How Are You Feeling Today?

Let us know in chat

Outline

- What is AI & Machine Learning?

- Real-world Applications of AI & ML

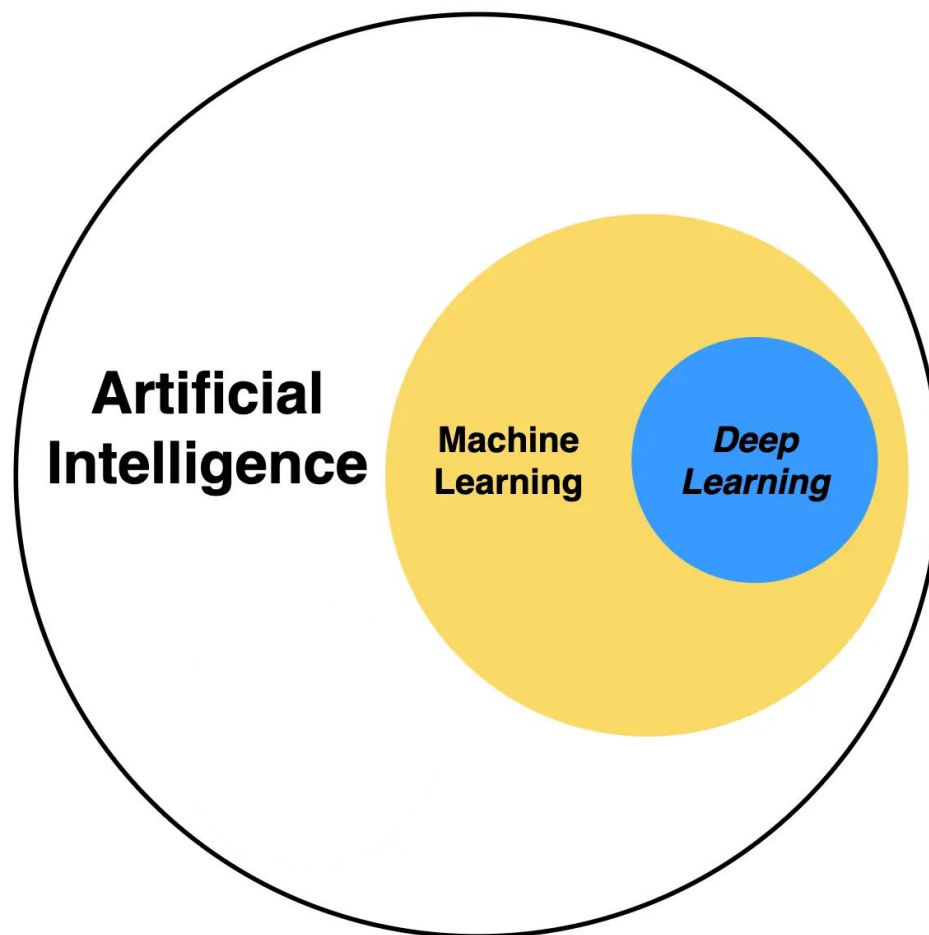- Bias & Ethics in AI & ML

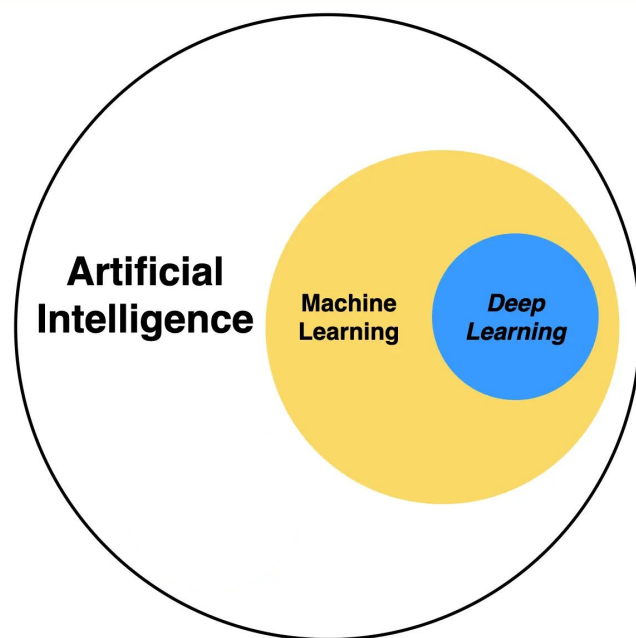- Hands On: Exploring AI Tools

AI & Machine Learning

Definition

Question

What is AI & Machine Learning?

And, why people keep talking about it?

What is AI & Machine Learning?

Artificial Intelligence
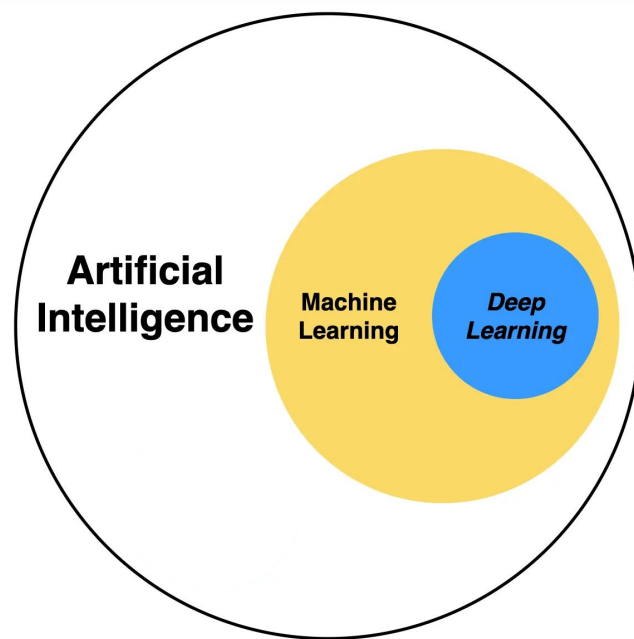
Machine Learning

*Deep Learning*

What is AI?

AI is the ability of a computer system to **perform tasks that typically require human intelligence**, such as learning, problem-solving, and decision-making

What is Machine Learning?

Artificial Intelligence / Machine Learning / Deep Learning

ML is the subset of AI that focuses on the creation of models that can **learn from data without the need to be explicitly programmed**

AI is Not Always ML

Rules ⟶

Data ⟶ **Traditional Programming (Non-ML AI)** ⟶ Answers

Answers ⟶

Data ⟶ Machine Learning ⟶ Model
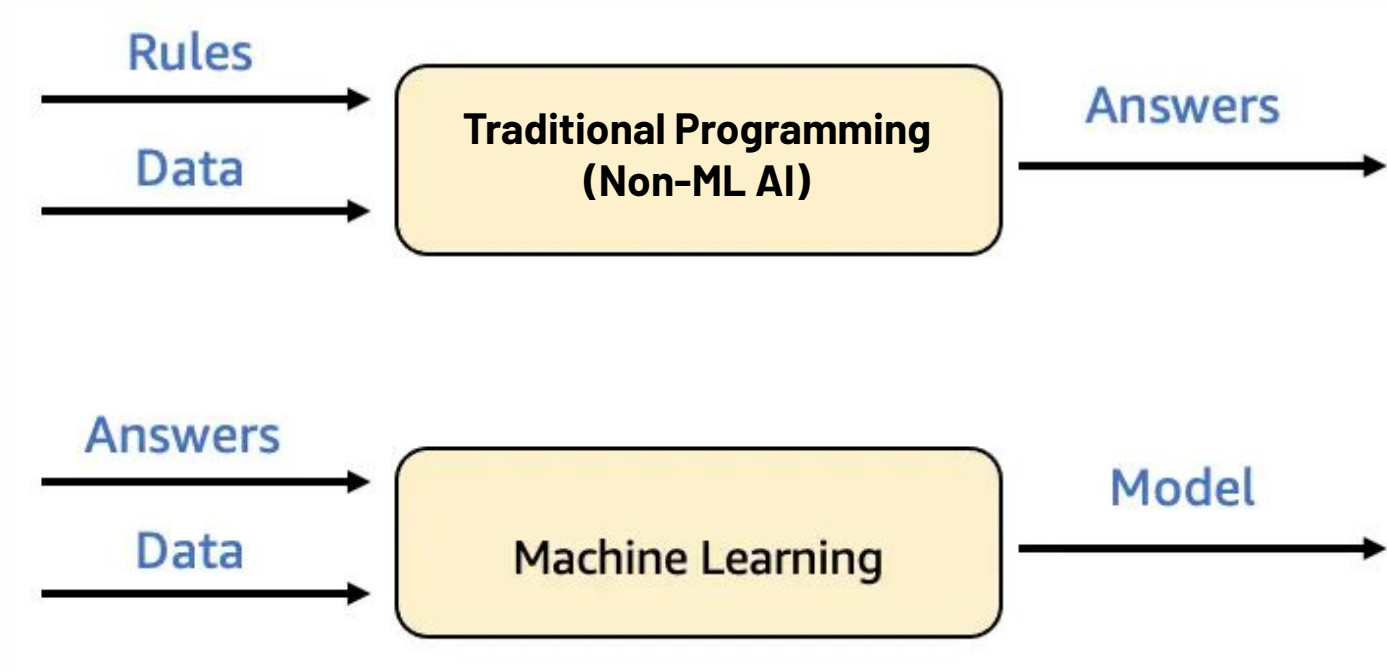
Traditional Programming vs ML

Let's say we want to build a system to predict a salary for a new employee based on their role and years of experience.

In **traditional programming**, we would write a bunch of if-else statements.

```python
def predict_salary(role, education, university, experience, location):
    if role == 'Manager':
        if education == 'Master':
            if university == 'Top Tier':
                if experience > 5:
                    return 25000
                else:
                    return 22000
            else:
                if experience > 5:
                    return 22000
                else:
                    return 20000
        elif education == 'Bachelor':
            if experience > 5:
                return 20000
            else:
                return 18000

    elif role == 'Data Scientist':
        if university == 'Top Tier':
            if experience > 3:
                return 20000

    ......
```

Generated Rule Using ML

in **ML**, instead of writing the rules ourselves, we feed the algorithm historical employee data — including role, experience, and actual salary.

Role	Education	University	Experience	Location	Salary
Manager	Master	Top Tier	6	Jakarta	25000
Data Scientist	Bachelor	Mid Tier	2	Bandung	16000
Software Engineer	Bachelor	Top Tier	3	Jakarta	15000
Intern	Diploma	Low Tier	0	Surabaya	4000
...	...	...	...	...	...
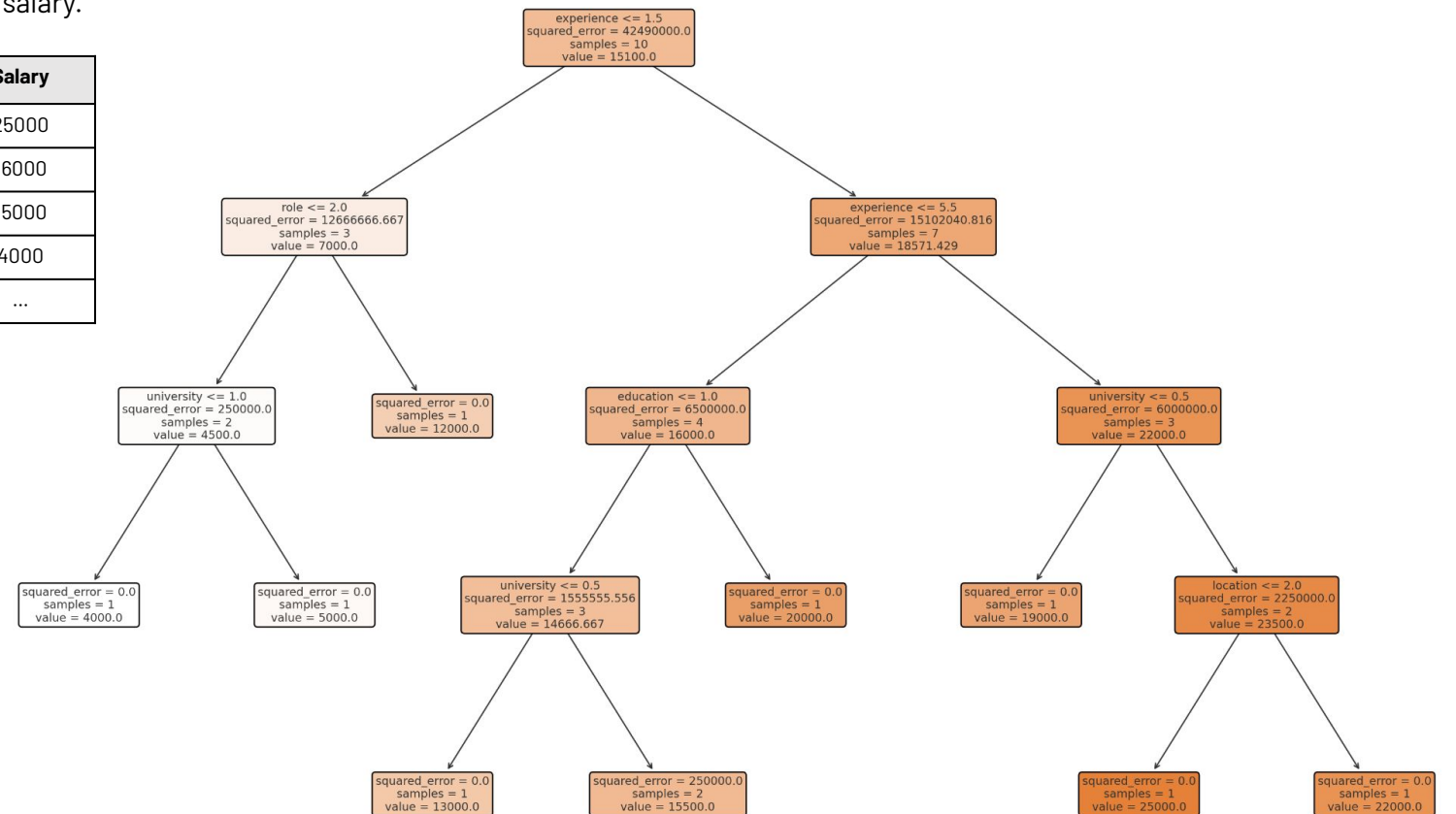
How Does a ML Model Learn?

To enable the model to learn, it must undergo "training". **This involves showing it data so it can understand and form a relationship between the data and the expected result. This relationship takes shape in the form of coefficients or parameters**, much like how we tweak a musical equalizer to achieve optimal sound.

Coefficients & Parameters

Example

The relationship between Centimeters and Inches is given by the formula:

$$A * Inch + B = Cm$$

The learning process of the model consists of applying an algorithm **to derive the values of A and B** from the **observed data** of Centimeters and Inches.

Inch	Cm
1 Inch	2.54
2 Inch	5.08
3 Inch	7.62
4 Inch	10.16
…	…
A Inch	A * Inch + B

observed data

model
(that we're going to train)

13

Example

This Algorithm (known as the ML algorithm) is applied iteratively over all the data (sometimes more than once) to find the parameters A and B.

$$2.54 * Inch + 0 = Cm \longrightarrow$$ Trained Model
(that we're going to train)

After several iterations of the algorithm, we obtain a trained model capable of generalizing the relationship between centimeters and inches for any new observations.

What is Deep Learning?

Artificial Intelligence

Machine Learning

Deep Learning
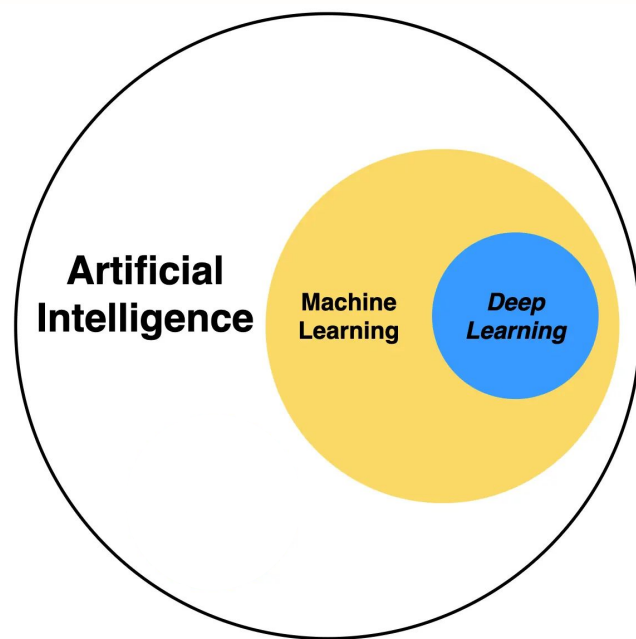
DL is an ML technique that **uses deep neural networks to learn from data**. A neural network is a type of ML model made up of many layers of interconnected nodes that adjust as they are exposed to data

What is & Why Neural Network?

Biological Neuron

Artificial Neuron
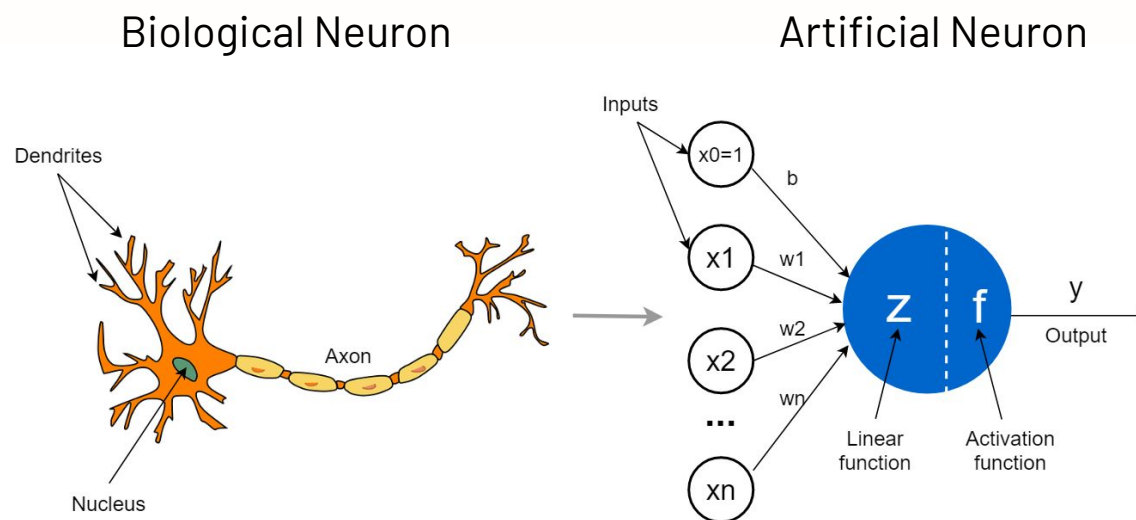
A neural network is a computational model **inspired by the neuron** (nerve cells in a human brain), designed to process data and make decisions. It is mathematically proven to solve more complex ML tasks.

History of AI

The history of AI

1940s-1950s

Foundations of AI

In the 1940s, the first artificial neurons were conceptualised. The 1950s introduced us to the Turing Test and the term "Artificial Intelligence.

1960s-1970s

Early Development

The 60s and 70s brought the birth of ELIZA, simulating human conversation, and Dendral, the first expert system, showcasing the early potentials of AI.

1980s

AI Winter & Expert Systems

The 80s faced reduced AI funding but saw the inaugural National Conference on AI. The backpropagation concept rejuvenated neural networks.

1990s

Revival & Emergence of ML

The 90s witnessed IBM's Deep Blue defeating chess champion Garry Kasparov and the inception of the LOOM project, laying the foundations for GenAI.

2000s

The Genesis of Generative AI

Geoffrey Hinton propelled deep learning into the limelight, steering AI toward relentless growth and innovation.

2010s

Rise of AI

In 2011, IBM Watson won "Jeopardy!", highlighting AI's language skills. The 2010s marked major AI milestones, including pioneering work in image recognition and the birth of GANs in 2014, followed by OpenAI's founding in 2015.

2020s

GenAI Reaches New Horizons

At the start of this decade, we've seen significant strides in GenAI, notably with OpenAI's GPT-3 and DALL-E. 2023 welcomed advanced tools like ChatGPT-4 and Google's Bard, alongside Microsoft's Bing AI, enhancing accessibility and reliability of information.

What Can AI Do – and What It Can't

AI shines in problems that have **clear objectives and patterns to learn from**

(even if it's a complex one).
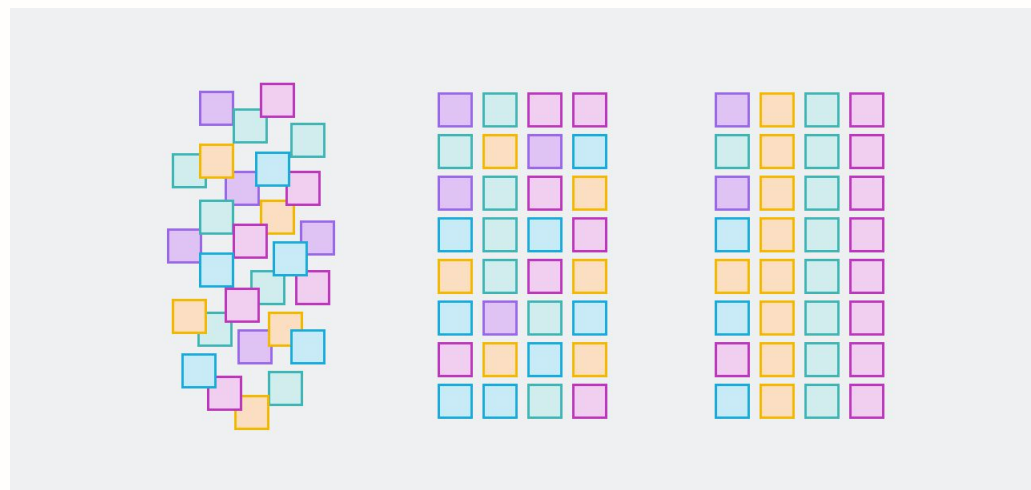
What AI Can Do Well

AI Strengths	Examples
Pattern Recognition	Image classification, speech-to-text, face recognition
Prediction	Stock prices, customer churn, disease risk
Automation	Replacing repetitive tasks (e.g., invoice processing)
Natural Language Processing (NLP)	Chatbots, translation, sentiment analysis
Personalization	Netflix, Spotify, TikTok recommendations
Anomaly Detection	Fraud detection, machine fault detection
Data Insight Discovery	Finding correlations in large datasets (e.g., in marketing analytics)

What AI Can't (or Shouldn't) Do

AI still has big limitations — especially in **understanding, reasoning, or adapting** like humans can.

AI Limitations	Why It's a Problem	Example
Needs Data	Can't learn without lots of clean data	New problems with little historical data
Bias & Fairness Issues	Learns and amplifies bias from data	Hiring systems preferring one gender
Explainability	Hard to understand why it made a decision	Black-box deep learning models
Fails in Novel Situations	Doesn't adapt well to unexpected events	Self-driving car in a snowstorm
Emotion & Empathy	No real understanding of human feelings	Can simulate emotion, but doesn't *feel* it

So, When to Use it?

Use AI when the problem is:

- Data-rich (historical examples exist)
- Repetitive or predictable
- Goal-oriented (e.g., maximize clicks, minimize cost)
- Time-saving at scale

Not good for:

- Problems with high uncertainty and low data
- Moral or ethical decisions (e.g., "Should this person get parole?")
- Creative tasks without clear criteria (AI can help, but not replace humans)

In Summary…

|	Artificial Intelligence (AI)*	Machine Learning (ML)	Deep Learning (DL)
Definition	The broad field of making machines **simulate human intelligence**.	A subset of AI where machines **learn from data** to make predictions.	A subset of ML that uses **neural networks** with many layers to learn complex patterns.
Use Cases	- Chatbots - Smart assistants (Siri, Alexa) - Robotics	- Email spam detection - Fraud detection - Price prediction	- Face recognition - Autonomous vehicles - Medical image analysis
Tools	- IBM Watson - Google AI - OpenAI APIs	- scikit-learn - XGBoost - AutoML platforms	- TensorFlow - PyTorch - Keras
Differences	General term; includes logic-based or rule-based systems	Learns from structured data with training algorithms	Learns from large data using deep neural networks; excels in unstructured data (images, audio, etc.)

* AI is so broad, it includes ML & DL. The use cases & tools mentioned is what commonly used today and it may overlap with ML & DL
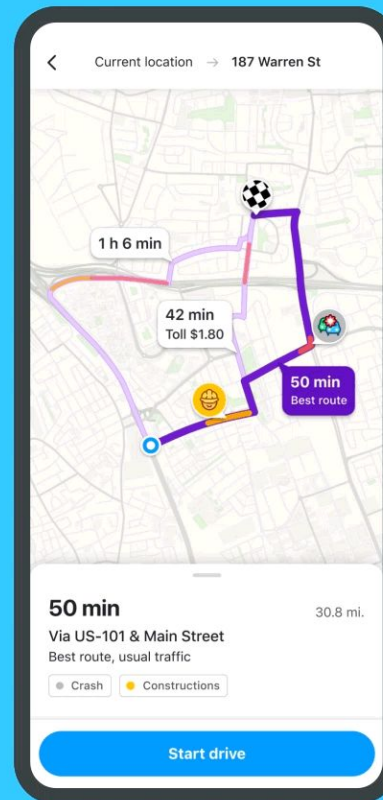
AI & Machine Learning

Real-world Applications

Why TikTok Feels Addictive? It's AI

How Does Google Know It's You in Every Photo?
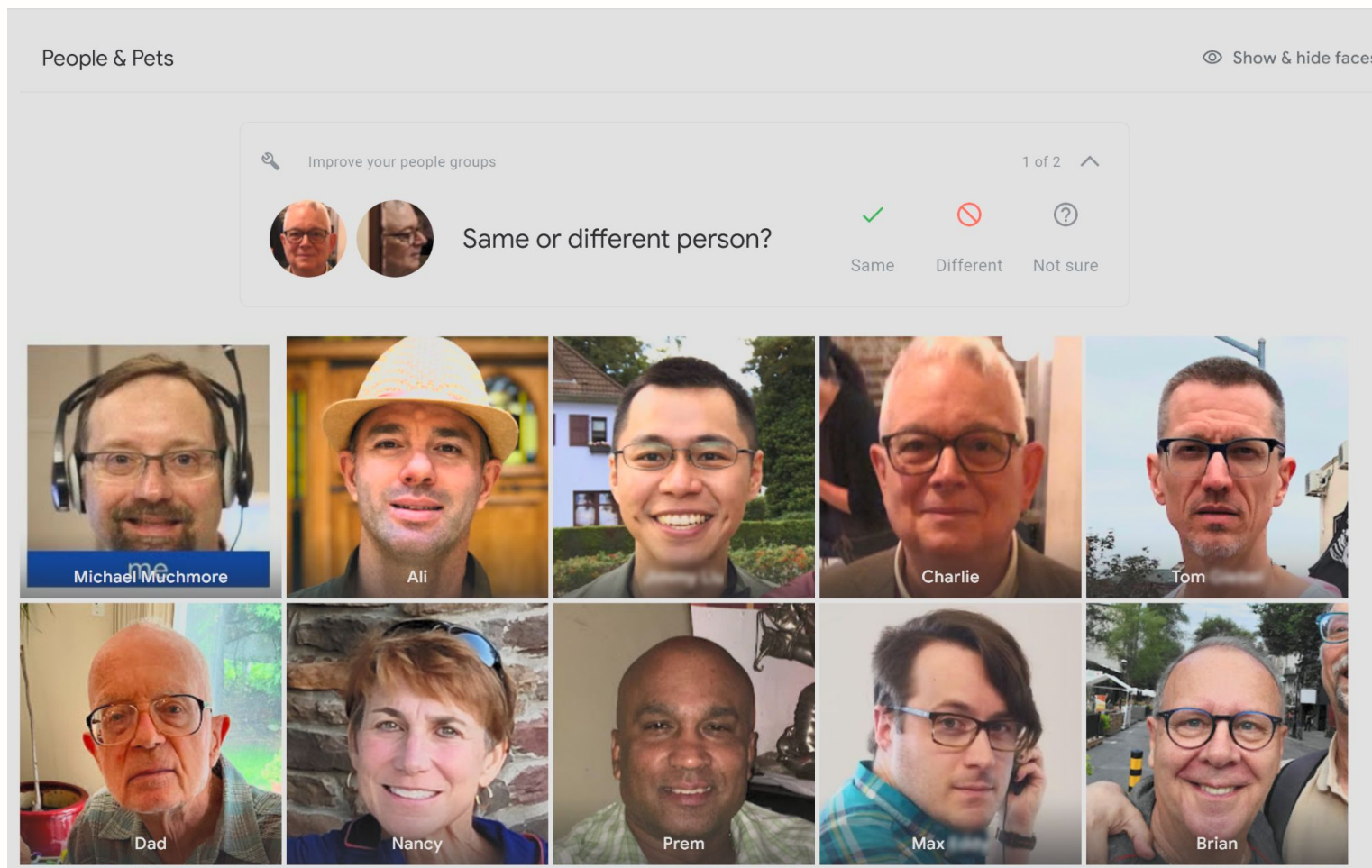
How Does Waze Know the Fastest Way?

# Other AI Usecases

Use Case	Industry	Company
Personalized Content Recommendation	Entertainment	Netflix, YouTube
Fraud Detection	Finance & Banking	Dana
Customer Service Chatbots	Retail & E-Commerce	Shopee, Tokopedia
Predictive Maintenance	Manufacturing	Astra
Autonomous Vehicles	Automotive	Tesla
Dynamic Pricing	Travel & Hospitality	Gojek, Traveloka
Disease Diagnosis (e.g. cancer)	Healthcare	IBM Watson Health
Route Optimization	Transportation	Waze, Grab
Personalized Learning	Education	Duolingo, Squirrel AI
AI-based Hiring & Screening	HR Tech	LinkedIn
Smart Home Automation	Consumer Electronics	Google Nest, Amazon Echo

AI & Machine Learning

Bias & Ethics

What is Bias in AI

Bias in AI means the system produces **unfair, inaccurate, or discriminatory outcomes**

AI Model
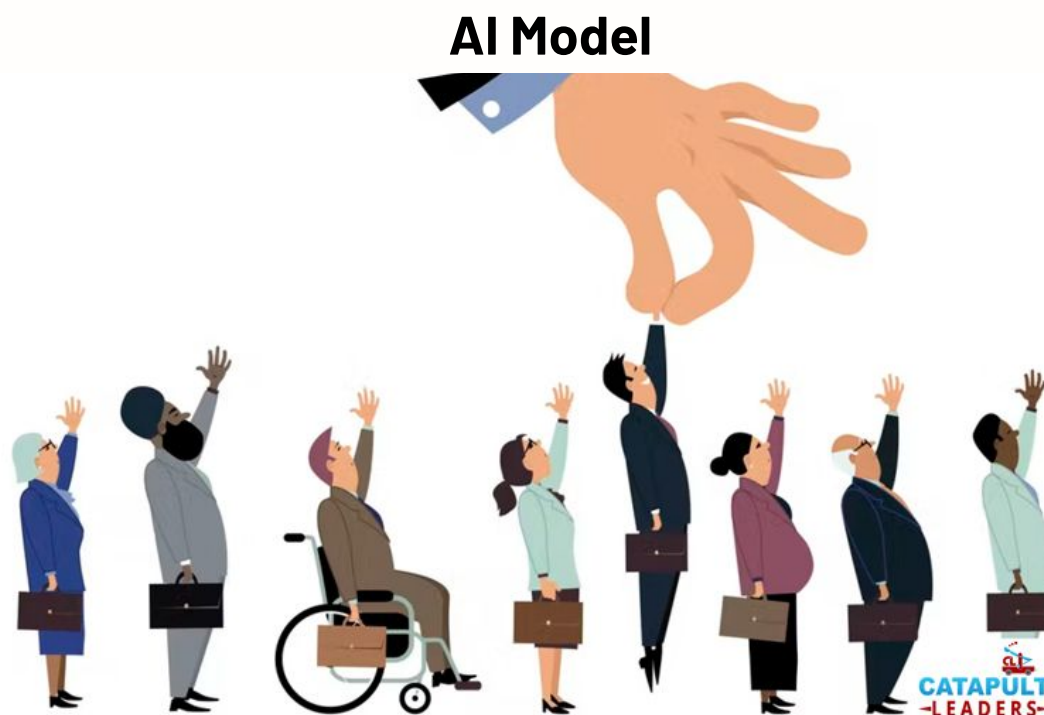
Why it Happens?

Bias in AI usually because of the data it learned from. We have a term called **"Garbage In Garbage Out"** — If training data has bias, the AI will learn and reflect that bias.
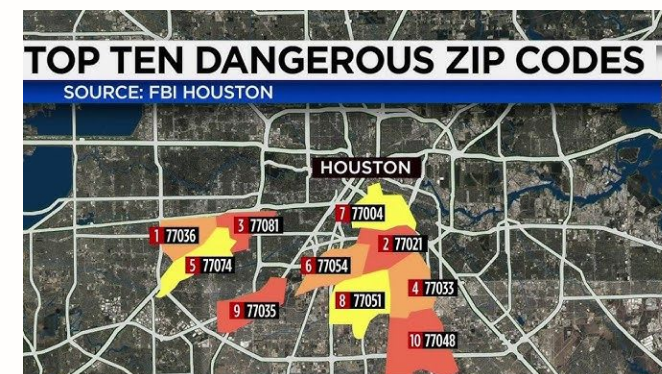
Examples of AI Bias

Hiring Algorithm

An AI tool trained on past resumes learned to favor male applicants over female

Facial Recognition

Some systems misidentified Black faces as guilty more often than white

Credit Scoring

People from certain zip codes were unfairly denied loans

Why Ethics in AI Matters

In this AI era, AI systems affect people's lives, jobs, privacy, and freedoms. Without ethics, AI can:

- Invade privacy (e.g., surveillance tools)
- Spread misinformation (e.g., deepfakes)
- Reinforce inequality (biased decisions)
- Reduce transparency (black-box models with no explanation)

AI & Machine Learning

Hands On: Exploring AI Tools

Ask Anything!
Using ChatGPT

Ask Anything!
Using ChatGPT

1. **Go to** 👉 https://chat.openai.com
2. **Login or Sign Up** with your email or Google account.
3. In the chat box, **try the following prompts**:
   a. *"Plan a 3-day trip to Bali for under $300"*
   b. *"Explain how a neural network works to a 10-year-old"*
   c. *"Write a polite follow-up email for a job application"*

4. **Explore**:
   a. Try writing your own prompt!
   b. Ask questions from your field or hobby (e.g., marketing, design, education, finance).
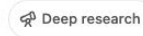
Generate Your Product Image
Using Dall-E

An eco-friendly leather backpack displayed on a white studio background

Image created

Ask anything

+ | Search | Reason | Deep research | Create image | ...
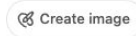
Generate Your Product Image
Using Dall-E

1. **Go to** 👉 https://chat.openai.com
2. **Login** (same as ChatGPT).
3. In the prompt box, try this:
   a. "Generate an eco-friendly leather backpack displayed on a white studio background"
   b. "Generate a refreshing summer drink on a beach table, highly detailed, vibrant colors"
   c. "Generate modern wireless earbuds placed on a marble surface, minimalist style"
4. Click the **image tab** to see the visual generation.
5. Modify your prompt to customize style, color, setting, or product type.

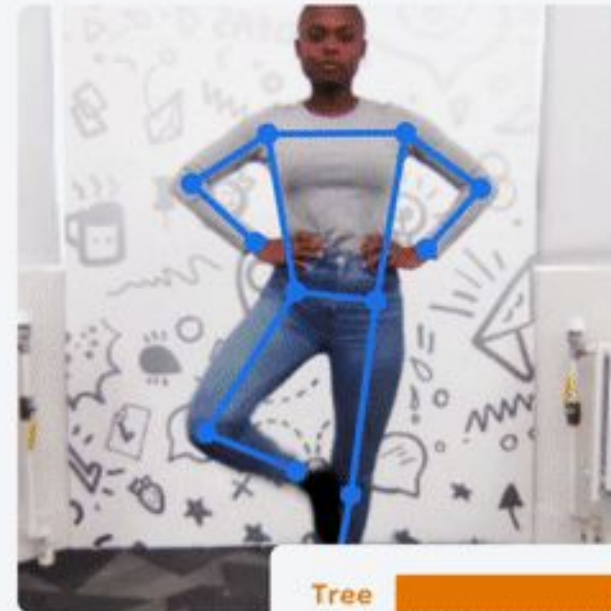# Image Classification
Using Teachable Machine by Google

Image Classification
Using Teachable Machine by Google

1. Create an Image Project
2. Record 2–3 categories using webcam (e.g., hand gestures)
   a. Class 1 = "Thumbs up"
   b. Class 2 = "Thumbs down"
3. Train the model
4. Test it live using their webcam

Chat with Your Docs
Using NotebookLM

Chat with Your Docs
Using NotebookLM

1. **Upload a PDF** (e.g. Introduction to AI.pdf)
2. Ask:
   a. *"Summarize this document in 3 bullet points"*
   b. *"Generate quiz questions from this document"*
   c. *"Give me a metaphor to explain this AI concept to kids"*

AI & Machine Learning

Q&A Session

Thank You!