learning-Ujm7v

10. https://www.sas.com/en_us/insights/analytics/machine-learning.html

11. https://www.forbes.com/sites/bernardmarr/2016/12/06/what-is-the-difference-between-artificial-intelligence-and-machine-learning/#210ff0df2742

12. https://www.webopedia.com/TERM/R/robotics.html

13. https://courses.cs.washington.edu/courses/csep590/06au/projects/history-ai.pdf