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Modul 1:

1.1 concepts

how the term Artificial Intelligence came about, and the history of AI. Why, how, what, when, where and by whom?

The concept of intelligence dates back to philosophers like Aristotle, who saw it as choosing the best way to achieve one's goals. Later, thinkers like Arnauld and Bernoulli added ideas of uncertainty and usefulness to decision-making. These ideas became the basis for economic theories about rational actions.

When AI research started in the 1940s and 1950s, researchers adopted the idea that intelligence is about acting rationally, meaning doing what is most likely to achieve a set goal. This standard model became the foundation of AI, focusing on creating systems that can perceive their environment and act to meet specific objectives.

In the early stages, AI development included methods like exploring multiple possible solutions and using logical rules for automated reasoning. By the 1980s, researchers started using probability theory to handle real world uncertainties, helping shape AI into what it is today (Stuart, R. 2021).

Three definitions of AI:

- Stuart Russell and Peter Norvig, in "Artificial Intelligence: A Modern Approach," define AI as "the study of agents that receive percepts from the environment and take actions that affect that environment." This widely accepted definition in AI academia and industry emphasizes creating rational agents that autonomously interact with their surroundings, focusing on adaptability and goal-oriented behavior rather than simply imitating human actions. (Stuart, R & Peter N. 2021)
- In 1956, John McCarthy defined AI as "the science and engineering of making intelligent machines, especially computer programs." This definition focuses on building machines that can solve problems, learn, and adapt, highlighting both the scientific and engineering aspect of AI. (S. L. Andresen, 202).
- AI is machines that can learn, understand, and make decisions based on the surroundings. The ability to solve problems, adapt to new situations, and function independently of human control.

Similarities and differences between human autonomy and machine autonomy:

Similarities: Both humans and machines can make decisions without someone telling them what to do. Humans use their thoughts and experiences. Machines follow their programming and react to inputs.

Both try to achieve goals. Humans set their own goals or goals for society. Machines are programmed to complete tasks set by their creators.

Differences: Humans are conscious and can think about what's right and wrong. Machines do not have awareness or feelings; they cannot understand ethics.

Humans learn and grow through experiences and interactions with others. Humans build skills like self confidence and critical thinking. Machines do not learn in the same way, they only do what they are programmed to do. Formosa, P.(2021)

Similarities between the concept of automatic and the concept of autonomous

Both automatic and autonomous systems can operate without someone controlling them directly.

Automatic systems and autonomous robots both work independently. They can either help people by doing tasks or limit their freedom by taking over decisions. Like automatic systems, autonomous robots can influence people's actions, affecting how genuine their choices are.

Select one of the articles from the curriculum. Write a brief review of this article: AI and HCI: two fields divided by a common focus:

This article discusses how Artificial Intelligence (AI) and Human-Computer Interaction (HCI) have been separate because they had different goals. AI focused on big, long-term projects needing advanced technology. HCI aimed to make widely used systems easier for people.

Because of these differences, AI and HCI often competed for resources. When AI faced setbacks during "AI winters," HCI tended to thrive.

Recently, technology has improved, and costs have decreased. This makes AI more accessible and allows it to merge with HCI. Now, AI researchers are thinking about usability, and HCI researchers are using AI techniques.

The article suggests that for both fields to succeed, they should find common goals and work together more closely.

Company that works with AI, how this company present AI on their web pages.

No Isolation is a company that creates technology to reduce loneliness among vulnerable people, like children with long-term illnesses and the elderly. On their website, they focus on how their products help people, not on Artificial Intelligence (AI).

They don’t present AI as a product, platform, or service. AI works behind the scenes in their products, but they don’t highlight it. They concentrate on practical benefits and ease of use.

On their website, No Isolation talks about the idea of using technology to bridge social gaps and connect people. They share user stories and the social issues they address. While AI might be part of their products, they don’t promote it as a separate product or service.

They include AI in their technology but mainly focus on the bigger idea of fighting loneliness through innovative tech, keeping the emphasis on people and reducing social isolation.

Select one documentary or a fictional film, book or game that is about the use and interaction with AI and interaction between people and AI.

In the Metalhead episode of Black Mirror, people are hunted by robot dogs powered by AI. These robots are relentless and cant be reasoned with, its a desperate fight to survive. The episode shows that AI can be dangerous when it operates without human control or ethics.

Its like Arthur C. Clarke’s idea that very advanced technology can seem like magic. The story warns us that while technology can do amazing things, we need to be careful. If we don’t manage it properly, it could become a threat. The episode reminds us that we must handle technology wisely to avoid unexpected dangers.

1.2 Robots and AI systems

write a section about how the word Robot came about

The word “robot” comes from the Czech word “robota,” meaning forced work or labor. It was first used by Czech writer Karel Čapek in his 1920 play called “R.U.R. (Rossum’s Universal Robots).” In this play, robots are machines created to serve humans. (A.E. Eiben, 2022)

Find two different definitions of Robot. Describe and explain these definitions.

Oxford Dictionary: “A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer.

This means a robot is a machine that can do tasks on its own, and we can program it to do different things.

Merriam-Webster: “A machine that resembles a living creature in being capable of moving independently and performing complex actions.”

This definition says a robot might look like a living thing, can move by itself, and do complicated tasks.

My Definition: A robot is a machine that can work on its own or with some guidance, programmed to do tasks, often using sensors to interact with its surroundings, to help or replace human work.

Is chatbot a robot?: a chatbot can be considered a type of robot, even though it does not have a physical body. It operates on its own, is programmed, and interacts with people to perform tasks, like answering questions or providing information.

Is a robot different from an AI?

According to the definitions from Ness, Stephanie, Nicki James Shepherd, and Teo Rong Xuan. (2023), robots are programmable machines designed to interact with their physical environment autonomously. They are built to perform repetitive tasks, operate in dangerous conditions, and enhance human productivity through automation.
on the other hand, AI is the technology that enables machines to exhibit human-like intelligence. This includes learning, problem-solving, decision-making, and adapting behavior based on experience. AI does not necessarily require a physical body, it can exist purely as software (e.g., chatbots, recommendation systems).

Differences: Robots have a physical form, allowing them to interact with the physical environment
AI can be software-based and may not have a tangible presence

Similarities: Both robots and AI systems can be programmed to operate autonomously. Robots use AI to enhance their adaptability and decision-making, while AI uses robotics to interact with the physical world.

Commercial robot and how a human user interacts and uses the robot in a specific situation.

AV1 by No Isolation is a robot designed to help children and young adults with long term illnesses stay connected with their school environment. The robot acts as a physical presence in the classroom for students who cannot attend due to health related issues.

How the robot moves?:
The robot is stationary and does not move around the classroom physically. It has a rotating and tilting head controlled by the child through an app on a tablet or smartphone. Using the app, the child sees and hears the classroom via AV1 camera and microphone. They can look around by moving the robots head. To communicate, they speaks into their device, and their voice comes out of the robots speaker. They can also use the robots lights to signal

things like wanting to speak. This setup allows the child to participate in lessons and interact with teachers and classmates as if they were there in person.

1.3 Universal Design and AI systems

Definition of Universal Design. Explain this definition and how you understand what Universal Design is about.

Universal design is an approach for designers to make products and services accessible and usable for the largest possible audience without the need for adaptation or specialized design. Designers use its seven principles to create a solution that can cater to as many users as possible. (IxDF, 2016)

This definition highlights making products, services, and environments that are naturally accessible and easy for everyone to use, regardless of their age, ability, or background. The main idea is to design with inclusivity from the very beginning so that as many people as possible can use the product without needing any changes or special adjustments.

Describe the potential of AI for human perception, human movement and human cognition/emotions.

AI helps interpret sensory data to improve human perception. For example, the "Hand Gesture Recognition Using 3D-CNN Model" uses a 3D Convolutional Neural Network to accurately recognize hand gestures, enabling better communication, especially for those who use sign language (A. K. Sangaiah, H. Lu and Q. Hu, 2020)

AI supports human movement by monitoring physical conditions. The "Human Arthritis Analysis in Fog Computing Environment" system uses sensors and fog computing to track limb movements in arthritis patients, providing real-time analysis and aiding doctors in efficient patient care (A. K. Sangaiah, H. Lu and Q. Hu, 2020).

Describe the potential of AI for both including and excluding people. You are encouraged to use examples

Including: AI tools like speech-to-text (Google Live Transcribe) help those with hearing impairments, while visual recognition apps (Microsoft Seeing AI) assist individuals with visual impairments by describing surroundings and reading text aloud.

Excluding: AI trained on biased data can lead to discrimination. For example, facial recognition software often misidentifies individuals.

In the WCAG 2.1 principles and in many of the Human AI-Interaction guidelines the concepts “understand” and “understanding” are used.

In WCAG 2.1, this means content should be clear and accessible for all users.
For example, videos and sounds should have text descriptions, text should have audio versions, images need alternative text, information must be structured so it can be easily interpreted by assistive technologies for example using heading tags correctly from h1 to h1 in logical order. Using colors thoughtfully in diagrams also helps convey information effectively etc.

Machines understanding is limited to following specific algorithms. They do not have awareness, emotions, or personal experiences like humans do. They can process data and give responses, but this is just a simulation of understanding, not real comprehension.

Do machines understands?

AI cannot fully replace human insight and experience. For example, human insight may be necessary to interpret and understand the data presented by AI. We want the data presented by AI to be 100% correct, including ensuring that hearing-impaired users receive accurate transcriptions of audio and video, and that blind users receive a correct description of the content. The problem description should be accurately explained, and the deviation found by AI should not be a false positive, and vice versa. It is likely that there may be a false deviation or a deviation that has been approved by the AI tool. This is a problem because it can lead to accessibility issues being overlooked. It can be difficult to determine which problems are real and which are not.

1.4 Guideline for Human-AI Interaction

Select one of the 18 guidelines for human-AI interaction from Microsoft, and describe this guideline with a different example than what is given by Microsoft.

The guideline 03: “Time services based on context” emphasizes that AI systems should provide their services at appropriate times based on the user’s current situation, environment, or needs. This helps make interactions more seamless and less disruptive.

Consider a smart learning app designed to help students with their studies. The app uses AI to analyze the students study patterns and learning progress. If the AI detects that the student has been studying for an extended period and their performance starts to decline it could suggest taking a break.

Find one set of HCI design guidelines. Similarities and differences between the HCI design guidelines and the Human-AI interaction guidelines.

The human-Computer Interaction (HCI) design guidelines i want to compare with is Nielsen's 10 Usability Heuristics.

Similarities: Both guidelines focus on keeping users informed. Nielsen's "Visibility of system status" heuristic suggests that systems should always keep users updated on what is happening. Similarly, AI Guideline 03 calls for systems to alert users when a timed action, such as a session timeout, is about to occur.

Differences: The AI guideline focuses on the system adapting to user behavior in real-time, like delaying actions if the user seems busy. Nielsen's guidelines, on the other hand, are more about fixed design principles and do not require the system to change based on user actions.

1.5 Journal - everyday engagement, interaction and use

Paper writing: It feels very natural to write with paper. when writing on paper, I only use one hand as opposed to the keyboard, this allows me to feel a little more free. Using pen and paper boosts my creativity in ways that typing on a keyboard does not. I also tend to make fewer mistakes when writing by hand compared to typing. However, paper writing can get a bit messy; when I do make an error, I have to cross out the word with my pen, which can make the page look cluttered.

Qwerty keyboard: When using a keyboard, I can type much faster, and unlike handwriting, my hands get less tired. While I do tend to make more typos along the way, correcting them is much quicker, and the autocorrect or spell check features often catch mistakes for me, which is a feature i appreciate.

By voice: Using my voice allows me to be more free and creative. I do not have to split my attention between a screen or paper and the words I'm writing. Instead, my thoughts flow more naturally when I can simply speak them out loud. I can even lie on the bed, stare at the ceiling, and let the ideas pour out effortlessly.

Modul 2:

Characteristics of AI infused systems

The paper “Guidelines for Human-AI Interaction, Amershi et al. (2019) looks at how AI systems interact directly with users. AI makes processes more personal, automatic, and efficient in many areas (Amershi et al., 2019). As AI becomes more common in things like virtual assistants and content recommendations, it faces big challenges in dealing with uncertainty, personalization, and adapting to different situations.

One key feature of AI systems is that they are not always certain. Unlike older systems with set rules, AI works with probabilities which makes its results less predictable. Example a movie recommendation system might suggest movies that you do not like if its misunderstands what you prefer. Amershi et al. (2019) say this can annoy users, make them lose trust, and stop using the system if it often gives bad results.

Another important feature is personalization. AI systems often change based on how users interact with them, collecting data about user behavior to improve future experiences. For instance, an AI might suggest products or content based on what you have done before. While this personalization can make the user experience better, it can also strengthen biases or limit the variety of information users get. Kocielnik et al. (2019) points out that users usually expect AI systems to be very accurate, and when personalization fails, it can confuse and disappoint users.

Example: Facebooks AI powered ad system

Facebooks AI powered ad system is a good example. It helps businesses show ads to specific groups of people based on things like interests and online behavior. This system shows how AI can personalize content and adapt to different situations.

The system learns from user data to guess which ads people might like. It looks at lots of information to show ads that match what users are interested in. For example, if someone often looks at fitness posts, they might see ads for gym clothes or vitamins. This helps advertisers reach the right people and possibly sell more.

However, this personalization has good and bad sides. It is nice for users to see ads they care about, which can make using Facebook more enjoyable. But it also raises worries about privacy and being influenced. Some people might not like that the system is always learning about them. Also, seeing only ads for things you already like might mean you miss out on new ideas or products. This can create a “bubble” where you only see more of what you already know and like.

The system also changes based on things like the time of day or where you are. This means you might see different ads in the morning compared to the evening. While this helps advertisers reach people at the right time, it can also feel a bit too personal for some users.

The system is not perfect. Sometimes it shows ads that do not make sense for the user, which can be annoying. For example, showing baby product ads to someone without children. This can make people trust Facebook less. There are also concerns about fairness, as the system might treat different groups of people differently when deciding which ads to show.

In summary, Facebooks ad system shows both the good and bad sides of AI. It is very good at personalizing content, but it also brings up issues about privacy and trust. When making these systems, it's important to balance personalization with being fair and open about how user data is used.

Human-AI interaction design

When humans interact with AI systems, it creates unique design challenges because AI systems often behave differently from regular computer systems. To help with this, Amershi et al. (2019) came up with 18 guidelines to make human AI interaction better. These guidelines help create systems that not only work well but are also easy to use. Two important guidelines are Guideline 13: Learn from how users behave and Guideline 18: Tell users about changes.

Guideline 13: “Learn from how users behave” issues in developing the AI system that would keep on learning and improving and updating according to the way people choose to use them. The continuous process of learning will help the AI system personalize experiences by tracking their interaction with the users. Example, A video suggesting system may keep track of what you repeatedly watch and adjust its suggestions so that they better align with that. This can personalize the experience more, therefore being more enjoyable for the user, since it gets better as time goes on understanding the users preferences. This method does have its cons. Kocielnik et al (2019) have shown that users often expect AI to always be highly accurate and consistent. If the system is wrong in its guesses or wrong when it guesses what the user likes, this may frustrate the user. Also, in case the system learns only

from what the user does, then it would be so narrow in the things it would suggest to the user that not many other varieties of content or ideas would be seen.

Guideline 18: “Tell users about changes” is about being open and clear with users about AI systems. AI systems often get updates to improve, add new features, or fix issues. But if these changes aren’t clearly explained, they can confuse users. For example, a virtual assistant might gain new skills, or a content recommendation system might change how it chooses what to show you. If users aren’t informed, they might be surprised or upset by unexpected changes in how the system works (Amershi et al., 2019). Explaining changes clearly helps maintain users’ trust. It allows users to understand how and why the system is changing. By informing users about important updates, the system can prevent confusion and help users feel confident when using it.

These two guidelines are very important for making users happier with AI systems. By learning from users, AI can offer more personalized experiences. Also, by telling users about changes, the system can build trust and be more transparent. Together, these practices ensure that AI systems not only work well but also provide a good experience that encourages users to keep using them.

Conversational user interfaces to large language models

Conversational interfaces, like those powered by large language models (LLMs), are a big step forward in AI systems. These interfaces let users talk to AI using natural language, which makes them easier to use. Designing these conversational interfaces comes with challenges, especially because these systems are complex and often unpredictable in what they say.

One big challenge in designing conversational interfaces for LLMs is managing what users expect. Users often think conversational systems, like ChatGPT will always give accurate and reliable answers. But large language models are not perfect they can make mistakes, have biases, and be inconsistent. Bender et al. (2021) say that one major issue with LLMs is that they learn from huge amounts of text data, which can include biases and stereotypes. These biases can show up in the AI's responses, potentially leading to harmful or offensive outputs. Also, LLMs can give answers that sound right but are actually wrong, which can mislead users into thinking the information is correct when it is not.

Another challenge is that AI systems can be unpredictable. Because conversational interfaces use complex algorithms that learn from data, it can be hard to predict how they will behave. Yang et al. (2020) point out how difficult it is to design human AI interactions when the system's responses are not consistent or reliable. For example, a user might get a correct and helpful answer one time, but a completely wrong or irrelevant answer another

time. This inconsistency can make users lose trust and make it hard for designers to create systems that feel reliable.

To help with these challenges, Amershi et al. (2019) suggest two guidelines for designing better conversational interfaces. Guideline 1: “Make it clear what the system can do” means that AI systems should clearly tell users what they are capable of. This is especially important for conversational interfaces, where users might not understand the system's limits. By setting clear expectations about what the AI can and can't do, designers can reduce user frustration. For example, a conversational system might tell users that it can answer factual questions but might struggle with more complex topics. This helps manage user expectations and builds trust.

Guideline 2: “Make it clear how well the system can do what it can do” is another important guideline for conversational interfaces. Because LLMs can make mistakes and be inconsistent, it is important to let users know how confident the system is in its answers. For example, the system could say whether it is very sure about its answer or if it is not certain. This helps users judge how reliable the information is and make better decisions about how to use it. Also, by showing when it is uncertain, the system can reduce the risk of users relying on wrong or misleading information, which is especially important for serious applications (Amershi et al., 2019).

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