



Because maths matters!

Welcome to the MEI conference 2026

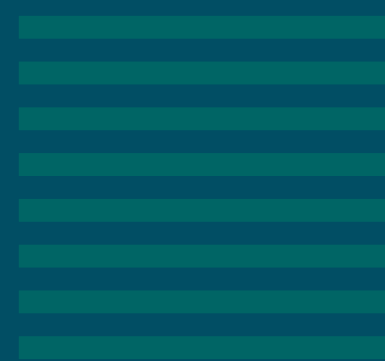
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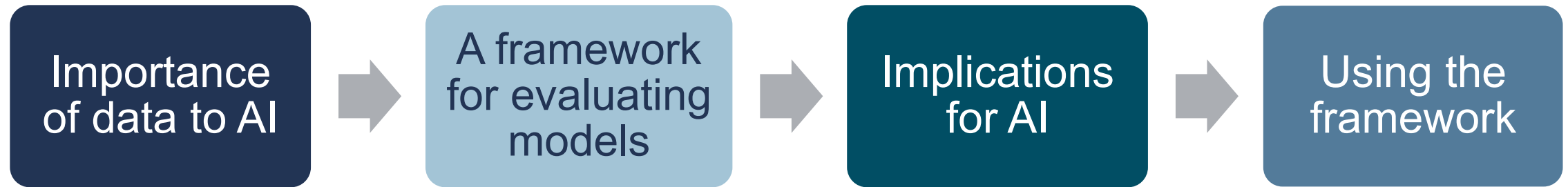
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The Ethics of Data Science, Machine Learning and AI

Jason Anquandah, Rob Butler and Tom Button

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The Ethics of Data Science, Machine Learning and AI





The importance of data to AI

What is AI?



How would your students
respond to the question:

“What is AI?”

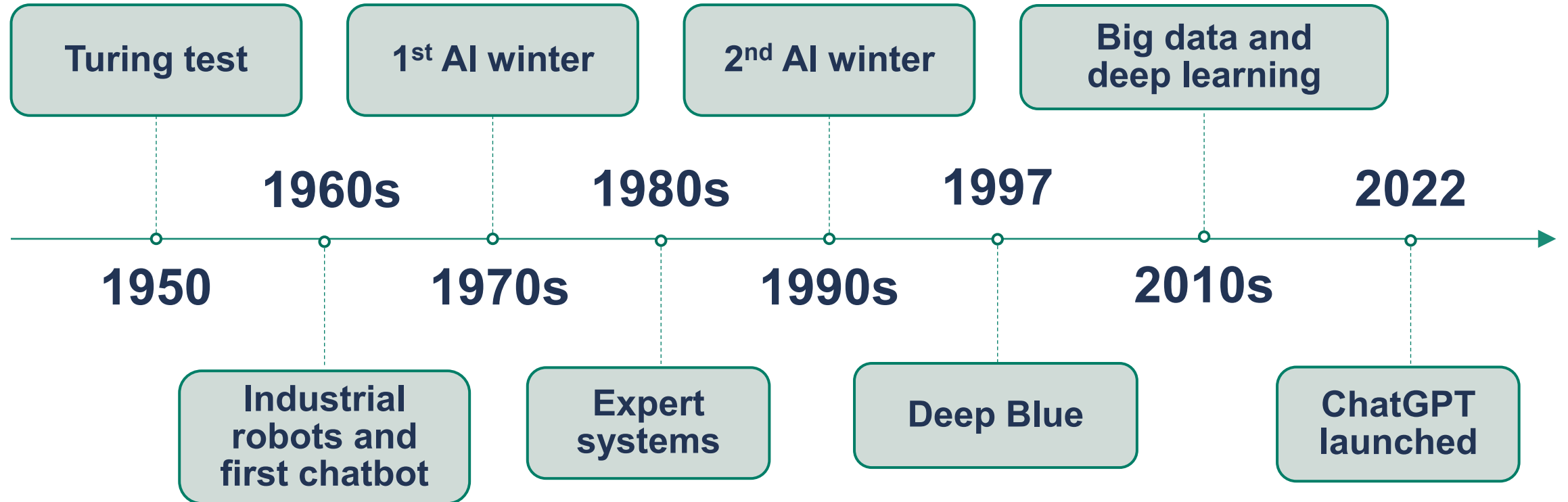
A definition of AI?

“Artificial intelligence leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind”

www.ibm.com/topics/artificial-intelligence



Timeline of AI

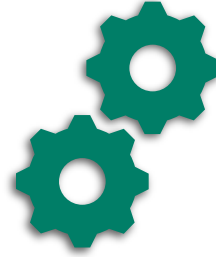


Source of dates: en.wikipedia.org/wiki/Timeline_of_artificial_intelligence

Most AI is built using data-driven models



Data analysis



**Machine
learning**



**Artificial
intelligence**

Rules vs data-driven models



UNESCO Core values for AI

UNESCO (United Nations Educational, Scientific and Cultural Organization)
list 4 core values for AI:

1. Human rights and human dignity
2. Living in peaceful just, and interconnected societies
3. Ensuring diversity and inclusiveness
4. Environment and ecosystem flourishing

www.unesco.org/en/artificial-intelligence/recommendation-ethics

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A framework for evaluating models

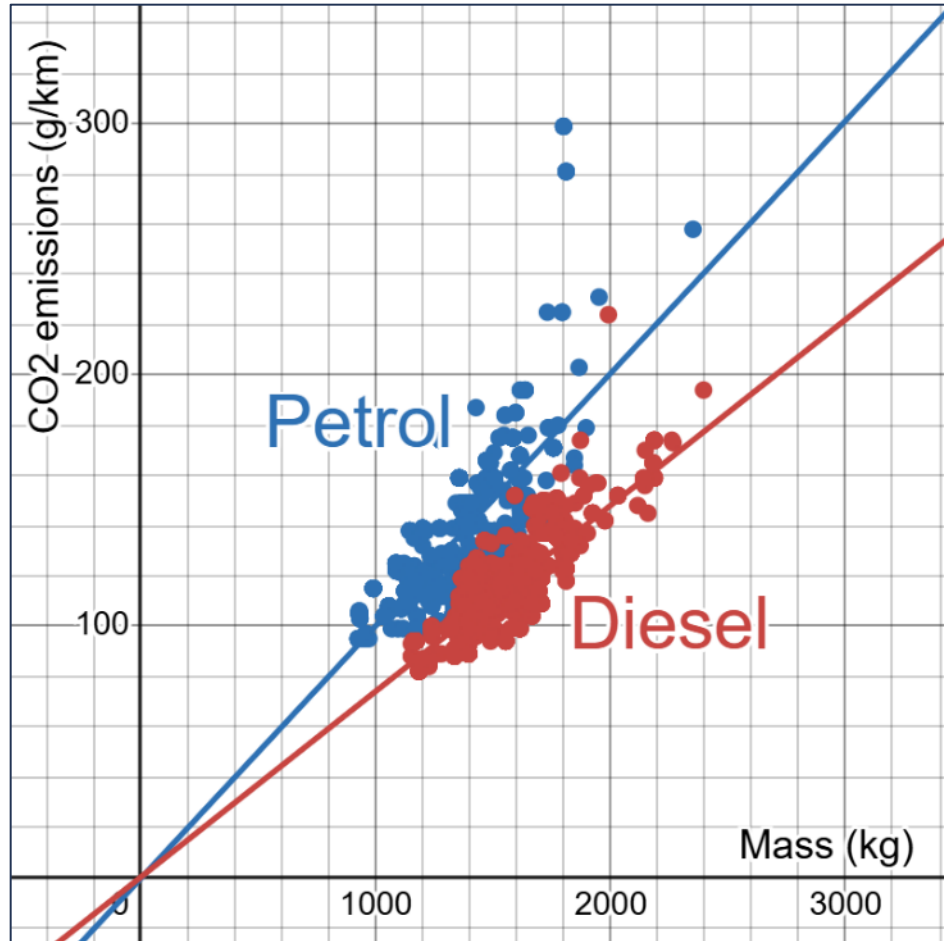
Evaluating models

A framework for evaluating models built from data



- *Where has the data come from?*
- *What is over or under-represented?*
- *How confident can you be in the models?*

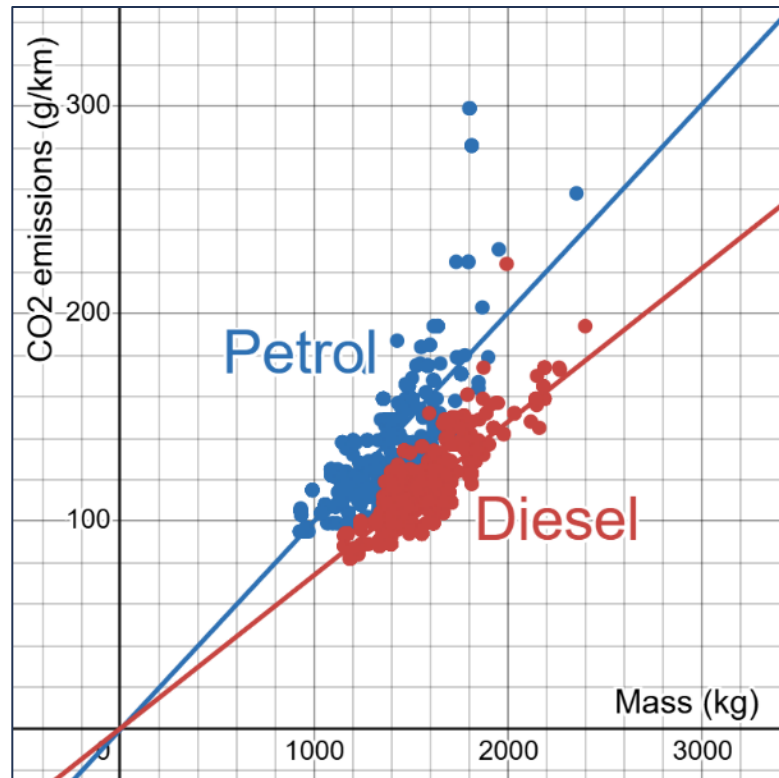
Mass and CO₂ emissions of petrol and diesel cars



- What do you notice?
- What do you wonder?

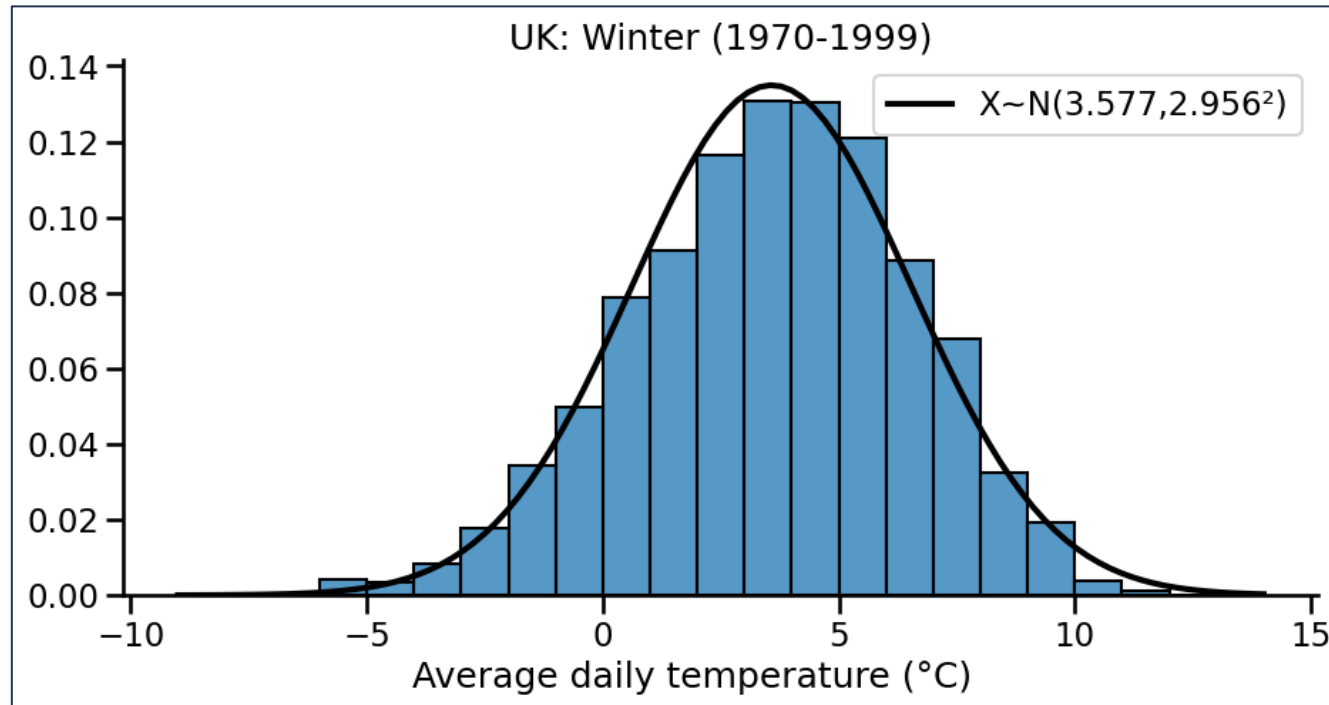
Evaluating the model: cars data

A sample of 2,409 petrol and diesel cars registered in 2016



- *Where has the data come from?*
- *What is over or under-represented?*
- *How confident can you be in the models?*

Average daily winter UK temperature, 1970-1999 (°C)

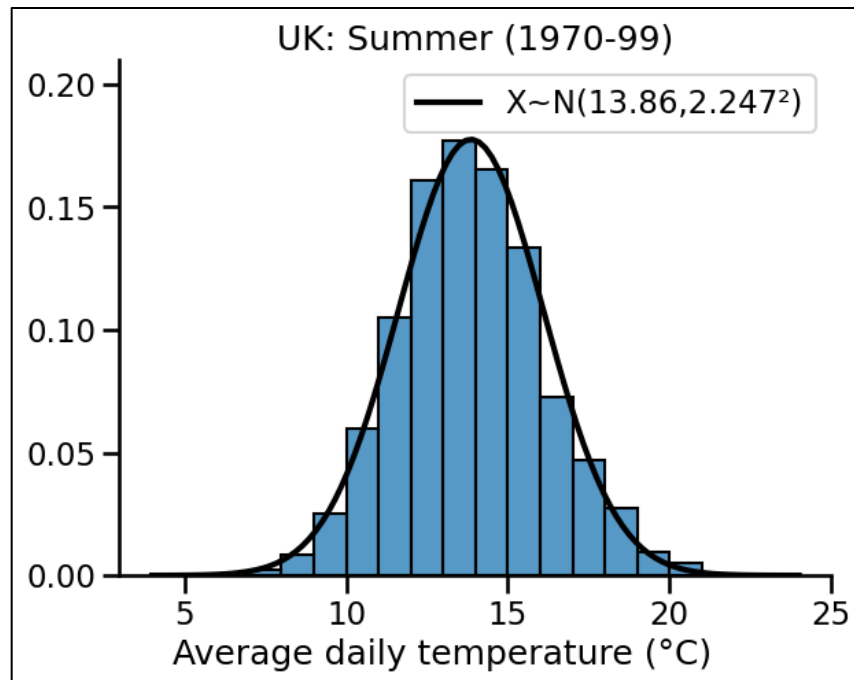


Data taken from [MEI Big Earth Data Project](#)

- Is the normal distribution a suitable model?
- What would be the impact of using this model for a randomly chosen:
 - UK autumn day (1970-1999)
 - A winter day in Keele (1970-1999)
 - UK winter day (2026)

Evaluating the model: average daily temperature

Average daily temperature, summer, 1970-1999 (°C)



- *Where has the data come from?*
- *What is over or under-represented?*
- *How confident can you be in the models?*



Implications for AI

Evaluating the model: AI recruitment tool

- A technology firm uses the CVs of previous applicants to create an AI tool to automatically sift CVs



- Where has the data come from?
- What is over or under-represented?
- How confident can you be in your conclusions?

Facial recognition algorithms



<https://www.youtube.com/watch?v=eRUEVYndh9c>

Large Language Models

- Large Language Models work by **predicting** which words are most likely to come next
- Large language Models, such as ChatGPT are built using **large quantities of data**



www.theguardian.com/technology/ng-interactive/2023/nov/01/how-ai-chatbots-like-chatgpt-or-bard-work-visual-explainer

Evaluating Large Language Models

Large Language Models, such as ChatGPT, are built using large quantities of data



- *Where has the data come from?*
- *What is over or under-represented?*
- *How confident can you be in the models?*

AI 'hallucinations'

 fastest parkrun by male 50-54

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 AI Overview

The fastest recorded parkrun time for a male aged 50-54 is **18:12**, achieved by Graham Shooter at Temple Newsam parkrun. He was the first finisher overall on April 22, 2017, [according to parkrun UK parkrun news](#). 

Here's a breakdown: 

- **Event:** Temple Newsam parkrun
- **Date:** April 22, 2017
- **Runner:** Graham Shooter
- **Age Category:** VM50-54
- **Time:** 18:12

Male	VM50-54		18:04
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Data analysis ...
and other maths



Machine
learning



Artificial
intelligence

Using the framework

Using this approach in the Maths classroom

- How can you use this framework in your teaching?
- To what extent should students be taught to be critical users of AI in maths lessons?



Key messages

- You can use this framework throughout your teaching of stats
- Keep it focussed! It's just about the data and the impact of the model
- You can make the connections between this framework and students' being critical users of AI
- Talk to a computer science teacher

AMSP Maths into AI courses



Maths into AI Student Programme

Maths into Data Science and AI aims to develop students' knowledge of how maths and statistics underpin machine learning and AI. It supports students' future study and careers by developing practical skills in modelling with real data.

[EXPLORE THE STUDENT COURSES >>](#)



Maths into AI Teacher Programme

Our professional development aims to develop teachers' understanding of how maths and statistics underpin machine learning and AI, as well as demonstrating how these link to the existing curriculum. We offer an introductory webinar as well as online and blended sustained courses.

[EXPLORE THE TEACHER COURSES >>](#)

amsp.org.uk/teachers/maths-into-ai-programme/