Manchester Metropolitan University

Graduate Skills:
Critical Thinking

Tutor Name

tutor@mmu.ac.uk

Introduction

- The primary aim of the session is to encourage you to think critically, form opinions, and make recommendations.

- The session will encourage critical thinking by exploring the following topics:
  - A brief introduction to what is Artificial Intelligence (AI)
  - The future of data and AI in the tech industry
  - AI for Good
  - Data protection and ethical considerations

Many thanks to Professor Keeley Crockett for providing content and her expertise in AI for this session.

Artificial Intelligence

- Artificial Intelligence (AI) defines “the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings.” – Britannica

- The definition allows for multiple systems to be considered as AI and somewhat mystifies what AI could be in our future.

- This session will focus on the connection between AI for good and the data behind AI, while also considering the ethical concerns around these points.

Artificial Intelligence

- As a topic of debate, AI affects us all, being at the core of many applications used by millions of people every day.

- AI and data can impact almost any area of IT/computing, and is therefore relevant to you all, regardless of what course you are on.

- AI is based on data, and there are many ethical considerations around how data is collected, stored and processed. Some of that data may be personal data about you!

AI for Good

- ‘AI for good’ refers to an area of AI that is dedicated to improving human quality of life, as a direct outcome of the system.
- ‘AI for good’ includes applications related to education, healthcare, defence, logistics, and more.
- The person-oriented nature of ‘AI for good’ brings ethical challenges that must be overcome before the technology can be harmoniously integrated with the general population.

AI for Good

Activity 1

Critically consider AI scenarios

Introduction

- The following activity will be used to source your views and opinions on some ethical considerations of AI.

- AI is an increasing area of software and web development, is used in games and VFX, and is driven by data. It will play a role in many of your future careers, and is increasingly part of our daily lives.

- These questions will encourage you to think critically, develop an argument, and form an opinion on a range of scenarios.

Instructions

- Working through the scenarios, you should act as a committee or panel to discuss the points as a group, and with your tutor. What questions does each scenario raise?

- We will see whether, having considered the questions, we all agree on a response. If not, where are the differences in opinion?

- You will be encouraged to think critically about the topics and visit multiple perspectives on each question.

Thinking about AI

"In the first two decades of the 21st century, the boom of advanced machine learning techniques and big data revolutionized modern computing. Highly capable AI has now infiltrated its way into nearly every field imaginable: medicine, finance, agriculture, manufacturing, the military and more. Rather than sentient beings, AI has taken form as complex algorithms — ones that can diagnose breast cancer from mammograms more accurately than trained radiologists or detect DNA mutations in tumor gene sequences.

Now more than ever, AI has an enormous capability to impact people's lives in a meaningful and substantial way. But it also raises multidimensional questions that simply don't have easy answers ……

One of the areas where AI is currently being implemented is at the intersection of law, government, policing and social issues like race: the criminal justice system."

Source: "Artificial intelligence poses serious risks in the criminal justice system", the John Hopkins University newsletter.

Key questions

- What are the potential benefits of this AI technology?
- What are the potential problems associated with this AI technology?
- Do the benefits always outweigh any problems?
- If we implement this system is there an acceptable level of error and if so, what is that level?
- Should AI or humans have the last say in making a decision?
- What do we know about the data behind the system? Is it important?
- What do we know about the algorithms behind the system? Is it important?

Activity I: Scenario 1

Scenario: A local tech company is seeking approval to use self-driving wheelchairs at a local hospital. The wheelchairs have passed the required safety checks, but have not been tested on the public yet.

Question: Will you Approve or Disapprove this request?

Self-Driving Wheelchairs Debut in Hospitals and Airports

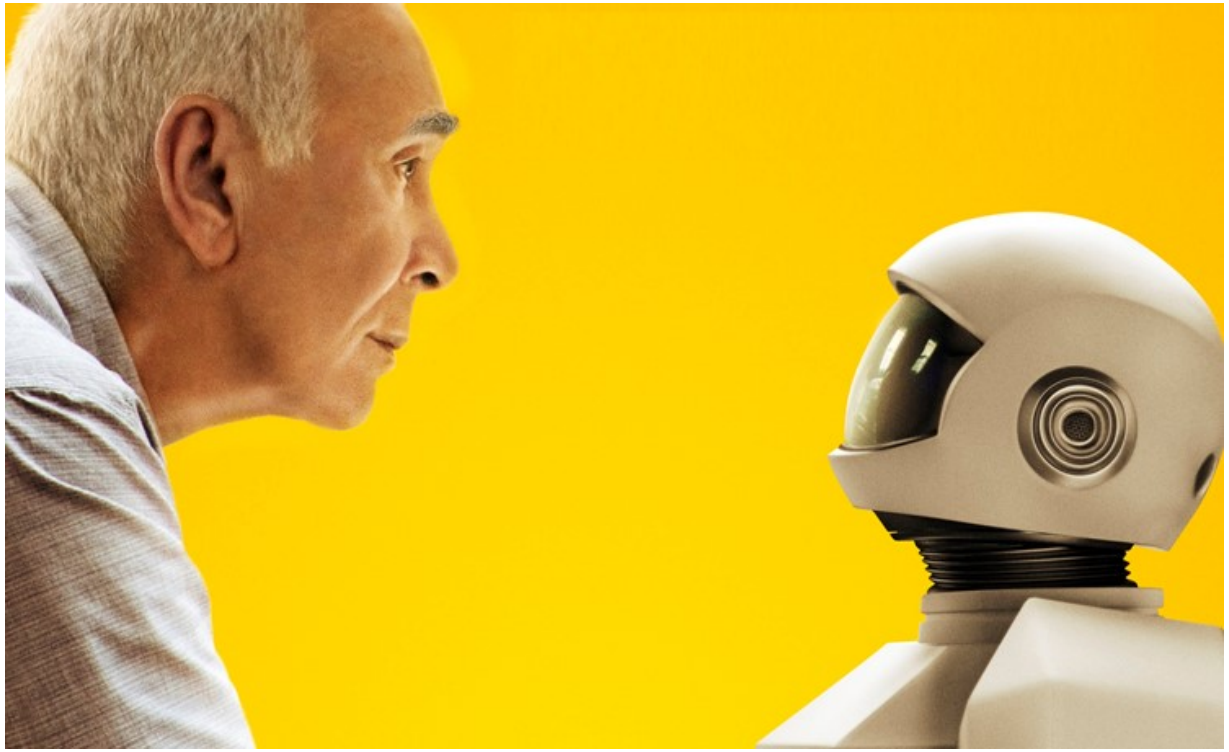
The autonomous vehicles sense positions, select routes, and stop for obstacles

By **Megan Scudellari**

Photo: Panasonic

Activity I: Question 2

Scenario: The local council is aiming to reduce admissions of elderly people into care homes by promoting care in the community where possible. They are considering an Eldercare Robot to look after the elderly so they can stay in their own home.



Question: Will you Approve or Disapprove this request?

Activity I: Question 3

Scenario: The army requests permission to complete research on drone technology that spies on targets without raising suspicion.

Question: Will you Approve or Disapprove this request?

Activity I: Question 4

Scenario: As part of budget cuts, local healthcare are considering the introduction of robot administrators that can also assist with quick medical queries.

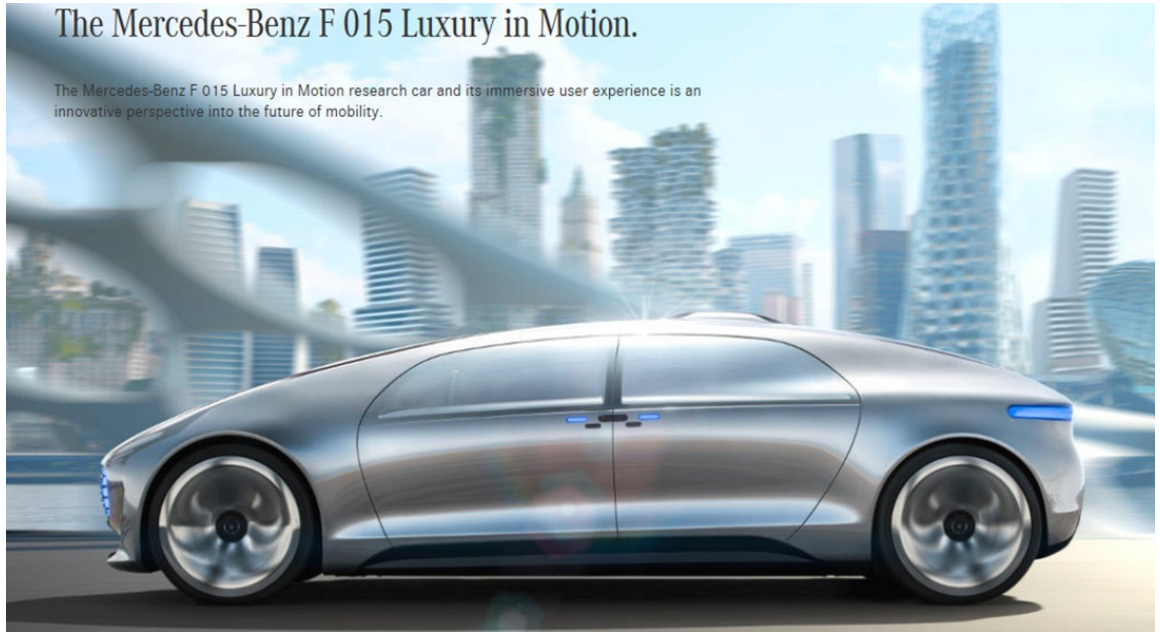
Question: Will you Approve or Disapprove this request?

“ websites and artificial intelligence “chat bots” could replace up to 90% of Whitehall’s administrators, as well as tens of thousands in the NHS and GPs’ surgeries, by 2030 – saving as much as £4bn a year.” – the Guardian

Activity I: Question 5

Scenario: A review is being conducted into the highway code, considering if fully self-driving cars should excuse passengers from any responsibility.

Question: Will you Approve or Disapprove this request?
(i.e. should passengers be excused, or not?)



https://www.mercedes-benz.com/en/innovation/autonomous/research-vehicle-f-015-luxury-in-motion/

Activity I: Question 6

Scenario: A local council are considering adopting self-driving school buses to reduce the cost of the service and support their image as leading in tech innovation.

Question: Will you Approve or Disapprove this request?

Meet Hannah, a concept for an autonomous bus that solves long-standing issues with school buses. But will parents ever trust an AV with their kids?

3/7 [Photo: courtesy Teague]

Activity I: Question 7

Scenario: A shopping arcade is considering the introduction of facial recognition technology to identify known shoplifters if they enter the arcade, so that security staff can be alerted to keep an eye on them.

Question: Will you Approve or Disapprove this request?

Activity I: Question 8

Scenario: A giant tech company in partnership with a local hospital are suggesting the introduction of robots to assist with healthcare amid a fall of nursing staff numbers.

Question: Will you Approve or Disapprove this request?

Moxi Prototype from Diligent Robotics Starts Helping Out in Hospitals

Diligent Robotics demos the latest version of their healthcare support robot

By **Evan Ackerman**

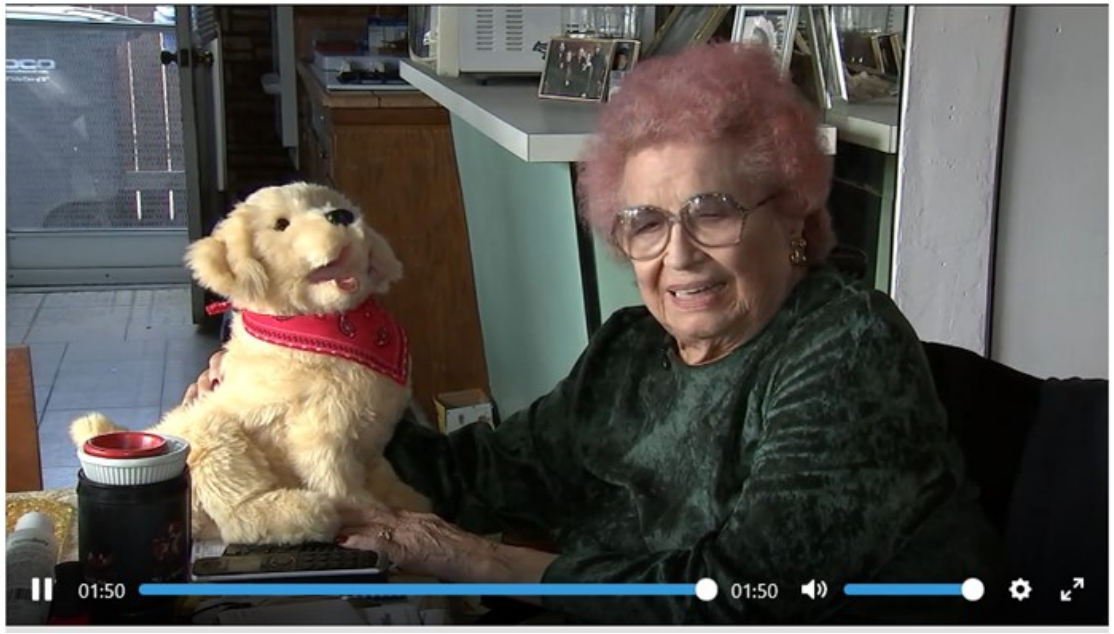
Photo: Diligent Robotics

Activity I: Question 9

Scenario: A local council are considering introducing robotic pets to combat loneliness experienced by their increasingly ageing demographic.

Question: Will you Approve or Disapprove this request?

Robotic pets helps seniors reduce stress and feelings of loneliness



https://www.youtube.com/watch?v=I9jup-fzmjc&ab_channel=VisitingAngelsLivingAssistanceServicesCorp.

Robotic dog moves into Dorset care home
https://www.bbc.co.uk/news/av/uk-england-dorset-43479791

Activity I: Question 10

Scenario: Local police are considering the introduction of robots to improve the safety of officers and reduce the strain of patrolling during unsociable hours.

Question: Will you Approve or Disapprove this request?

Activity 1: Debrief

- In this activity you used critical thinking to consider and discuss a range of scenarios and ethical issues related to AI.
- Critical thinking is an important graduate skill, and something you should continue to develop throughout your course.
- Every scenario discussed was based on a true story sourced from news or press releases from around the world.

Activity 2

AI and Data

Activity 2: Introduction

- The previous exercise focused on AI and AI for good, navigating complex ethical issues that arise from the introduction of this powerful technology to the general public.

- We will turn our attention now to the data that powers AI, and the data pipeline, from collection to processing. We have already mentioned data when considering earlier scenarios.

- Most data will be stored in databases, optimised for Big Data.

Big Data

- Big Data refers to a large volume of data that forms a collection. The data can originate from multiple sources and be structured or unstructured.

- AI utilises large data volumes to create decisions, using supervised learning for data that has been structured and is appropriately labelled, and unsupervised learning for data that is unstructured.

- Details about you is probably included in existing big data sets (e.g. from your online activities).

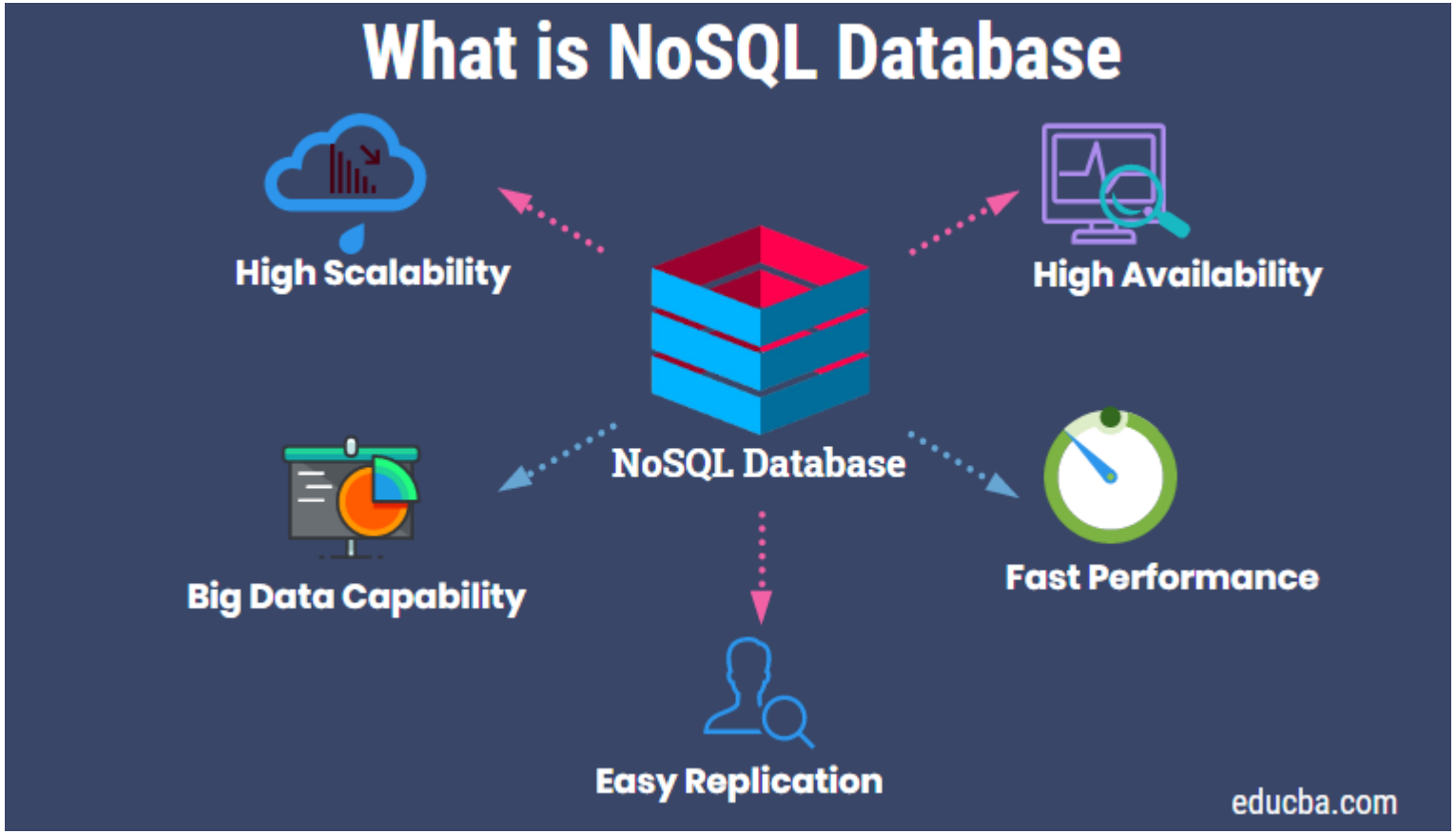
Big Data

- From a data perspective, big data requires new database technologies to accommodate the large volumes of data involved.

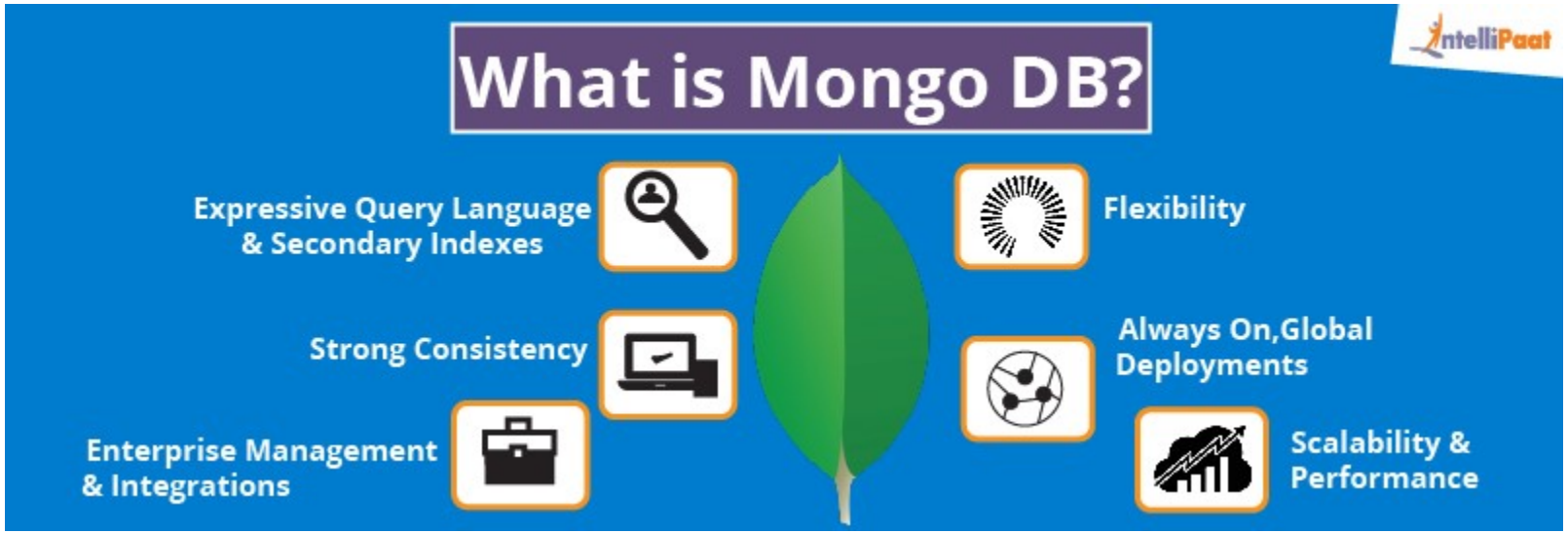
- You may have heard of some of these databases before and may have seen the increase in demand for knowledge of working with these databases in active listings.

- Two popular database platforms that work well with Big Data are No SQL and MongoDB.

Big Data - NoSQL



Big Data - MongoDB



Data and AI

- A key challenge for AI is identifying risk from the provided dataset, especially when considering that the output of an AI-based system is dependent on the data it consumes or studies.

- Similarly to the risks identified in the previous activity, it is important to consider bias and discrimination that may occur in AI due to the training data.

- If a dataset contains demographic information, but the data has not been sanitised to remove invalid data, or the context of the data has not been considered at training, a biased outcome is possible.

Activity 2: Instructions

- The following activity will help explore the importance of assessing the risk your dataset may generate when training AI.

- You will critically consider a couple of scenarios that highlight the importance of risk assessment in AI, specifically deriving from the data that forms the machine-learning or decision-making process.

Data and AI – Scenario

- A recruitment company is investing in an AI-assisted HR Recruitment Tool for identifying certain character traits and criteria during video interviews, to predict which candidates would be a good fit for their organisation.

- The company is using a dataset of 6000 historical records, however the data does derive from a recruitment procedure that has now changed.

- The dataset contains information on 1500 Females, 4000 males, and 5000 not disclosed

❖**What are the potential risks to the candidate?**
❖**What are the potential risks to the company?**

Data and AI – Scenario

- A courtroom is investing in AI-driven technology which helps judges in making bail decisions, by predicting how likely an offender is to jump bail or to reoffend. It also matches prisoners to suitable intervention programmes.

- The system has been trained using the data from everyone granted bail over a 5-year period, including what happened after they were bailed.

What are the potential risks in terms of the data?

What are the potential risks of the system?

What are the potential advantages of the system?

Reducing AI bias - Scenario

- Consider the following example scenario from the Information Commissioner's Office:

> A bank develops an AI system to calculate the credit risk of potential customers. The bank will use the AI system to approve or reject loan applications.
>
> The system is trained on a large dataset containing a range of information about previous borrowers, such as their occupation, income, age, and whether or not they repaid their loan.
>
> During testing, the bank wants to check against any possible gender bias and finds the AI system tends to give women lower credit scores.

- What could have caused this bias to occur?
- What could have been done to prevent this from happening, or at least reduce any bias?

Source: Information Commissioner's Office

Reducing AI bias

Risks	Solution
Imbalanced Training Data	Obtain balance by adding more data points
Training data reflects past discrimination	Modify the data, change the learning process, or modify the model after training.
• Bias in the labelling process • Cultural assumptions • Inappropriately defined objectives • Model deployment (User Interface) • Automation bias • Lack of interpretability	Ensure mathematical fairness methods or statistical validation has been used when training AI

Activity 2: Debrief

- This activity explored the potential risks involved with training AI, due to the data used to train these systems.

- Although this session has focussed on data in the context of AI, as future programmers and producers or manipulators of data, it is important that you consider the integrity and appropriateness of data for any task in which data is involved.

Activity 3

Data, Privacy and the Web

What does privacy mean to you?

- How would you define privacy?
- What does it meant to you for something to be private?

Definition

- “Privacy is the claim of individuals, groups or institutions to determine for themselves when, how, and to what extent information about them is communicated to others.”

(Alan Westin, *Privacy and Freedom,* 1967)

Privacy on the Web

Gathering, compilation and selective dissemination of information.

- Where is my data?
- How is it used?
- Who sees it?

Privacy in the context of data processing

- “respect the capacity of the individual to determine in principle the disclosure and use of his/her personal data. Limitations to this informational self-determination are allowed only in case of overriding public interest”

(German Constitutional Court, 1983)

How is data privacy protected?

Privacy as a right is protected:

- By law
- By policy
- By technology

How is data privacy protected?

- By law:
  - **General Data Protection Regulation** (GDPR) – drafted by EU, and is the toughest privacy and security law in the world
    https://gdpr.eu/
  - **The Data Protection Act** – controls how your personal information is used by organisations, businesses or the government
    https://www.gov.uk/data-protection

How data privacy is protected by policy

- Organizational privacy policy is concerned with the organisation's role as a controller of personal data

- Organisations must have policies that ensure GDPR compliance

Privacy policy negotiation:

- The **Platform for Privacy Preferences Project** (P3P) - P3P's design allows Web sites to deliver automated privacy statements, and makes it possible for users' browsers to review the statements and to automate decision-making based on these practices when appropriate.

https://www.w3.org/P3P/

How data privacy is protected by technology

- Privacy-enhancing technologies (PET) - technologies that embody fundamental data protection principles by minimizing personal data use, maximizing data security, and empowering individuals

- PET can range from ad-blocker browser extensions to encryption infrastructures that secure information we communicate over the web

Web privacy concerns

- Data is usually collected silently.
- Data from multiple sources may be merged.
- Data collected for business purposes may be used elsewhere.
- Users given no meaningful choice.
- But, GDPR compliance should give users more control over what happens to their data.

Categories of web privacy violation

1. Information collection.

2. Information processing.

3. Information dissemination.

4. Information Invasion.

https://hackercombat.com/knowledge-base/privacy-violation-what-it-means/

(Daniel J. Solove, A Taxonomy of Privacy, 2006)

Informed vs Implied Consent

- GDPR definition of informed consent:

- **Informed consent** means the **data** subject knows your identity, what **data processing** activities you intend to conduct, the purpose of the **data processing**, and that they can withdraw their **consent** at any time.

Implied Consent

- *Consent that is inferred from actions, facts, or other consent of broader coverage.*

- Many sites collecting information about users do not explicitly inform them that they are doing so!

- Your browser is implicitly giving consent on your behalf when accepting cookies.

Activity 3: Introduction

- Social media applications provide interactive platforms that facilitate the creation and exchange of information, through virtual communities.

- In this activity, we will look at social media **privacy** from a design perspective.

Instructions

- Discuss the **technological** and **ethical** privacy considerations related to social media applications with a particular focus on information.
- Discuss the issues from a **technology** point of view in isolation of any other factors.
- Discuss the issues from an **ethical** point of view in isolation of any other factors.
- Based on these factors, what privacy recommendations would you make?

Technological Considerations

- Personal data storage and processing
- Use of cookies
- Users publish data openly
- Wireless devices may send and receive unprotected data

Ethical Reasoning

- Identifiers make it personal data – protected.
- New “public” space – “digital" plane (Wifi, Bluetooth, Tweets - technically mediated).
- Possibility of social profiling, and 3rd party advertising
  - transparency is essential.
- Inappropriate content – control measures needed.

Possible Recommendations

- Privacy policies needed that reflect the ethical values and comply with existing laws.
- Informed consent is vital: opt-in or opt-out depending on sensitivity.
- Filtering inappropriate content.
- No spamming or over promoting.

Activity 3: Debrief

- In this activity we looked at information privacy by design for social media applications on the web.

- We have specifically taken technological and ethical factors into account and concluded a set of privacy recommendations.

Activity 4

Data, Privacy and Cross-Channel Advertising

Introduction

Cross Channel Advertising Platforms

- Cross-channel advertising refers to the process of advertising across multiple digital advertising channels.
- Advertisers have several avenues through which to advertise online, with search, display, mobile, social, and video advertisements all being viable options for reaching potential customers.
- In this activity, we will be looking at cross-channel advertising **privacy** from a design perspective.

The Privacy and Electronic Communications Regulations (PECR)

- PECR gives people specific privacy rights in relation to electronic communications.

- Specific rules on: marketing calls, emails, texts, cookies (and similar technologies).

PECR Rules

- A person's (valid) consent is usually needed before sending them a marketing message.
- Consent must be knowingly and freely given, clear and specific.
- It must cover both your particular organisation and the type of communication you want to use (eg call, automated call, fax, email, text).
- The person must fully understand that they are giving you consent.
- You cannot show consent if you only provide information about marketing as part of a privacy policy that is hard to find, difficult to understand, or rarely read.

Instructions

- As a group, discuss the **technological** and **ethical** privacy considerations for Cross-channel advertising platforms.
- Discuss the considerations from a **technology** point of view in isolation of any other factors.
- Discuss the considerations from an **ethical** point of view in isolation of any other factors.
- Based on these factors, what privacy recommendations would you make?

Technological Reasoning

- Multiple communication channels (PC, mobile, etc.) - increases complexity for privacy preservation.
- Interconnected third-party platforms and tools - increases complexity for privacy preservation.
- Transfer of customer data from third party services.

Ethical Reasoning

- Possibility of conflict in privacy policies with third party services that provide customer data.
- Consistency in customer privacy among different communication channels.
- Maintaining the balance between complying with privacy regulations and understanding customer needs.

Possible Recommendations

- Privacy policies needed that reflect the ethical values and comply with existing laws.
- Obtain customer consent clearly and specifically for marketing purposes.
- Liaise with third parties to agree privacy policies that effect customer data.

Activity 4: Debrief

- In this activity we have looked at information privacy by design for Cross-channel advertising platforms.

- We have specifically taken technological and ethical factors into account and concluded a set of privacy recommendations.

Final note

- In this session you have thought critically about a range of scenarios related to AI and data.

- The report you will write for the assessment for this unit asks you critically discuss one of the provided topics. So the activities in today's session should have given you a good understanding of what we mean by critical thinking.

Thanks for taking part in the session!

Any Questions?