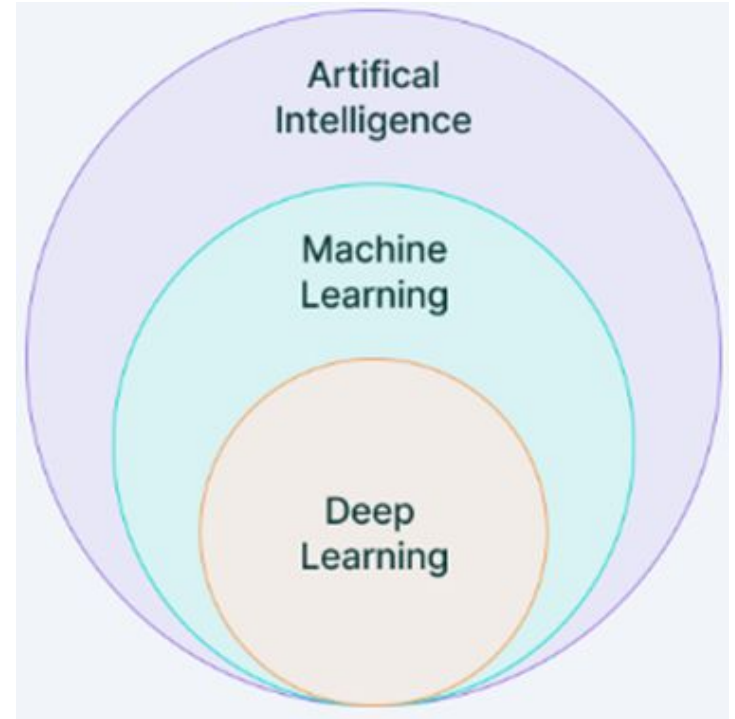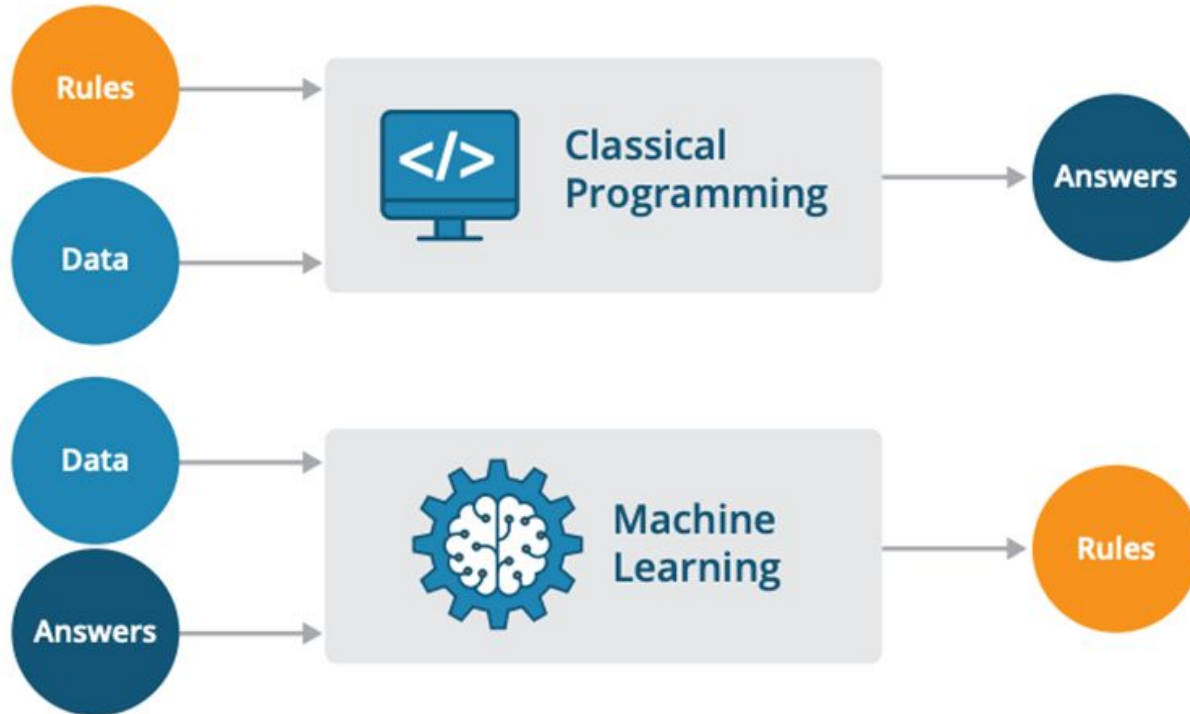# Introduction
to
Machine Learning

What is Machine Learning?

- Field of study that gives computers the ability to learn without being explicitly programmed.

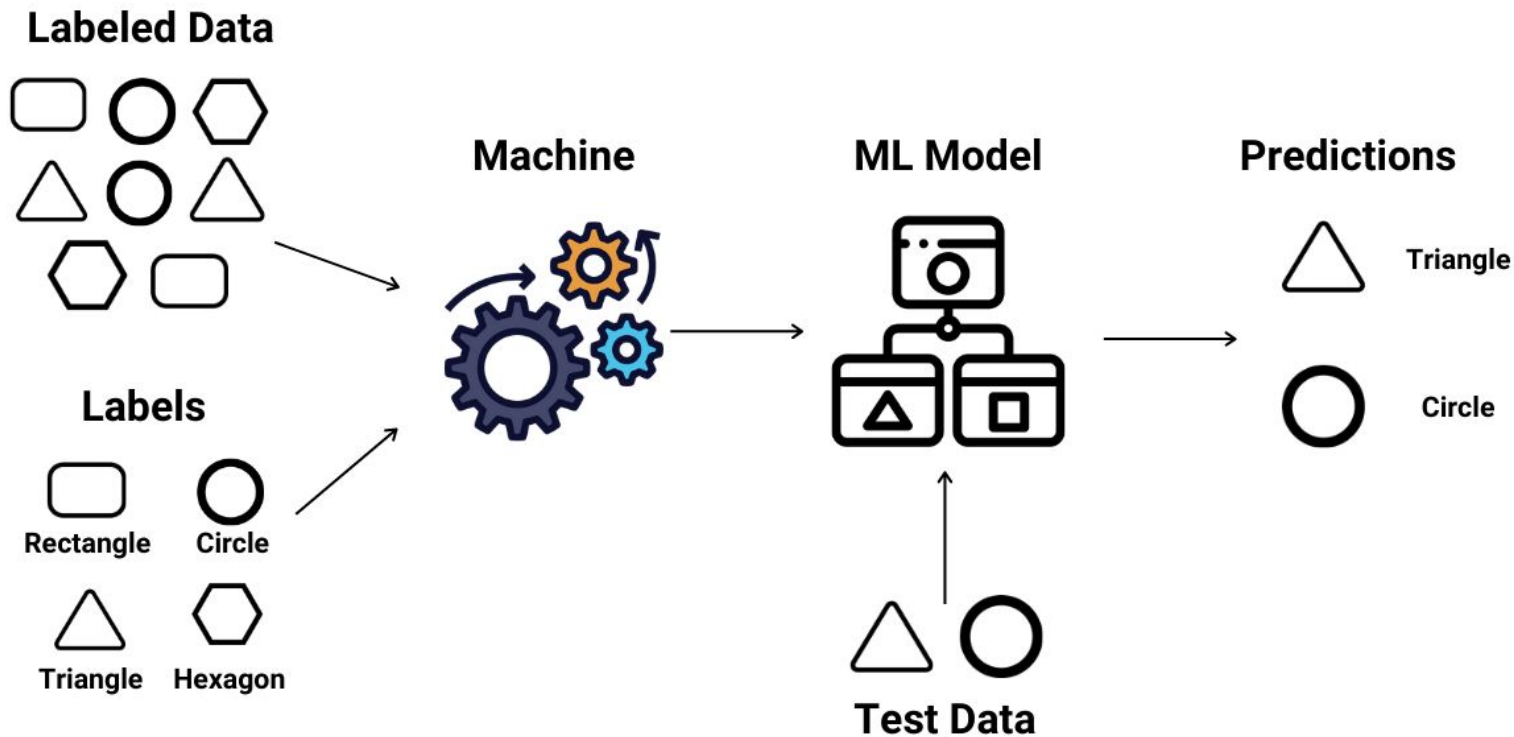# Classical Programming Vs. Machine Learning

Machine Learning Algorithms

- Supervised Learning

- Unsupervised Learning

- Others:

  - Semi-Supervised Learning

  - Reinforcement Learning

  - Recommender Systems

Supervised Learning

- Supervised learning is a category of machine learning that uses labeled datasets to train algorithms to predict outcomes and recognize patterns.

- It uses **LABELED DATA or GROUND TRUTH**.

- Right Answers are given.

- Broadly classified as:

  - Classification Algorithms

  - Regression Algorithms

Supervised Learning

Labeled Data

Machine

ML Model

Predictions

Triangle

Circle

Labels

Rectangle   Circle

Triangle   Hexagon

**Test Data**

Supervised Learning: Classification Algorithm

- Classification is a type of supervised learning where the goal is to predict the categorical label (class) of a given input based on training data.

- Output is **Discrete Value.**

- Example:

  - Spam Detection: Classify emails as "spam" or "not spam".

  - Breast Cancer: Classify breast cancer as "benign" or "malignant".

  - Image Classification: Predict whether an image is of "cat" or "dog".

Supervised Learning: Regression Algorithm

- Regression is a type of supervised learning where the goal is to predict a continuous output variable based on one or more input variables.

- Output is **Continuous Real Value.**

- Example:

  - House price prediction: Predict the price of a house based on its features (size, location, etc.).

  - Stock price prediction: Forecast future stock prices based on historical data.

  - Sales forecasting: Estimate future sales based on past sales data and market conditions.
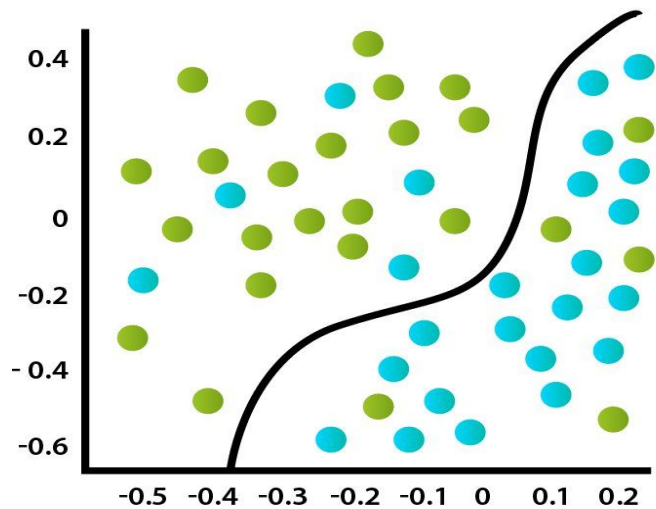
CLASSIFICATION
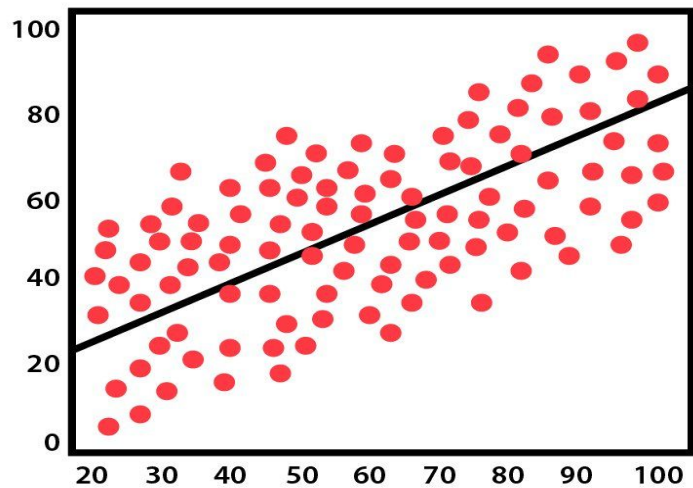
REGRESSION

Unsupervised Learning

- Unsupervised Learning is a type of machine learning that learns from data without human supervision.

- Unlike supervised learning, unsupervised machine learning models are given unlabeled data and allowed to discover patterns and insights without any explicit guidance or instruction.

- It uses **UNLABELED DATA**

- Common Unsupervised Algorithms:
    - Clustering
    - Dimensionality Reduction

Unsupervised Learning

Unlabeled Data