AI FUNDAMENTALS: A JOURNEY FROM CONCEPTS TO CLASSROOM

Thanassis Drivas

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#2738601

ROADMAP OF THE SEMINAR

Intro to AI

AI in Education

Workshop for Primary School

Workshop for Secondary School

SLIDO

LET'S BREAK THE ICE WITH A QUIZ!

- Grab your phone or open a browser, and go to Slido.com.

- Enter the event code: 2738601

- Answer the questions as they appear on the screen

WHY THIS SEMINAR NOW?

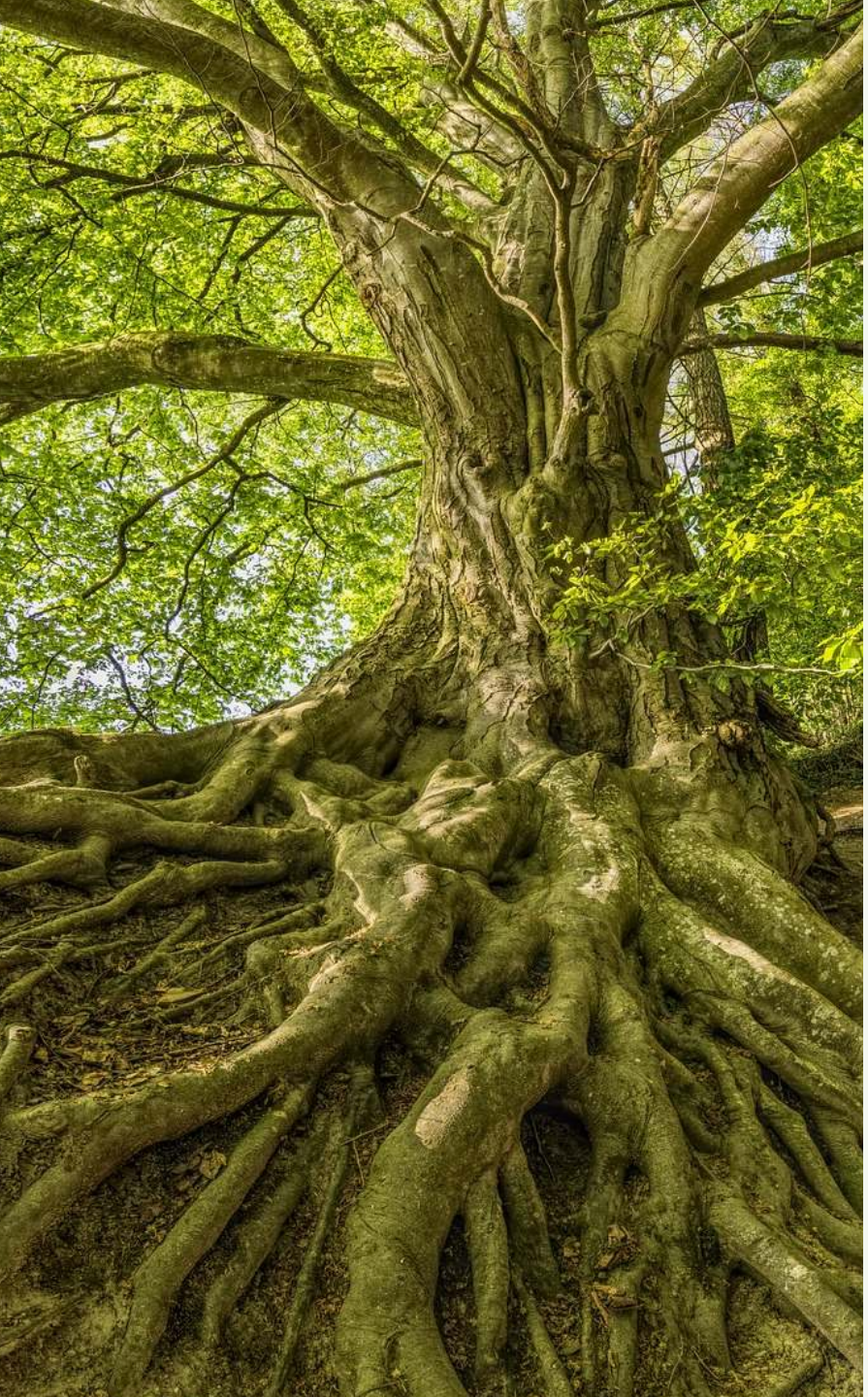
"The rise of AI will create unprecedented opportunities. But it's up to us to ensure that its benefits reach everyone, not just the privileged few."

Andrew Ng, AI Pioneer and Co-founder of Coursera

AI Integration in Education

Preparing Students for the Future

Timely Adaptation



...BUT WHY "INTRO TO AI" ?

Foundational Understanding

Without this foundation, teachers might struggle to fully grasp how AI tools generate results, leading to misuse

Confidence in Technology

Rather than feeling overwhelmed by the technology, teachers with a foundational understanding are more likely to experiment with and fully leverage AI tools

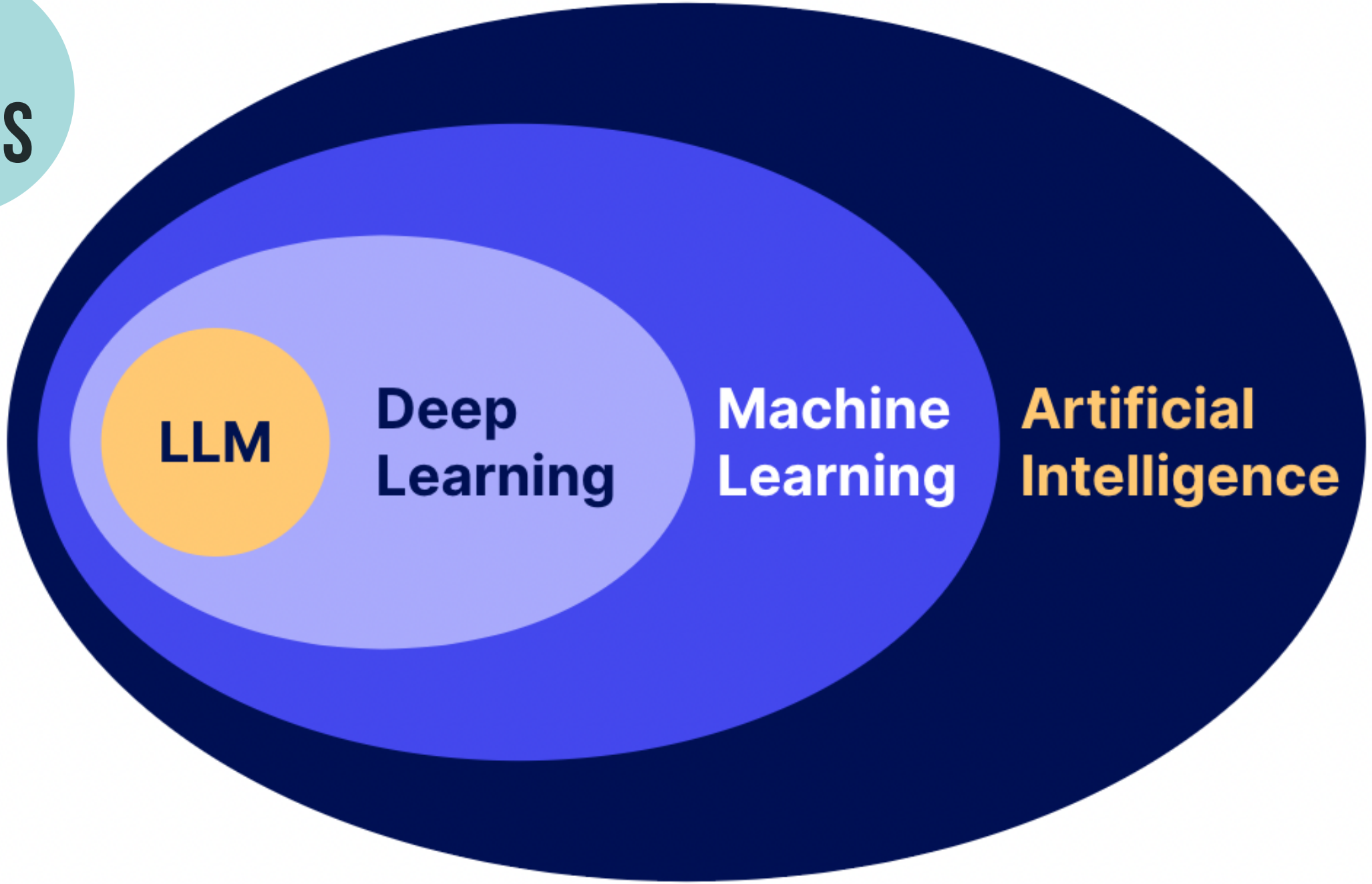
Ethical Awareness

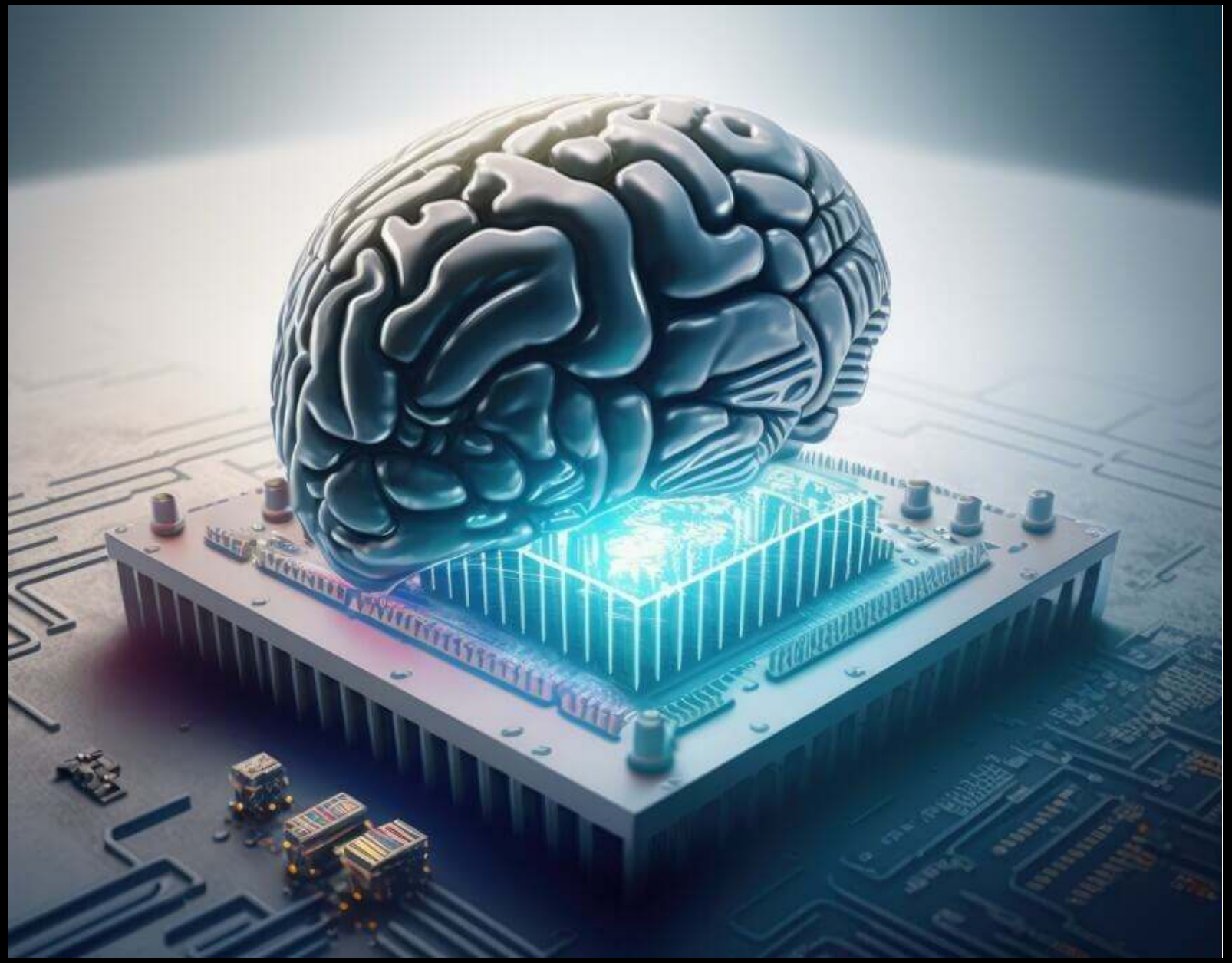
This knowledge is crucial for teachers to use AI tools responsibly, ensuring they safeguard students' data and promote fairness

Informed Decision-Making

It helps them make informed decisions about which tools are best suited for their specific teaching needs

AI TYPES


LLM
Deep Learning
Machine Learning
Artificial Intelligence



SINGULARITY

The singularity in AI is a theoretical point in the future when AI surpasses human intelligence in a way that leads to unprecedented and rapid technological growth. This concept suggests a transformative shift where AI systems become capable of improving themselves autonomously, resulting in exponential advancements that are difficult—or even impossible—for humans to predict or control.

MACHINE LEARNING

Machine learning is about teaching computers to learn from examples so they can do tasks like recognizing images, predicting the weather, or suggesting products without needing specific instructions for each task.

Supervised Learning

Teach Machine by labelled examples

Unsupervised Learning

Teach Machine by unlabelled examples

Reinforcement Learning

Teach Machines via rewards

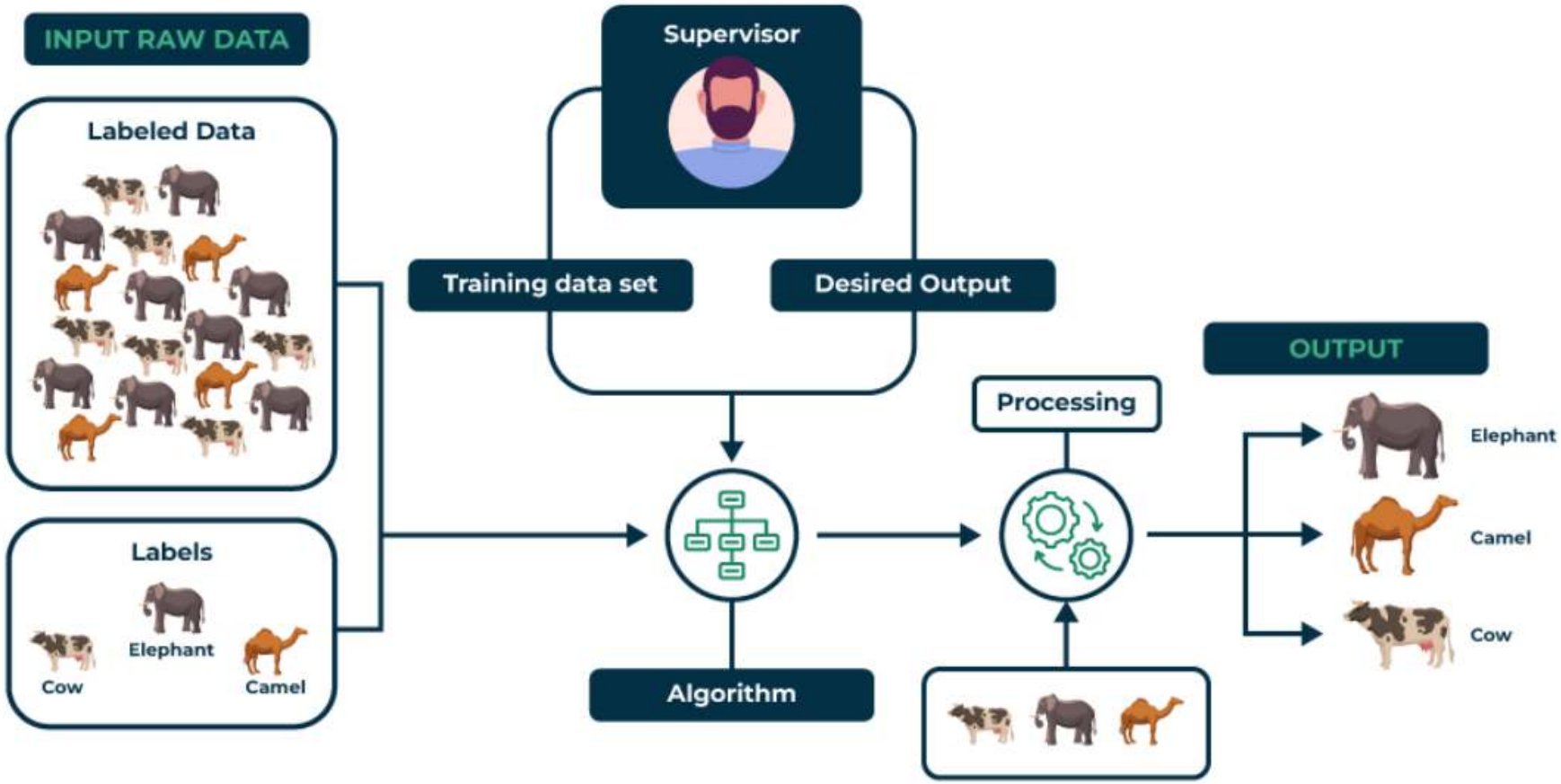
SUPERVISED LEARNING

Supervised learning involves training a machine from **labeled** data.

Labeled data consists of **examples** with the correct answer or classification.

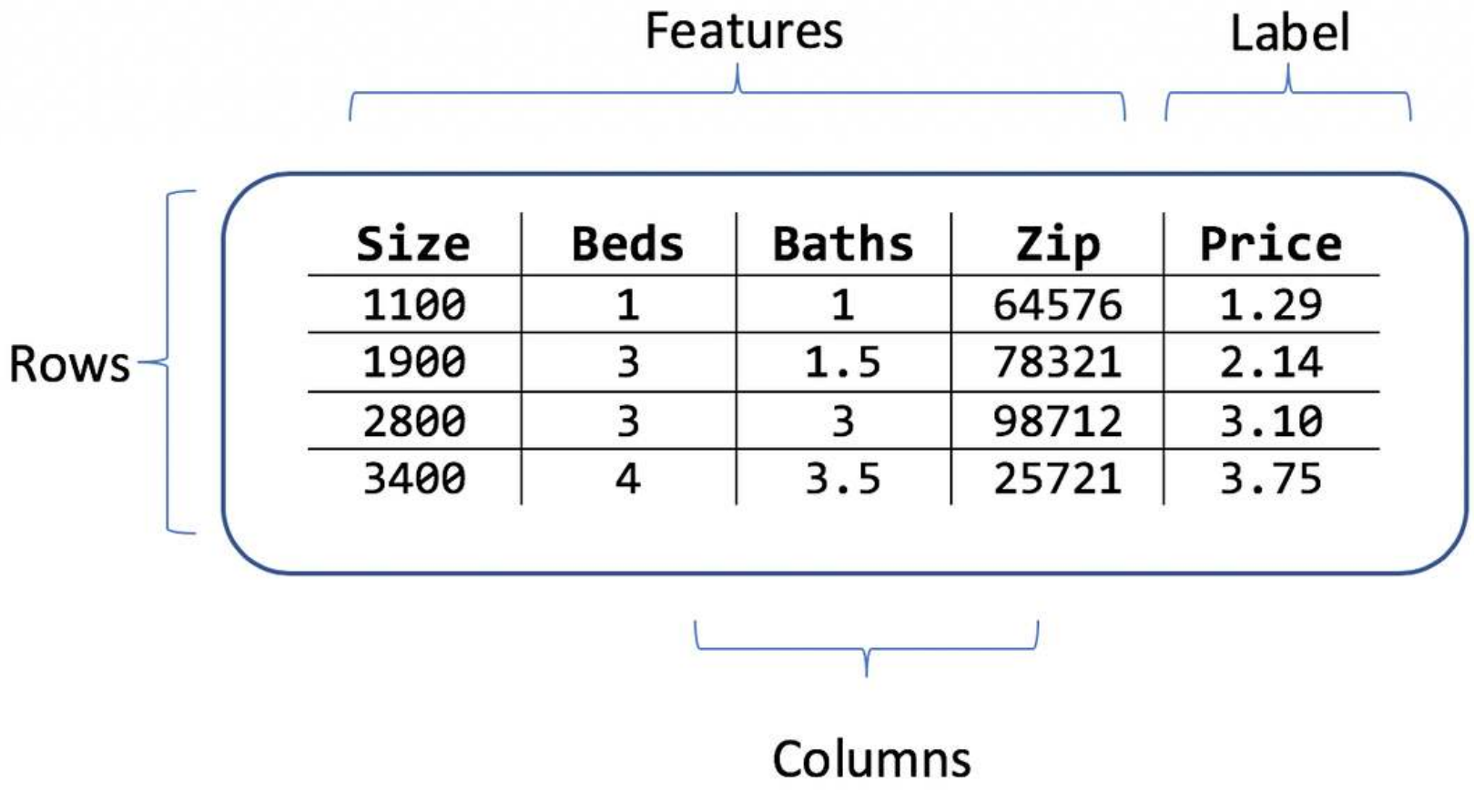
The machine learns the **relationship** between inputs and outputs .

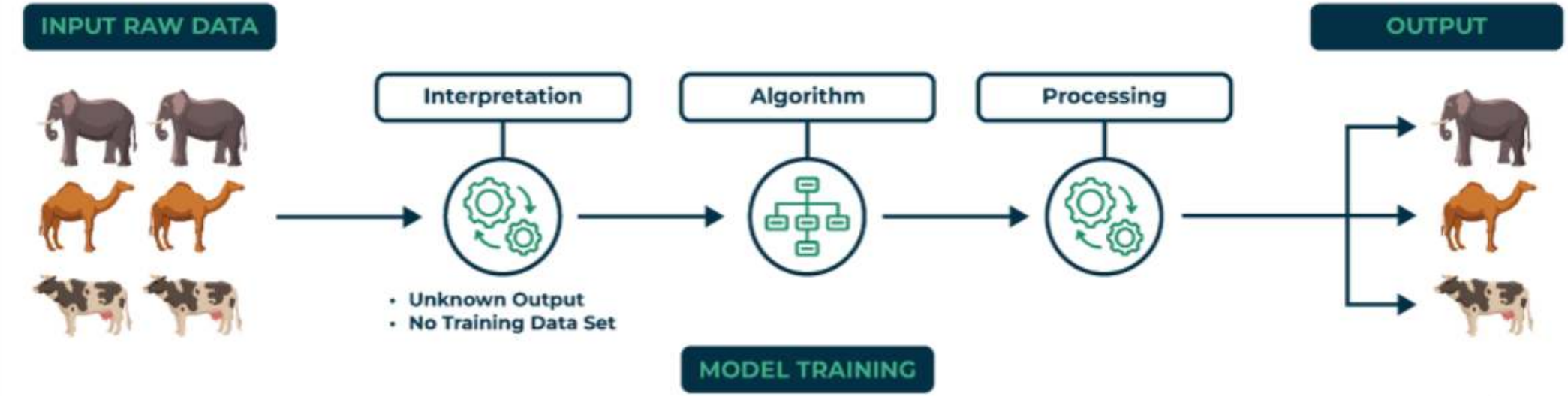
The trained machine can then make **predictions** on new, unlabeled data.



SUPERVISED LEARNING - HOW WE FEED THE MODEL WITH DATA?

Feature space refers to the **multi-dimensional space** that represents all possible values of the features (also called variables or attributes) used in a machine learning model.
In supervised machine learning, this feature space is where the algorithm "looks" to find **patterns** in the data to make predictions.





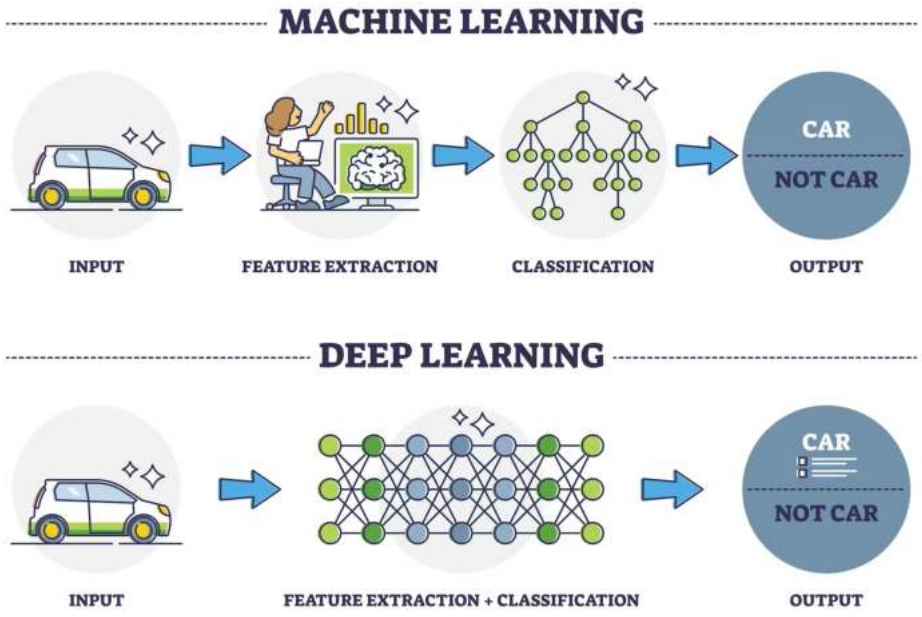
Unsupervised learning is particularly useful in situations where you have a lot of data but don't have labels or categories for that data. The algorithm looks for patterns or structures in the data on its own.

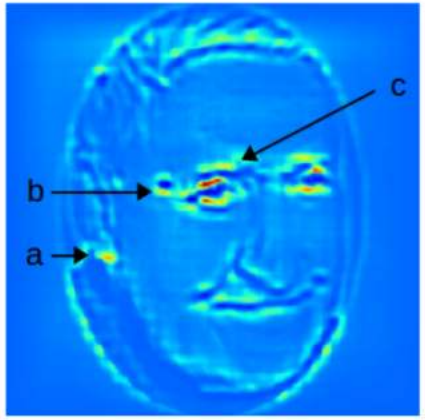
UNSUPERVISED LEARNING

DEEP LEARNING

Deep learning is especially powerful for tasks that involve complex patterns or large amounts of data, like recognizing images, understanding speech, or driving a car. It's used in many cutting-edge technologies that we interact with daily, making it a fundamental tool in the development of AI.

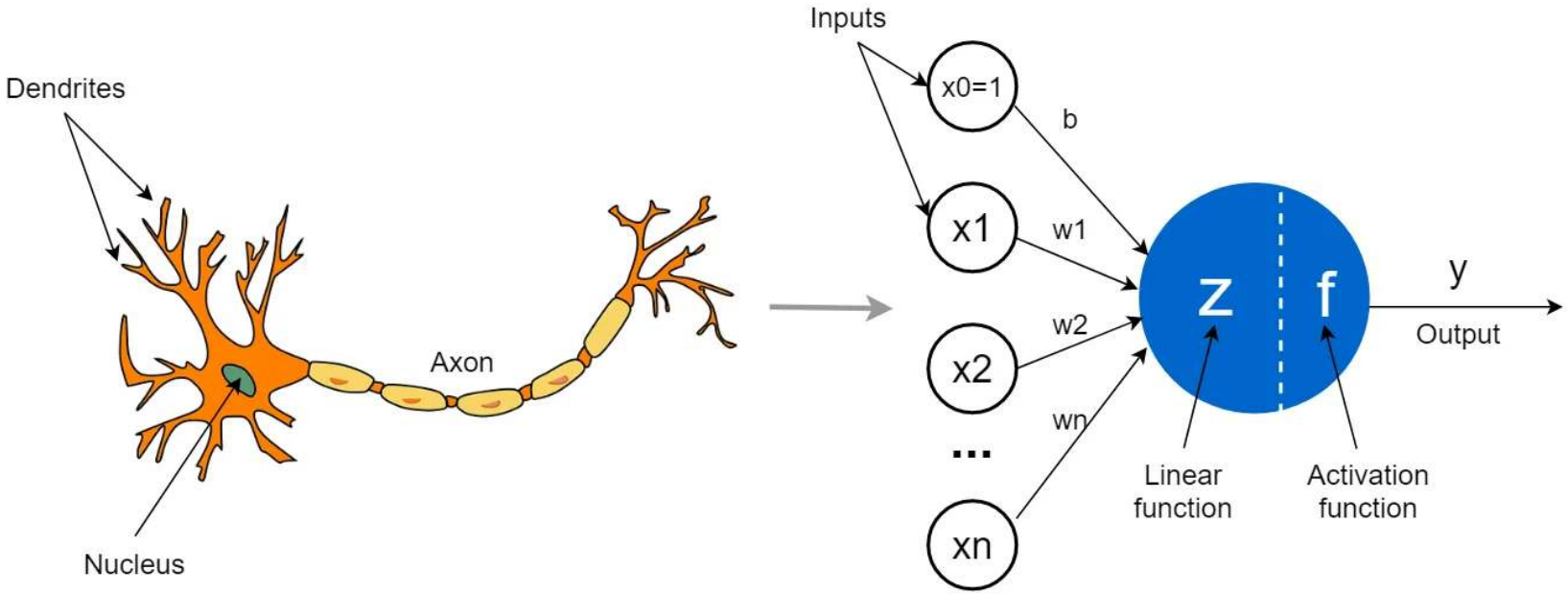
Neural Networks: These are the building blocks of deep learning. They consist of layers: an input layer (where data enters), one or more hidden layers (where the data is processed), and an output layer (where predictions or classifications are made).
Layers: Each layer transforms the data in some way. The more layers there are, the more complex patterns the network can learn.
Training: The network learns by adjusting its internal parameters (weights) based on the data it's given, improving its accuracy over time.





A SIMPLE NETWORK: PERCEPTRON

DEEP LEARNING



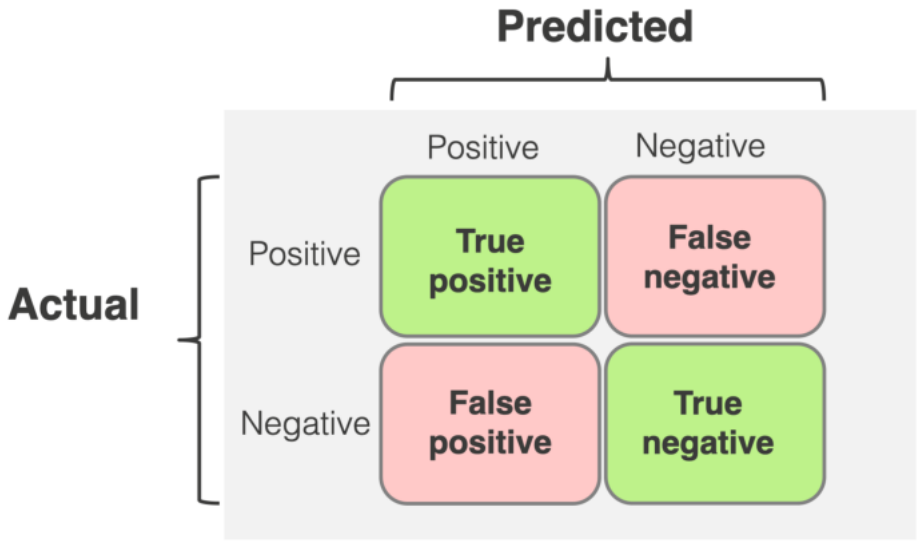
Biological NeuronDendrites: These are the branch-like structures that receive signals from other neurons. They bring information into the neuron.
Nucleus: This is the control center of the neuron, containing the cell's genetic material.
Axon: The axon is a long, thin structure that transmits signals from the neuron to other neurons, muscles, or glands.
The **dendrites** collect electrical signals from other neurons and send them to the nucleus.The **nucleus** processes these signals.If the signal is strong enough, it travels down the **axon** to pass the signal on to the next neuron

METRICS FOR EVALUATION

metrics are quantitative measures used to evaluate the performance of a machine learning model. These metrics help in understanding how well a model is making predictions and where it might need improvement.

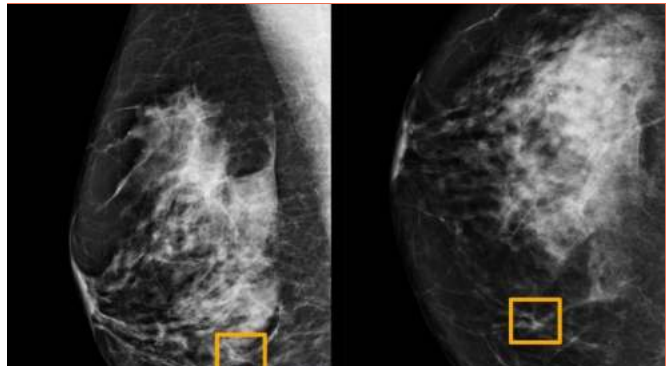
Common metrics: Accuracy, Precision, Recall, F1 Score, Confusion Matrix, MAE, MSE, R^2

	Predicted	Actual	Correct?
1.	Not fraud	Not fraud	✓
2.	Not fraud	Not fraud	✓
3.	Not fraud	Fraud	X
4.	Fraud	Fraud	✓
...			
n.	Fraud	Not fraud	X



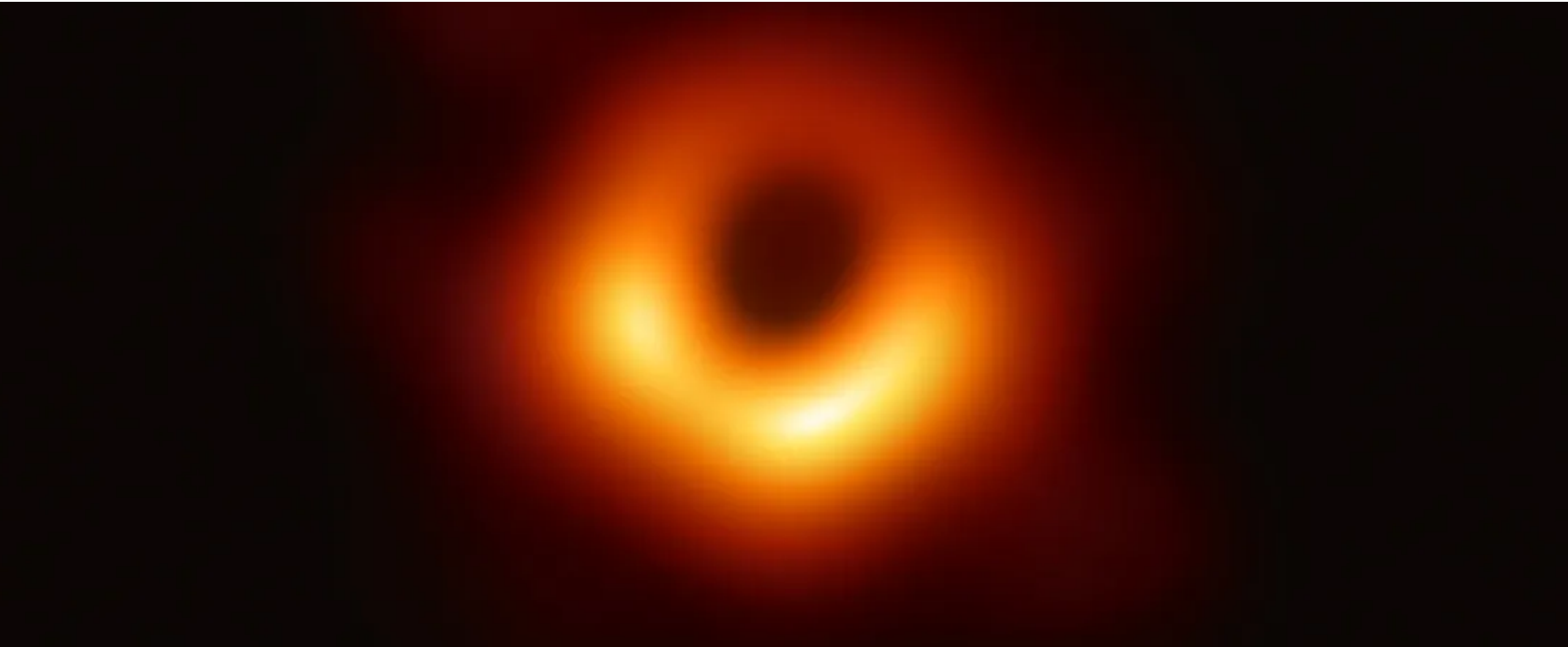
APPLICATIONS OF AI IN INDUSTRIES

Medicine and Healthcare



APPLICATIONS OF AI IN INDUSTRIES

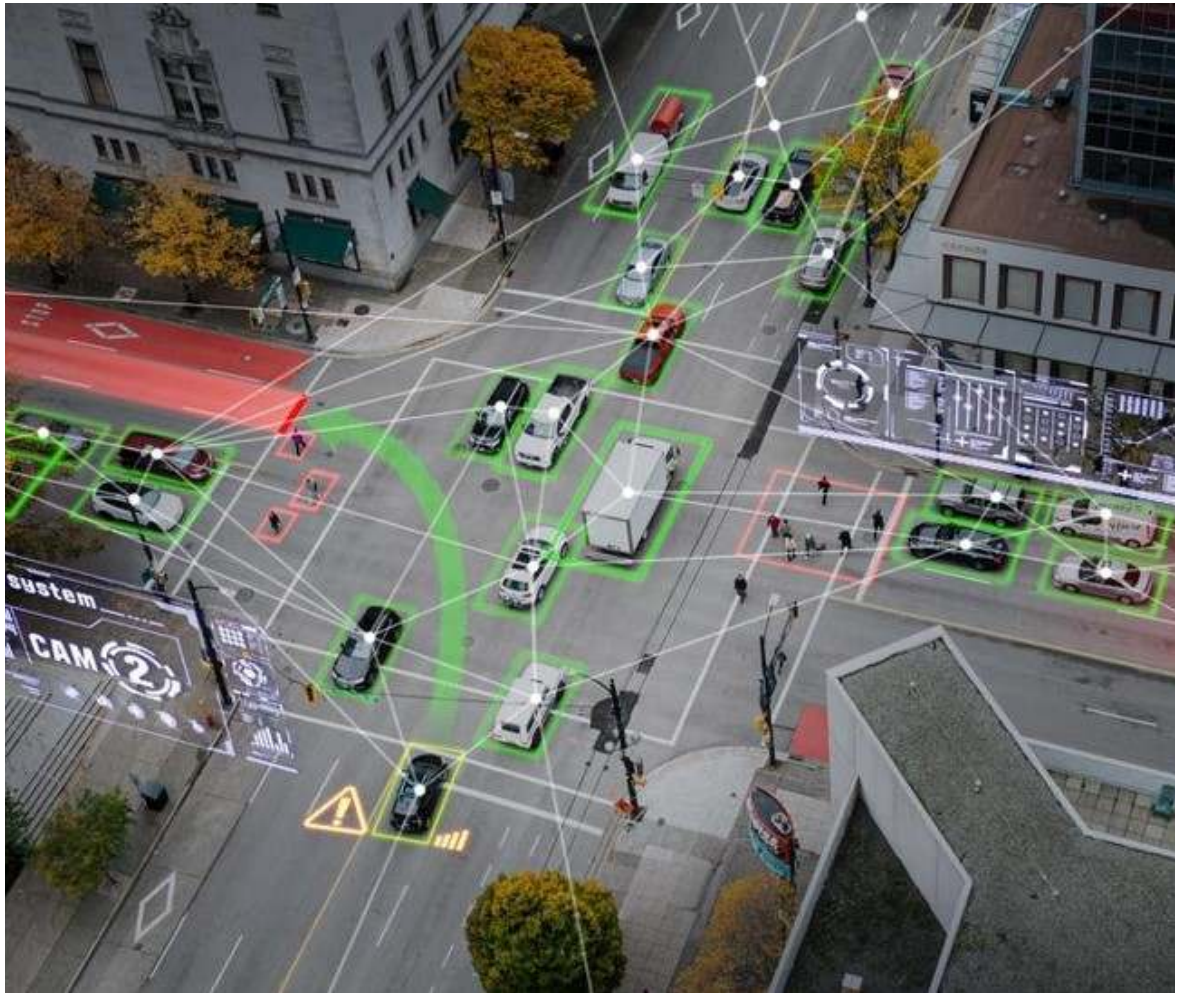
Space Exploration and Space Weather



APPLICATIONS OF AI IN INDUSTRIES

CLIMATE AND NATURAL DISASTERS

APPLICATIONS OF AI IN INDUSTRIES: TRANSPOTATION

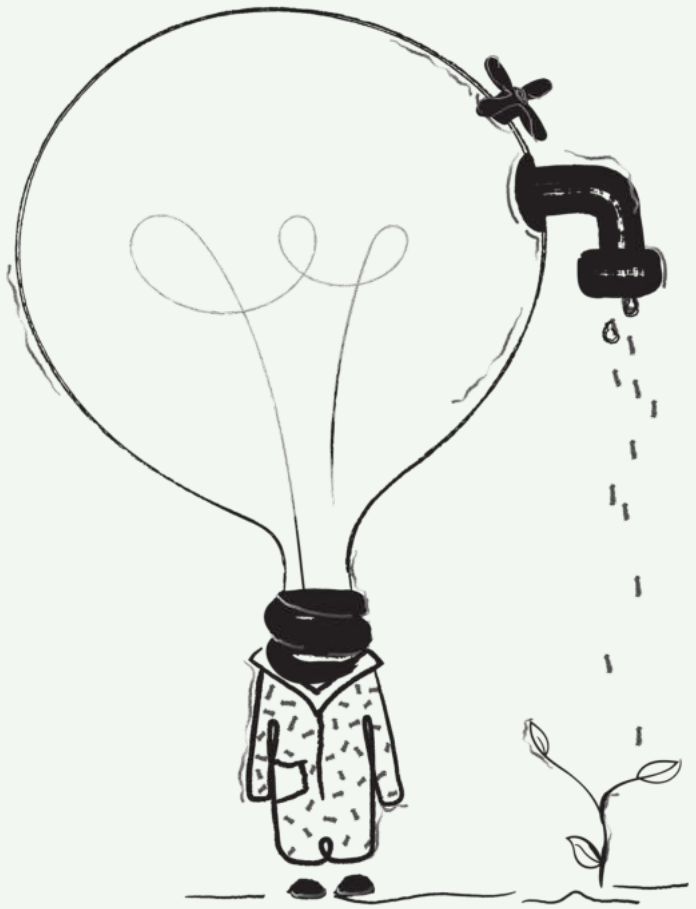


APPLICATIONS OF AI IN INDUSTRIES: EDUCATION

Personalized Learning

Enhancing Accessibility and instant feedback

Automating Administrative Tasks



ETHICS: BIAS

AI systems are often trained on large datasets that reflect real-world information. However, these datasets can contain **biases**—whether based on race, gender, socioeconomic status, or other factors.

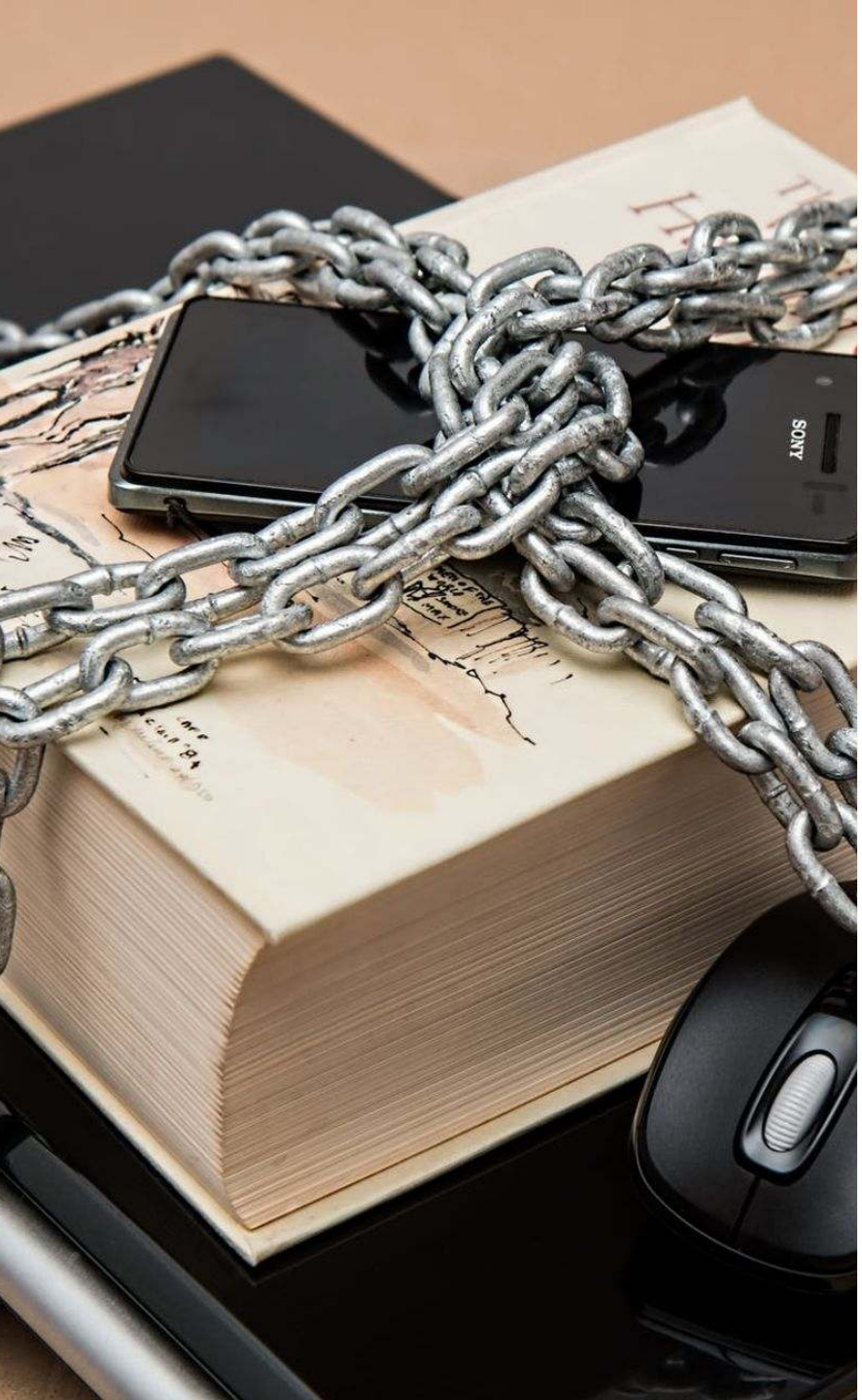
Example of discriminatory Algorithms: AI used in hiring processes might favor certain groups over others if it's trained on biased data, leading to unfair job market practices.

The Importance of Addressing Bias

1. Fairness and Equality. Ensuring AI systems are fair and equitable is crucial for upholding human rights and preventing discrimination.

2. Trust in AI. For AI to be widely accepted and trusted, it must be perceived as unbiased and impartial. Addressing bias is key to building and maintaining this trust.

Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	3	Braund, Mr. Owen Harris	male	22	1	0	A/5 21171	7.25		S
0	1	Cumings, Mrs. John Bradley (Florence Briggs Thayer	female	38	1	0	PC 17599	71.2833	C85	C
0	3	Heikkinen, Miss. Laina	female	26	0	0	STON/O2.	7.925		S
0	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35	1	0	113803	53.1	C123	S
0	3	Allen, Mr. William Henry	male	35	0	0	373450	8.05		S
0	3	Moran, Mr. James	male		0	0	330877	8.4583		Q
0	1	McCarthy, Mr. Timothy J	male	54	0	0	17463	51.8625	E46	S
0	3	Palsson, Master. Gosta Leonard	male	2	3	1	349909	21.075		S
0	3	Johnson, Mrs. Oscar W (Elisabeth Vilhelmina Berg)	female	27	0	2	347742	11.1333		S
0	2	Nasser, Mrs. Nicholas (Adele Achem)	female	14	1	0	237736	30.0708		C
0	3	Sandstrom, Miss. Marguerite Rut	female	4	1	1	PP 9549	16.7	G6	S
0	1	Bonnell, Miss. Elizabeth	female	58	0	0	113783	26.55	C103	S
0	3	Saundercock, Mr. William Henry	male	20	0	0	A/5. 2151	8.05		S
0	3	Andersson, Mr. Anders Johan	male	39	1	5	347082	31.275		S
0	3	Vestrom, Miss. Hulda Amanda Adolfina	female	14	0	0	350406	7.8542		S
1	`	Hewlett, Mrs. (Mary D Kingcome)	female	55	0	0	248706	16		S
0	3	Rice, Master. Eugene	male	2	4	1	382652	29.125		Q
0	2	Williams, Mr. Charles Eugene	male		0	0	244373	13		S
0	3	Vander Planke, Mrs. Julius (Emelia Maria Vandemoo	female	31	1	0	345763	18		S
0	3	Masselmani, Mrs. Fatima	female		0	0	2649	7.225		C
0	2	Fynney, Mr. Joseph J	male	35	0	0	239865	26		S
0	2	Beesley, Mr. Lawrence	male	34	0	0	248698	13	D56	S
0	3	McGowan, Miss. Anna "Annie"	female	15	0	0	330923	8.0292		Q
0	1	Sloper, Mr. William Thompson	male	28	0	0	113788	35.5	A6	S



ETHICS: PRIVACY CONCERNS

AI systems often rely on vast amounts of personal data to function effectively. This can include everything from social media activity and shopping habits to medical records and location data. The collection, storage, and use of this data raise significant privacy concerns.

The Importance of Protecting Privacy:

1. Personal Autonomy. Individuals have the right to control their personal information and how it is used. AI development must respect this right.

2. Legal and Ethical Standards. Ensuring AI systems comply with data protection laws and ethical standards is essential for preventing misuse of personal data and maintaining public trust.

ETHICS: JOB DISPLACEMENT

AI and automation are transforming industries by taking over tasks traditionally performed by humans. While this can lead to increased efficiency and new opportunities, it also poses a significant risk of job displacement for millions of workers.

Example: Chatbots and AI-driven customer support systems can handle many queries that were once managed by human employees, leading to job losses in the service sector.

The Importance of Managing Job Displacement

1. Economic Stability: Ensuring that workers can transition to new roles or industries is vital for maintaining economic stability and avoiding mass unemployment.

2. Social Equity. Policies and initiatives that support reskilling and upskilling workers can help mitigate the impact of AI-driven job displacement and promote social equity.

USE CASE: MEMORY VS LIFE

Dad X, a 45-year-old father and professional, has been battling severe **epilepsy** for several years. Despite trying various treatments, his condition remains debilitating, significantly affecting his quality of life and ability to work. His neurologist has proposed a **new, advanced treatment involving a brain interface**. In order to successfully integrate the brain interface and ensure its effectiveness, Dad X must undergo a procedure that may result in the **loss of specific memories.**

The AI within the brain interface could inadvertently affect regions of the brain associated with personal recollections, particularly memories involving his son, who is a central part of his life.

The potential memory loss (that his son does not want at all) creates a profound ethical dilemma: **Memory or Quality of Life?**

TAKE-HOME MESSAGES

AI is not just a tool, but a gateway to innovation. Embrace its potential, explore its possibilities, and let your creativity and curiosity drive the future.

- AI is Everywhere
- AI for Everyone
- Understanding AI Basics is Essential
- AI’s Potential and Limitations
- Ethics and Responsibility
- Collaboration Between Humans and AI
- Lifelong Learning
- AI has the power to transform our world in ways we can only imagine and helps build a more equitable and prosperous world for all


That's all Folks!