# AI Ethics & NLP

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THE UNIVERSITY of EDINBURGH
Centre for Data, Culture & Society

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Ada Lovelace Institute

# Introduction

HANNAH CLAUS

- Research Assistant at the Ada Lovelace Institute
- DeepMind & Gates Cambridge Scholar
- Background in AI, Robotics, NLP, Ethics
- Worked with the German Aerospace Centre
- Mission: build AI/Robots that work for everyone

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# Overview

AI Ethics

Natural Language Processing

Practical Examples

# AI Ethics

Ethical considerations and principles governing the development and deployment of AI systems

- Bias
- Privacy
- Safety
- Accountability
- ...

# AI Ethics

**Ultimate purpose of AI:**

**Create solutions for given problems, improving our quality of life...?**

**How do we define the problem in the 'right' way?**

**More importantly:**

**WHO are we solving the problem for?**

# XAI

## Explainable AI

- ability of an AI system to explain its decisions in a way that is understandable to humans
- identify and mitigate bias and errors
- understand ethical and responsible decisions made by the system

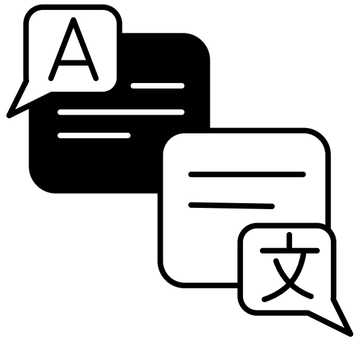
# Algorithmic Bias

- The Gender Shades project found that facial recognition software was more likely to misidentify women and people of colour than white men.
- A study by ProPublica found that an AI-powered hiring tool used by Amazon was more likely to recommend men than women for certain jobs.
- A study by the University of Washington found that algorithmic bias in the criminal justice system can lead to people of colour being more likely to be arrested and sentenced to harsher penalties than white people.

# Algorithmic Bias

- Use "unbiased" data - equally distributed data
- Have teams that properly represent our society
- Design algorithms with fairness in mind
- Audit algorithms for bias:
  - testing algorithms on different groups of people to identify any bias
- Be transparent about how algorithms are used:
  - letting people know how algorithms are used to make decisions and allowing them to challenge those decisions

# Natural Language Processing




# NLP

- Deals with the interaction between computers and human (natural) languages
- It's concerned with giving computers the ability to decipher and generate human language, including speech and text
- NLP has a long history but has always been too complex
- Now with powerful ML algorithms and large datasets of text and code it has become easier

# NLP

Machine Translation

Text Summarisation

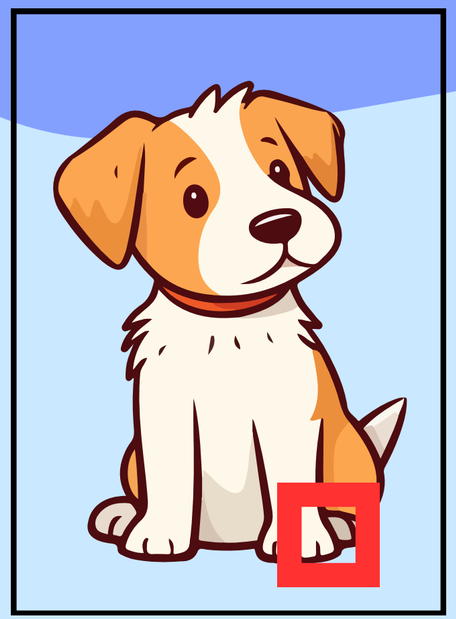
Question Answering

Sentiment Analysis

Text Generation

# Text Representation

**Computer Vision:**



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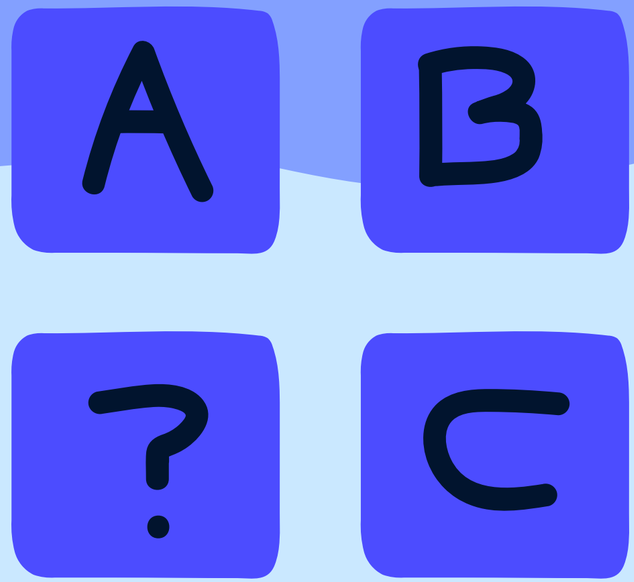

# Text Representation

## Bag of Words model

Document 1: This is a dog.
Document 2: This is a cat.

preprocess text

["this", "is", "a", "dog", "cat"] → ["dog", "cat"]

Document 1: [1, 1, 1, 1, 0]
Document 2: [1, 1, 1, 0, 1]

# LLMs

- Language models that are trained on large amounts of data
- this way wider use is possible
- accuracy of generated text improves

Problem with text representation:

- too much data, the model becomes too complex
- no context between the words

# Transformers

- first introduced in the paper "Attention Is All You Need" by Vaswani et al. in 2017, and have since become the state-of-the-art for many NLP tasks
- using a self-attention mechanism to learn long-range dependencies in text
- allows them to model the relationships between words and phrases that are far apart in a sentence
- Example: Sammy said she likes dogs. Do you like them too?

# Tips:

- Set up a GitHub account to document your coding journey
- Before you start with your own project, go through tutorials of similar projects so you understand the scope
- Make use of open-source material and learn from them
- Join communities with like-minded people, who share your mission
- Celebrate your success with other people

# Additional Resources:

- AI Ethics Principles, Google AI: https://ai.google/principles/
- The AI Now Institute: https://ainowinstitute.org/
- The Partnership on AI: https://www.partnershiponai.org/
- The Stanford Human-Centered AI Institute: https://hai.stanford.edu/
- The Allen Institute for AI: https://www.allenai.org/
- Gender Shades project: http://gendershades.org/

# For coding:

- Hugging Face: https://huggingface.co/
- Kaggle for datasets: https://www.kaggle.com/
- W3 Schools for Coding tutorials: https://www.w3schools.com/
- GitHub for open-source material: https://github.com

# Conclusion

- The development and deployment of AI is unstoppable
- We have to keep up with the progress and set out rules and regulations that are inclusive
- Especially when it comes to LLMs that are accessible to everyone, we need to make sure that everyone is aware of the risks and limitations
- Everyone can code, and there are many resources you can learn from
- Good luck ❤️

# Connect with me


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# Notebooks

# https://github.com/melkemaryam/presentations

# Q&A