Individual assignment – second iteration

1.Search and find three definitions of AI, describe them briefly. Make references.

1.1. The first definition is from the article "Some philosophical problems from the standpoint of artificial intelligence" by John McCarthy and Patrick J. Hayes, 1969.

"A machine is intelligent if it solves certain classes of problems requiring intelligence in humans, or survives in an intellectually demanding environment" (p.4)

This definition is based on an understanding of what intelligence is. The author points out that this definition seems vague and suggests that it can be made more precise without departing from behavioral term (McCarthy, 1969, p.4).

1.2. Stuart Russell and Peter Norvig organized some definitions of AI into two main dimensions; *thought processes and reasoning* and *behavior*. Then they put the definitions into four categories:

- System that <u>think like</u> humans – "[The automation of] activities that we associate with human thinking, activities such as decision-making, problem solving, learning…" (Bellmann, 1978, as seen in Russell, S. and Norvig, P., 2003)

- Systems that <u>act like</u> humans – "The art of creating machines that perform functions that require intelligence when performed by people" (Kurzweil, 1990, as seen in Russell, S. and Norvig, P., 2003)

- Systems that <u>think rationally</u> – "The study of the computations that make it possible to perceive, reason, and act" (Winston, 1992, as seen in Russell, S. and Norvig, P., 2003)

- Systems that <u>act rationally</u> – "AI…is concerned with intelligent behavior in artifacts" (Nilsson, 1998, as seen in Russell, S. and Norvig, P., 2003)

By categorizing the definitions in this way, we´re forced to understand AI in the two main dimensions as the authors mentioned. Because we humans perceive information, then reasoning and act based on our thought, we have to try and copy this behavior into a machine.

1.3. The third definition is from a web-page, Business Dictionary (web page 1):

"Software technologies that make a computer or robot perform equal to or better than normal human computational ability in accuracy, capacity, and speed."

This definition covers more the software technologies and how we can make a machine do things more accuracy, have more capacity and in a higher speed than normal human computational ability. The definition doesn´t cover the human behavior, the understanding

of the environment or the thought process behind actions. It only covers how we can make intelligence that is faster and help us make complex decisions.

Discuss definitions relative to discussions of AI in the course:
I think my definitions and the descriptions of these covers most of what we have talked about in this course.

2. Search and find three definitions of Robotics, describe these briefly.

2.1. This definition is from a web-page, Business Dictionary (web page 2):

"Science and technology of design, manufacture, and use robots"

This definition seems a bit general. This only says that robotics is a science and a technology of design, manufacture and use of robots. It doesn´t say anything about what a robot may be/not be and what it does.

2.2. In the 1980´s robotics was defined "as the science which studies the intelligent connection between perception and action" (Siciliano, 2016, p. 2)

This definition covers more the basics of what a robot should be able to do based on the environment it is built for. The perception is extracted from the sensors providing information on the state of the robot (position and speed) and its surrounding environment (force and tactile, range and vision) (Siciliano, 2016, p.2). The action of a robotic system is entrusted to a locomotion apparatus to move in the environment (wheels, legs, propellers), where suitable actuators animate the mechanical components of the robot (Siciliano, 2016, p.2). The intelligent connection is entrusted to a programming, planning and control architecture which relies on perception and available models of the robot and environment (Siciliano, 2016, p.2).

2.3. The third definition is from the article *Robotics and Control* from 2003 written by R K Mittal and I J Nagrath:

"Machines that can replace human beings as regards to physical work and decision making are categorized as robots and their study as robotics".

This may not be a fully definition of robotics, but it covered up the basics of what the word robotics is.

3. Search and find three definitions of Machine Learning, describe these briefly.

3.1. Shai Shalev-Shwartz and Shai Ben-David wrote the article *Understanding Machine Learning: From Theory to Algorithms* in 2014 and defined machine learning as

"The term machine learning refers to the automated detection of meaningful patterns in data."

The machine is programmed to "learn" from the input data and look for patterns of data it already has.

3.2. "A learning machine, broadly defined, is any device whose actions are influenced by past experiences" (Nils J. Nilsson, as seen in Kononenko, I. and Kukar, M., 2007).
This is strait forward and tells us that devices learn when new input is given and then they act from experience.

3.3. "Machine learning focuses in the development of computer programs that can access data and use it to learn for themselves" (Web-page 3).

This is the same definition as the previous two.

Discuss definitions relative to discussions of Machine Learning in the course:
I think my definitions and the descriptions of these covers most of what we have talked about in this course.

4. Write in three to five sentences the relationship between AI and Robotics as you understand it.
I understand Robotics as the study of the science and technology of how we can **use** robots in everyday life. Robotics also covers how we can interact with robots and what they can do for us. As for the AI, I understand this as the field of **how** we can make the robots understand and act the way we like them to. AI covers the software, and the inside of a robot/device.

5. Make a text to describe your own definition of AI. Explain briefly this definition.
With AI, we can make machine, robots and devices that possess information, skills and knowledge to act and think as humans. With AI, we can give these devices the ability to take information as input, process this information, and then act/make decisions in a rational and logical way.

Expand on this text to explain the relation between AI and Machine Learning:
When it comes to Machine Learning as I see it, we have to go a little deeper and look at how we can make machines, robots and devices learn from the input they get. By understanding AI and how humans think and learn, we then need to look at the machines and in depth of the software systems. How can we make machines learn from their input and how can machines give us output that is similar, or in some cases better than, human decisions?

6. Make a drawing of an interaction with an AI – something that you imagine. Describe with some sentences your drawing.
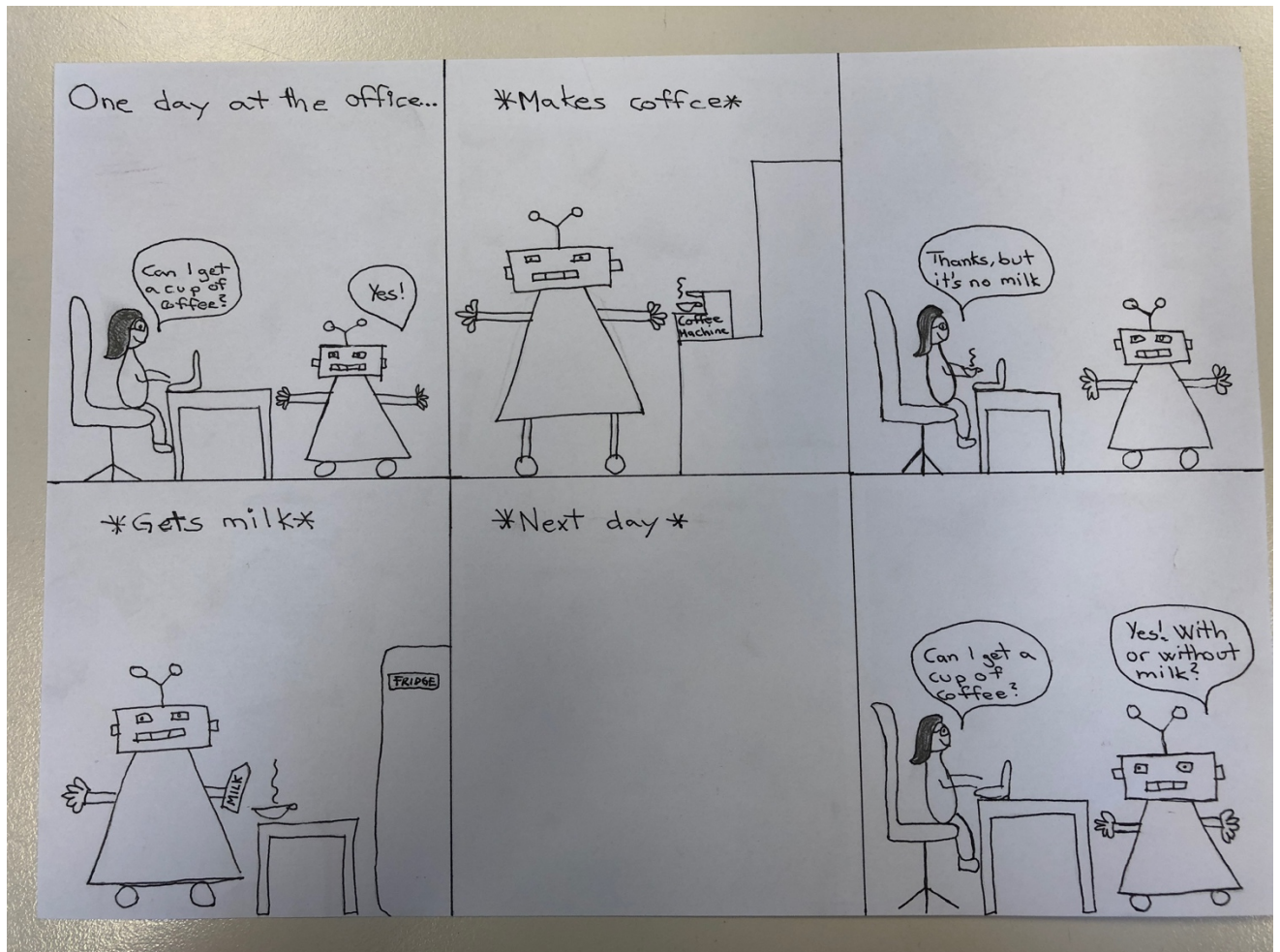
This is a drawing of a robot at an office who helps out with small tasks to make the workers more efficient and their day a little better. The robot is there to interact with the workers and to help them with making coffee, get supplies, take out the trash, get their printing, to answer some questions and to be of any assistance if someone needs any help.

Summarize key characteristics of interaction design for AI-based systems (challenges, principles, trends).

The key characteristics of interaction design for AI-based systems is through some tentative design principles (Følstad, A. 2018); the machine learns dynamically, improve and collects data through the users and the interaction between them. One challenge by this type of interaction with the user is that the users can type many different words/sentences just for fun and in this way the machine teaches the wrong things. Another challenge is that the machines gather a lot of data for the users and one have to be careful with personal information and other data that gives concerns in privacy and ethics.

Some trends in interacting with AI is chatbots, that many companies use to help out with frequently asked questions on their websites.

Sketch a user interface illustrating one or more of these characteristics.
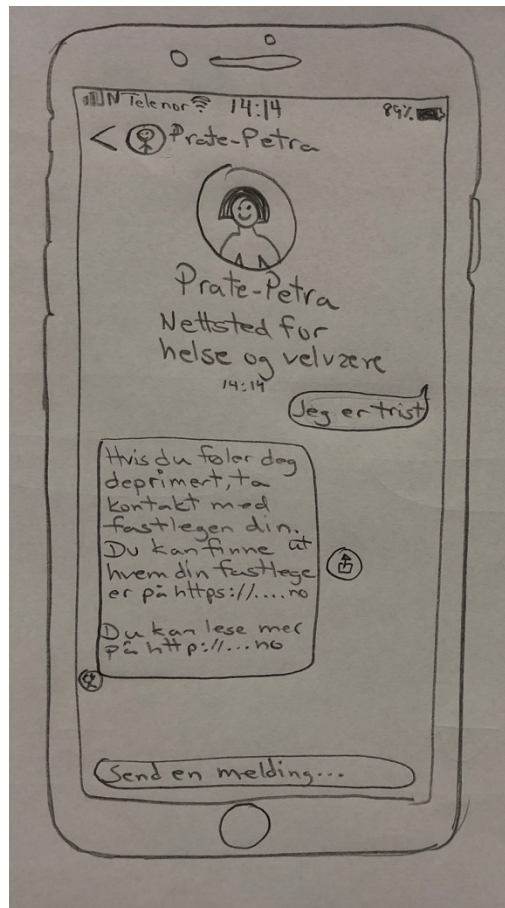
This is a user interface where the user is talking to a chatbot and feeling a little sad.

7. Read the article: "*On the subject of Objects: Four Views on Object Perception and Tool Use*", by Tarja Susi/ Tom Ziemke. Write in your own words one page about the different perspectives on the human relationships with tools.

This article is about the interaction between an agent and its environment, or the relation between subject and object. The authors specify that they will look at object as something *physical* and address the question of what makes something an object in the first place. The subjects in this article are humans and artificial subjects is addressed as robots. So, in other words, how can a robot perceive the environment? The article highlights four different conceptions of the relation between subjects and objects:

1. Functional tone – The German biologist Jakob von UexKüll, formed the term. In the eyes of the subject, it comes down to what the subject sees and the current mood it's in. If a subject is thirsty, it will see a glass as something to have liquid in, but if the subject is in a boat that takes in water, it will use this glass to pour out the water. The subject gives the object a meaning in its own *Umwelt*.

2. Equipment – The German philosopher Martin Heidegger developed the concept. Subjects and objects cannot be seen as to separate entities, they depend on each other. The equipment has to fit into the context of an activity since the object is what it is in a meaningful context. Which means that you won´t take on your raincoat or your umbrella on a sunny day.

3. Affordance – The American psychologist James J. Gibson found the concept. It's the properties of objects in the environment. The affordance is always in relation to the subject and the subjects need may changes but the affordances do not.

4. Entry point – "are environmental structures that invite people to enter an information space or office task". It is similar to affordances cause they both invite to do things. People do things a certain way given the environment.

8. Select one of the perspectives from the article and go into detail when you describe it.
See perspective 1 – functional tone, in task 7.

9. Select one other article from module 1 and write with your own words what this article is about.
I read the article "*Does AI make PD obsolete? Exploring challenges from Artificial Intelligence to Participatory Design",* by Tone Bratteteig and Guri Verne, 2018.

This article is about if and how AI challenges Participatory Design (PD). As the technology is getting more and more personalized, the PD field is questioning whether it is room for a design process with the future users closely involved. The article gives a brief introduction of AI and Machine Learning (ML). AI and ML collects data that is given and uses this data to create statistics and recognize different patterns which gives the users more personalized devices. These data algorithms and design choices behind them are not easy to see, therefor also not easy to understand for the designer or the user. With that in mind, the PD process is challenged because it relays on the basic understanding from the user of what AI can do and what AI cannot do when ideas come up and when they evaluate AI elements. In PD, users are closely part of the entire process; bringing in design ideas, selecting the ideas and concretizing it and to evaluate the result (page 2). When AI collects data, use statistics to personalize and then uses time to learn, it will be challenging to include users in the process.

10. Select one documentary or a fictional film, book or game: describe with your own word how interaction with AI is portrayed in this work.
I saw a science fiction film named "*Zoe*". It´s from 2018 and is about a man named Cole who works with developing and making synthetic humans. Synthetic humans are "real" humans in size and shape, but their minds are programmed, and the intestines are synthetic, like mucus and gut. The way Cole program these "humans" is by giving them real memories from real humans. He describes things, places, and what they have done in the past. Then he "puts" them to life and they live like humans and the whole purpose is to let real humans get a chance of real love. Cole programmed them to be faithful. The interaction to AI in this film is that we live around synthetic humans and cannot tell the difference without looking them deep in their eyes. Can Cole get synthetic people to feel and even love, and how does people around these synthetic humans react to the concept. Can real humans love them back if they know what they really are?

11. Describe what you understand by autonomy; both human autonomy and machine autonomy.
Human autonomy is, for me, how people are independent and make their own decisions based on their individual opinion.

Machin autonomy would be how a machine are making decisions and performs tasks based on the code and set of rules that is given, this without a human in control of the decision.

12. When was the term "AI" first coined? Please make a reference.
It was articulated a complete vision of AI in Alan Turing's article "*Computing Machinery and Intelligence*" from 1950 (Russell, S. and Norvig, P., 2003). But the term "AI" was first coined by John McCarthy in 1956 when he was at his first academic conference on the subject (Web-page 4).

13. Articulate one question for the article "*What we talk about when we talk about context*" by Paul Dourish in the curriculum.
Can we design AI that define its own context based upon what it already knows through awesome Machine Learning?

14. Articulate one question for any other article in the curriculum.
I read the article: "Chatbots and the New World of HCI", by Asbjørn Følstad and Petter Bae Brandtzæg, 2017, in the curriculum.

The authors mentioned that the area of ethics and privacy needs to be more researched within chatbots. How could we design a chatbot who´s intention is, among other things, to learn from users without picking up personal opinions and in this way be "wrongly" informed/learned?

15. Choose one of the following tasks, a or b:
b) Read the article: "Using Artificial Intelligence to Augment Human Intelligence" by Carter & Nielsen. Summarize in your own words the articles discussion of different views on computers, and on how AI may augment human intelligence (1/2-1 page)
This article is about creating a new field called artificial intelligence augmentation (AIA), which has emerged from AI and intelligence augmentation (IA). They argue that AIA would use AI systems to help develop new methods for intelligence augmentation and form new fundamental questions that are not associated to either parent field.
In IA, computers are built to work *with* humans and help humans to expand their problem-solving process. While AI works on complete outsourcing of intellectual tasks to machines, but they have problems matching human intelligence.

One way of making a machine augment human creativity, is by using generative models and training them through machine learning. By building a neural network in the generative model we can use this model to learn more complex tasks in fewer variables. The authors give us an example of a model that creates new fonts, by letting the user chose some fonts and then makes new one based on the users wish/input. Another way of using machine learning models to augment human creativity is by interactive generative adversarial networks. The example given in the article shows that while the user is sketching the model come with suggestions based on learnings (the trainer of the model have been uploading many pictures of the same thing, so the machine can learn shapes, details etc).

So, the authors talk about what computers are for and at the very beginning of computers history, they were used to compute artillery firing tables for the United States Army. They

were also used to solve numerical problems, such as simulating nuclear explosions, predicting the weather and planning the motions of rockets (p. 1). And by creating a new field like AIA, the authors believe that we could get a better understanding of machines ability to help humans think and create in new ways.

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Web pages:

Web page 1:

http://www.businessdictionary.com/definition/artificial-intelligence.html

Web page 2:

http://www.businessdictionary.com/definition/robotics.html

Web page 3:

https://www.expertsystem.com/machine-learning-definition/