Individual Assignment 1

1.1 Concepts, definition and history of AI and interaction with AI

The history of AI

AI came about during the second world war when the allies started making machines with the objective of breaking the Germans communication devices. According to Grudin (Grudin 2009) the term Artificial Intelligence was first used in 1956 by American mathematician and logician John McCarthy.

Discuss briefly similarities and differences between the HCI design guidelines and the Human-AI interaction guidelines.

Definition from T.Bratteige and G.verne 2018:
“AI is a subfield of computer science aimed at specifying and making computer systems that mimic human intelligence or express rational behaviour, in the sense that the task would require intelligence if executed by a human” (T.Bratteige 2018)
This definition was made in 2018 by Tone Bratteige and Guri Verne both belonging to the section for digitalization at the institute for informatics at UiO.

Definition from Merriam-webster dictionary:
“the capability of a machine to imitate intelligent human behavior” (Merriam-Webster 2020)
This is one of the current definitions of Artificial Intelligence in the renowned Merriam-Webster dictionary.

Definition from Cambridge dictionary:
“the study of how to produce machines that have some of the qualities that the human mind has, such as the ability to understand language, recognize pictures, solve problems, and learn”
This definition is from the University of Cambridge one of the world's oldest and most respected universities

My definition of Artificial intelligence:
“A computer system with the ability to extract information from different sources and process it in order to complete some form of task”
My definition of AI is based on that an AI is a system that can take in information from either the physical or digital realm and process it as needed in order to perform that task that is expected from it.

Microsoft and how it presents AI

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I have looked at how Microsoft presents AI on their page. They try to present it as a positive tool and base for platforms that will change the world for the better. They do this by listing examples of AI being on the frontline of helping humanitarian organizations. Microsoft also tries to reassure the people who have fears about some of the implications of AI´s with claims that they are developing it responsibly with a focus of making lives easier and more effective by relying on AI as a supplement.

Westworld and how it portrays human interaction with AI

I will describe the interactions between robots and humans in the hit HBO show Westworld. The base concept of the show is that human guests visit an amusement park inhabited by extremely life-like robots. Here the humans are free to do whatever they want, a lot of them choose to experience the parks with robots on scripted adventures where they can choose to either be a hero or villain. But there are others who sees the park as an opportunity to vent out a lot of things they wouldnt be able to do in the real world, like for example brutally raping and murdering these very life-like robots.

1.2 Robots and AI systems

The origin of the Robot

The word robot comes from the czech word robota meaning slave. The first use of it in the context of a human built obedient autonomos machine was in the czech play R.U.R from 1920.

Two definitions of “robot” along with mine

The Cambridge dictionary´s definition of the word Robot:
“a machine controlled by a computer that is used to perform jobs automatically” (Cambridge 2020)
Cambridge definition of the word Robot can be said to be quite vague, but since there is no consensus of what a robot actually is, it is a good starting point in that it defines the most agreed on basic concept of a robot.

Britannica dictionary´s definition of the word Robot:
“Robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner. By extension, robotics is the engineering discipline dealing with the design, construction, and operation of robots.” (Britannica 2020)
This definition also focuses on the basic concept that a robot performs a task but also includes some tidbits in saying that a robot both can and can not resemble a human in both appearance and how it accomplishes tasks.

My definition of Robot:

“A machine that can perform at least one task. A Robot often has a human-like element in appearance or how it accomplishes a task that makes it different from what humans normally would just call a machine. “
I think this definition of robots highlights there is a sort of mental difference between what we would just call a machine and what we would call a robot, and that it often lies in that the robot completes its task in a more advanced human-like manner.

The relation between AI and Robots

I think AIs and Robots are very closely related and that the main difference might be that a robot is more at times the physical manifestation of an artificial intelligence. Even though it doesn't have to be given that it exists robots without any form of artificial intelligence. TBut given that it is a robot with artificial intelligence, manifestation can take a lot of forms like for example that of a smartspeaker that speaks back to you like a human or a boston dynamics robot that resembles how a human actually looks and moves.

The Paro therapeutic sea

The Paro therapeutic seal is used with a lot of different groups that are in need of a companion that can both relax them and make them feel less alone. The way the robot is used, is that the patient treats it like an actual living seal so they pet it and hug it.

1.3 Universal Design and AI systems

Universal Design

Definition of Universal design by universaldesign.ie:
“Universal Design is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability” (Universal Design 2020)
I think this a good definition based on what I have learned about universal design and its focus on designing stuff that can be used by everyone regardless.

The potential of AI with respect to humans

Depending on how AI develops it can be used to improve upon human attributes like perception, movement and cognitions. An example could be a blind man getting a device with sensors that could read his surroundings, perhaps even better than an able-bodied person, and then perfectly guide him where he needs to go.
It is not unreasonable to think that AI also could be used to make prosthetic limbs like arms and legs that worked perfectly in conjunction with the rest of the body.

The potential of AI inclusion and exclusion

AI has the potential to both be an including and excluding force. Given that the AI is not developed in conjunction with different parts of society and the world at large it might end up not having the necessary dataset to be able to service all sorts of different people. Thereby giving it biases to only work properly with the people that are similar to the ones that developed it. An example of this is an AI that has problems recognizing people with different skin color or accents then what it is used to.

Human and machine understanding

In both WCAG 2.1 and Human-AI guidelines the terms understand and understanding is used. Both of them use them in the context of presenting the user with information in a way that he can actually process it and base his actions on it.
In that context a machine can “understand” given the right dataset.

1.4 Guideline for Human-AI interaction

Microsoft guideline with a different example

Make clear why the system did what it did.
It’s important that the system informs the user why it did what it did. Because in the event that the user uncovers a bias of some sort in how the AI solves a task. The AI can get fixed.

Comparing HCI and Human-AI interaction

I decided to compare microsoft's AI guidelines with Nielsen and Molich's 10 User Interface Design Guidelines.
The HCI

- Visibility of system status
    - “Make clear why the system did what it did” matches this in that it focuses on showing where the system is and how it got there.
- Match between system and the real world
    - Matches the “Match relevant social norms” in that the system should be expected to be able to communicate with a user in a given context.
- User control and freedom
    - Matches “Support efficient correction” in that it is easy to fix when system or user has made an error.
- Consistency and standards
    - This matches the point “Update and adapt cautiously”. Both the hci guideline and the ai guideline is warning us about making changes that can result in the user having troubling get back into the system as it has changed beyond what can be expected from him.
- Error prevention

    - This matches “show contextually relevant information” in that we should limit the chances for the user to make a mistake.
- Recognition rather than recall
    - Sort of matches “Show contextually relevant information” in that we need to display task-related information in way that it is easy to recognize it and not having to recall where it is.
- Flexibility and efficiency of use
    - Connected to “Learn form user behavior” in that the system should be able to learn from the users behavior so that it can improve upon its efficiency in doing the tasks it knows the user frequently does.
- Aesthetic and minimalist design
    - Matches “Show contextually relevant information” the main focus should be to present the users with the information they need for their current tasks, not unnecessary information that might distract them from finding what they need.
- Help users recognize, diagnose and recover from errors
    - Is connected to “Make clear why the system did what it did” in that it should be clear to the user why the system behaved the way it did.
- Help and documentation
    - This can be connected to the initial guidelines with “Make clear what the system can do” and “Make clear how well the system can do what it can do” in that program easily tells the user what it can do and how well the system can do it.

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Appendix 1:

Based on the feedback I received from the last Individual Assignment I have tried to structure this assignment to have a bit more logical and consistent structure, hopefully making it a bit easier to read.

Individual Assignment 2

1 AI-infused systems

1.1 Identify and describe key characteristics of AI-infused systems

There are a lot of key characteristics of an AI-Infused system. One of the most important is the ability to learn. Either from huge data sets or from the users

behavior. Based upon what it has learned it should also try to improve, meaning making less errors as time goes by and as it gets the feedback and information it needs to properly fulfill its tasks.
But errors are in fact themselfs a characteristic of the system as it is nearly impossible to make a system without any sort of error. These errors can be manifested in the system in a lot of different ways either technical like the system crashing or social like the system not functioning properly for different kinds of people then the ones that built the system.
Another characteristic seen from the user perspective is that AI-Infused systems often function like a black-box. Meaning that you do not know what the systems actually does with your input and why it delivers the output it does.

1.2 Discuss the implications of these characteristics for the example system, in particular how users are affected by these characteristics.

I have picked the AI-Infused word-processor Google Docs. The AI-Infused functionality in the program is its autocorrect and word suggestions functionality. Concerning the key characteristics mentioned above I think the learning one is probably the most relevant one. This because of the gigantic scope of data and users Google has at its disposal to properly train the Google Docs AI. Making the AI able to distinguish between for example Norwegian and English in the same sentence and only correcting based upon if the actual words were written wrong not the mix of languages.

2 Human-AI interaction design

2.1 Main take-aways from Amershi et al. (2019) and Kocielnik et al. (2019)

The main take-away from Amershi et al (2019) concerning interaction design is that with the rapidly increasing amount of solutions implementing different types of AI the interaction design community needs to try to keep up in order to shape the solutions in a way that fits the users. Amerishi et al contribution to this is the 18 guidelines that they have developed to help clarify some problems they see and make the solutions more accountable for the users.

Kocielnik et al (2019) main take-away concerning interaction design is the importance of managing users expectations and some techniques that can help in doing so. The reason for this is because of the negative effects, expectations not built on the actual reality of the system, can have on the users satisfaction and willingness to actually use the system.

2.2 Discussing design guidelines

For the first design guideline I have chosen g4: “Show contextually relevant information”. An example of this is in Google Docs is how the system helps users finish commonly used phrases based on the rest of your text by semi-filling them out for the user, so that the user can choose whether they want to take the system's advice or write it in their own way.

For the second design guideline I have chosen g8: “Support efficient dismissal”. The system incorporates this by letting the user tell the system to ignore false-positives that the system's autocorrect function has picked up, which can happen to for example some names probably because of social biases. Another instance where it incorporates this guideline is the ease you can correct it when it actually tries to autocorrect something that it shoulnt have and you can by either returning or pressing the backspace key dismiss change.

3 Chatbots / conversational user interfaces

3.1 Discussing key challenges in the design of chatbots

There are a lot of challenges connected to developing chatbots . One challenge is to manage expectations like stated in Kocielnik et al (2019). For example if the user comes into the context expecting the chatbot to be able to answer his every question he might be disappointed to find out that it is in fact limited to the more common questions.

Therefore it is important that the chabot try to adhere to some of the AI design guidelines given in Amershi et al. The most importants is probably “Make clear what the system can do” so that the user don't have waste a lot of time on a solution that will never and if the chatbot is setup more like a filter before the users come to an actual human being make it possible to “Support efficient dismissal” so that the user can easily dismiss the chatbot and go right to talking to an actual human. The chatbot should also as much as possible follow “Remember recent interactions' ' so that the user does not need to repeat already stated information that the chatbot should already be aware of, as this can cause a lot of frustration for the user.

Another challenge when it comes to chatbot is shaping the language of the chatbot so that it is understandable and actually helps the user in the task they are trying to accomplish (given that it is a typical customer support chatbot). One way of making sure of this can perhaps be to base it upon successful interactions actual human beings in customer support has had with people, but even that might just be

propagating something that could have been explained in much simpler and understandable terms.

3.2 Guidelines G1 and G2 in chatbots

Guideline G1 is as I mentioned earlier of major importance when trying to make the user understand what the chatbot is capable of. Guideline G2 is also of importance as the system should not necessarily expect that it has actually solved the users problem, since it can make mistakes. And that is something users should be aware of and possibly have the opportunity to correct.

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Individual Assignment 3:

Industrial robot and Nano robot

The industrial robot is explained in Phillips et al (2016) as a tool to multiply the physical capabilities of a human. An example of this sort of robot would be the typical robot arm you often see in factories doing repetitive tasks that it can do faster and more reliably than humans due to the fact that it doesn't have to concern itself with stamina like a human would. This task would probably be put somewhere in the middle of the right corner of the two-dimensional framework shown in Shneiderman (2020).This due to the nature that these robots perform their tasks separately from humans at different stages of the product's assembly line. Meaning that the humans working around it probably don't have that much control over it, other than being able to stop it in case of errors or emergencies.

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The Nano robot explained in Phillips et al (2016) is explained as a tool to multiply cognitive capabilities. The robot in the article, the Black Hornet, does this by allowing it’s operator to program waypoints for it to take, allowing it’s operator to watch from the video feed transmitting from the robot instead of having to for example peek around a corner. If i had to place it in the two-dimensional framework shown in Shneiderman (2020) this sort of robot would probably find itself in the upper right quadrant somewhere. I based this on what I have understood from the way it functions. In that humans have full control over the path of the robot, but that a lot of the flying and sensor-reading are more automated. Meaning that the operators no longer have any need for physically peeking around the corner, in order to get some general situational awareness.

Adjusting the level of autonomy

Industrial robot

Increasing the automation of the industrial robot would probably mean making it take on more tasks in producing whatever product it is making. It would also probably mean making it able to a larger degree to learn from what it is doing and optimize itself without needing human intervention.This would probably lead to faster and cheaper production, but would probably also lead to it replacing even more human-tasks at it’s factory. An effect of this could be that workers get a more fulfilling workday as repetitive and boring tasks are done by the robots, but it can also lead to unemployment as the workers talent is no longer needed to produce a product. There can also be some negative aspects to the AI itself deciding how to improve itself, as there could be biases in how it measures improved performance like neglecting a negative effect in the new procedure, for example that the industrial robot wears out at a much faster phase then before.

Decreasing it’s autonomy would lead to it needing more human input in order to produce the product leading to slower and more expensive production, but would probably be seen as a good thing from highly specialized workers at the factory as their service would be needed more.

Nano robot

Increasing it’s level of autonomy even further would probably go at the expense of human control as the robot would probably decide the route and the places it would monitor. These could both be a positive thing as it could perhaps find things the operator couldn't sense in the same way as the robot, but could also make it worse as the user would either not be confident enough to actually use the system or maybe too confident leading to the operator trusting it blindly. These are both scenarios that could lead to dangerous situations given the environment this robot is meant for, where the operator's trust in the system can have life and death consequences.

Decreasing the automation of the nano bot would probably lead to it being harder to operate as quality of life features like it being able to hover on it’s own would probably disappear. This would probably reduce its usefulness in the field as you would need somebody to completely dedicate themself to controlling the robot during operation, instead of it being able to do certain tasks by itself.

Explainability of the robots

To judge the robots' explainability as explained in Hagras (2018) we need to examine how understandable the robot actions are for the user and how understandable they need to be.

For the industrial robot I would hope that the current level of explainability is sufficient enough. With sufficient I mean so that the person charged with controlling the robot performance is able to understand how it performs its task. Meaning that he should be able to look over how it is programmed to do the task, seeing things like how it maneuvers and how much force it applies. So that he can see that it is set up right to perform its tasks. And so that he is able to see that it is not performing its tasks based on any biases that could have a negative impact on both the safety of the manufacturing process and the quality of the finished product.

I would think that given that this is military grade equipment, where the users trust in the equipment may be key in saving lives. Would mean that the system vendor has had a big focus on achieving an acceptable level of explainability in order for the military to be able audit it and for them to be able to properly train an operator in how to use the system.

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