# *Introduction to machine learning (lecture 1)*
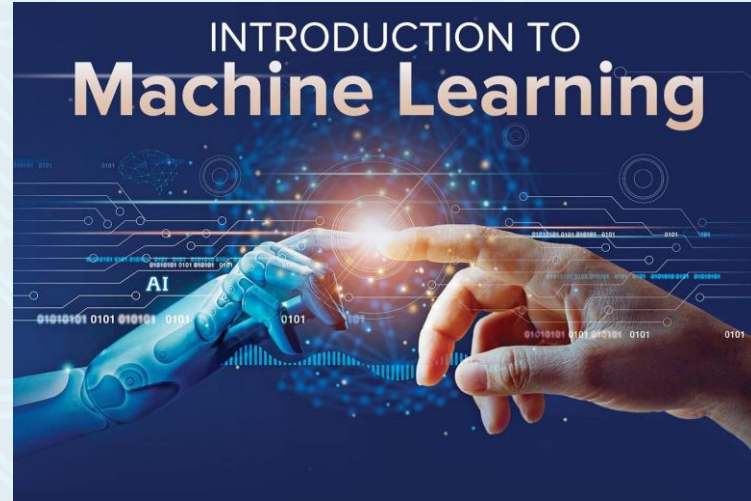
*By/ Aly Maher Abdel Fattah*

# About me

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- *Artificial intelligence science program (level 3)*

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- *Hold an internship certificate in machine learning from SYNIC INTERN'S*

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# Lesson Outline

- *What is Machine Learning?*

- *The Practitioner's Perspective*

- *Real-life Scenarios in ML*

- *Summary*

# What is Machine Learning?

*Machine Learning (ML) is a modern software development technique, a* *subset of artificial intelligence (AI),* *that enables computers to solve problems using examples of real-world data. Essentially, it allows computers to* *learn and make decisions* *without being explicitly programmed to do so.*
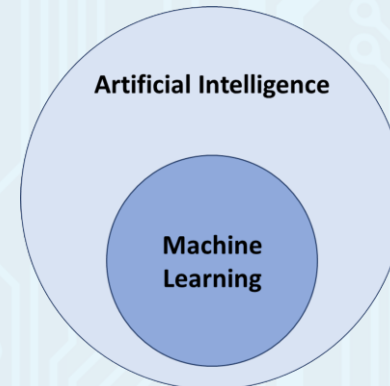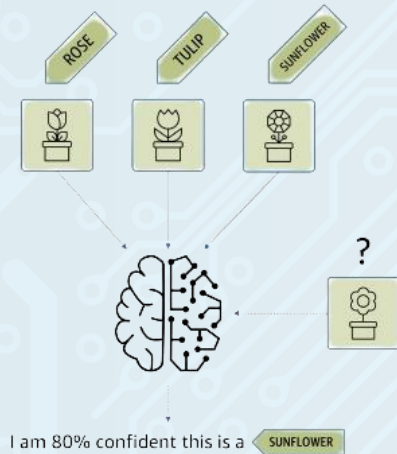
# Types of Machine Learning

*There are three main types of machine learning:*

- *Supervised Learning, where algorithms learn from labeled data*

- *Unsupervised Learning, where the algorithm seeks patterns in unlabelled data*

- *Reinforcement Learning, a method where an agent learns how to behave in an environment by performing actions and observing rewards.*
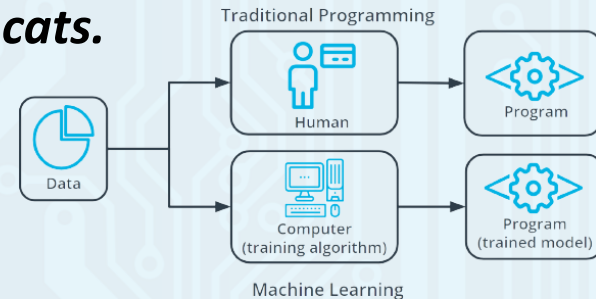
# Types of Machine Learning



**Supervised Learning**

**Unsupervised Learning**

**Reinforcement Learning**

# Machine Learning vs. Traditional Programming

*In traditional programming, a programmer specifies rules. In contrast, machine learning involves the computer discovering rules to make predictions or decisions based on data. For instance, rather than explicitly programming rules to detect a cat in an image, a machine learning algorithm uses examples of images with and without cats to learn to detect cats.*

# The Process of Machine Learning

*Machine learning involves creating a model, which is a specified set of rules and patterns, and then training this model using data. Once trained, this model, which has learned from data, can be used to make predictions or decisions without being specifically coded for the task.*

# Terminology

*Here we introduce essential terms such as 'Model', which is the core algorithm that makes predictions, 'Training Algorithm', which adjusts the model based on data, and 'Inference Algorithm', which applies the model to new data to make predictions.*

# ML's Impact on Society

*Machine Learning is bringing about transformative changes across various sectors. It is powering advancements in industries like autonomous vehicles, enabling rapid and accurate language translation, improving worker safety, and accelerating pharmaceutical development.*

# The Three Primary Components

*Every machine learning task involves three core components: a Machine Learning Model, which is akin to a raw block of clay, a Model Training Algorithm, which shapes the clay into a desired form (like a teapot), and a Model Inference Algorithm, which is like using the teapot to pour tea.*



| Machine Learning Model | Model Training Algorithm | Model Inference Algorithm |

# The Clay Analogy of Machine Learning

*The components of machine learning can be understood by comparing them to crafting a teapot from clay. The 'clay' represents the potential of the model, and the crafting process represents the training algorithm. The final 'teapot' represents the trained model, ready to serve its purpose.*

# What is a Model?

*A model is a generic program made specific by the data used to train it. It's like a raw block of clay, shapeless and unformed, that can be molded by the training data to form the 'teapot', a specific solution to a problem.*

# Model Training Algorithms

*Model training is the process of adjusting a machine learning model based on data. It is an iterative and interactive process, much like molding clay into a desired shape, where the model is continuously refined until it performs well on a given task.*

# Model Inference

*Once a model is trained, it can be used to make predictions on new, unseen data. This process is known as inference. In our clay analogy, this is the stage where the teapot, once crafted, is now used to serve tea.*

# The Five Machine Learning Steps (Preview)

*In the next chapter, we will delve into the five foundational steps used by machine learning practitioners to solve problems: defining a problem, building a dataset, training a model, evaluating the model, and deploying the trained model to make decisions or predictions.*

# Summary and Key Takeaways

*To summarize, today's lesson introduced you to the fundamental concepts and components of Machine Learning. We learned the differences between traditional programming and machine learning, and how machine learning is already transforming various industries.*

# Thank you

*Any Question?*