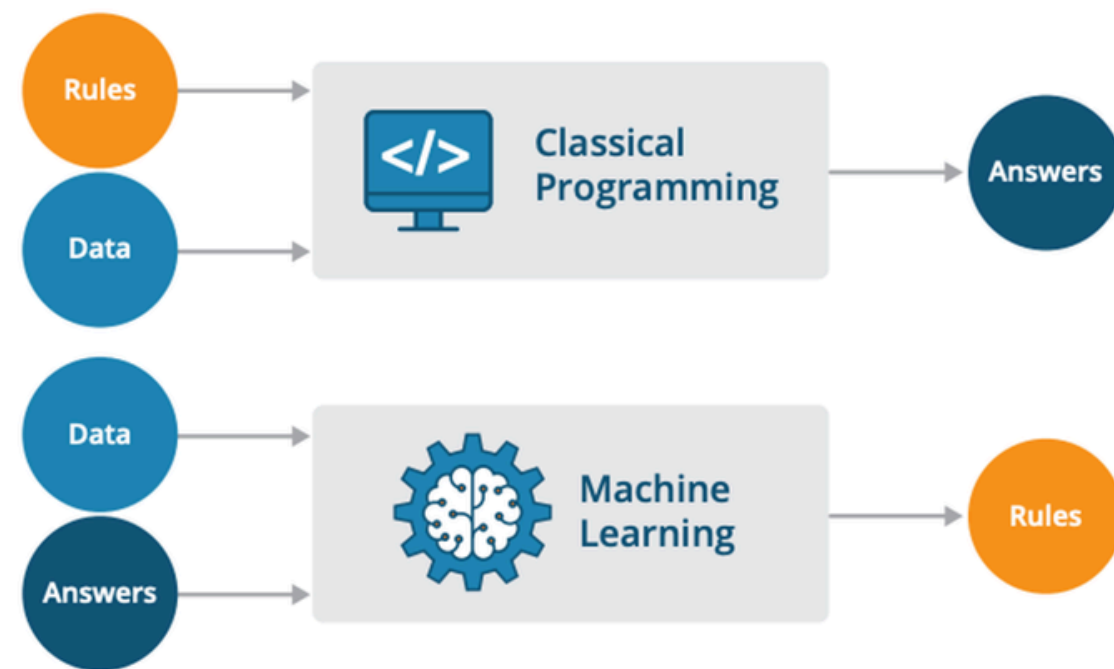


Machine Learning - Introduction



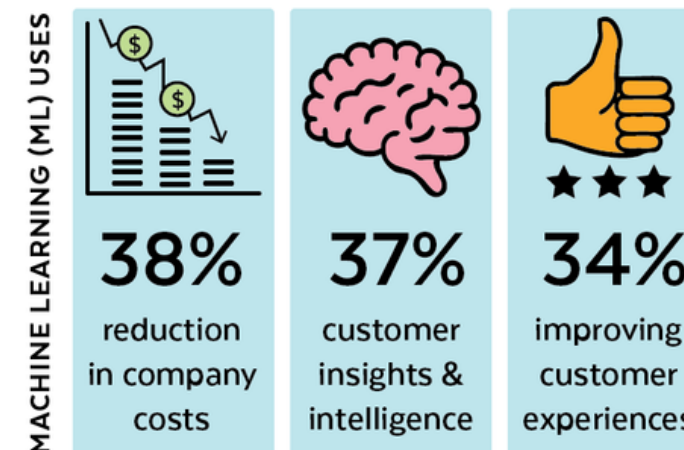
Definition

- Machine Learning (ML) is a subset of artificial intelligence (AI).
- ML involves developing algorithms and statistical models.
- The goal is to enable computers to learn from data and make predictions or decisions.
- ML doesn't require explicit programming for each task.
- It mimics how humans learn and adapt from experience.



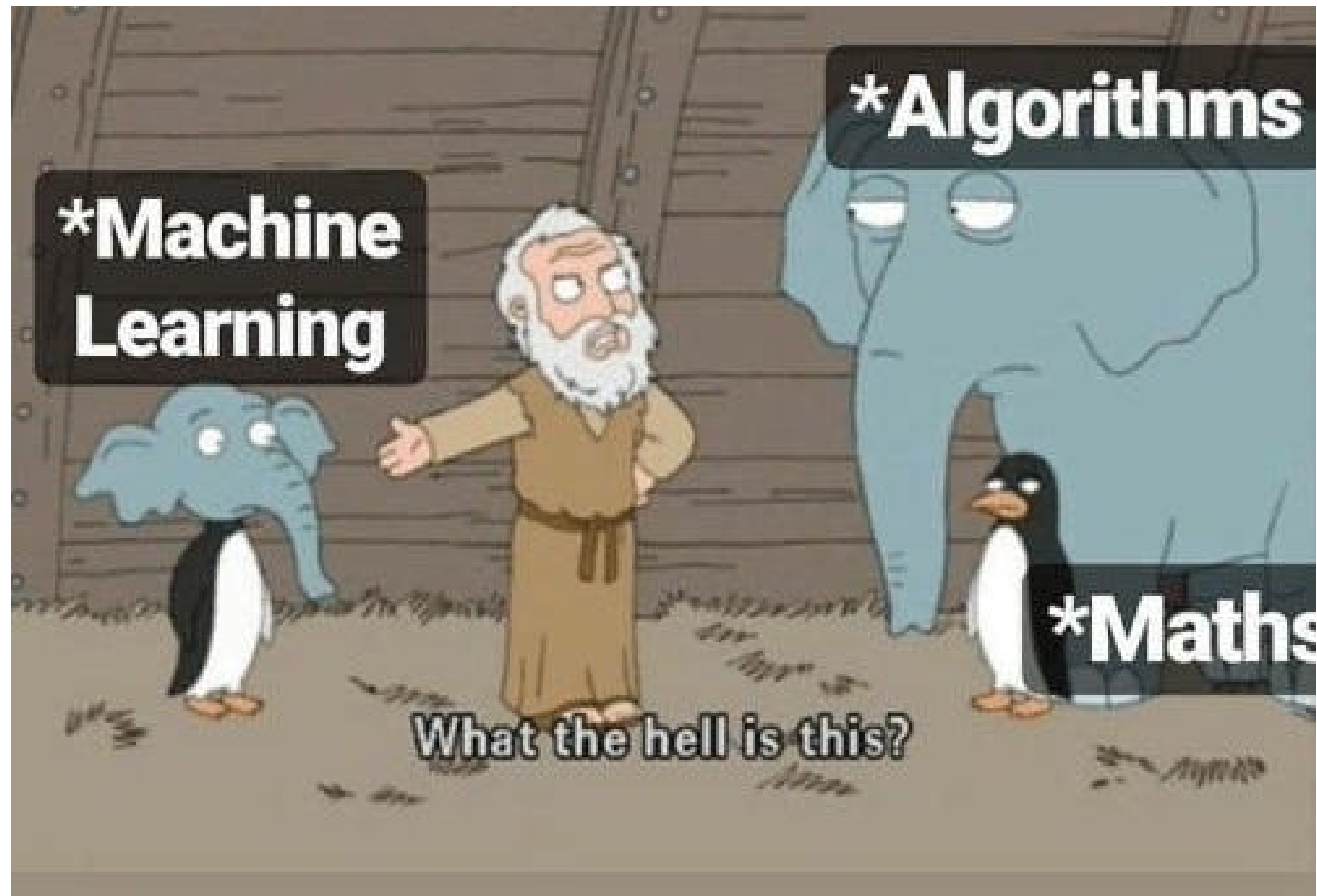
Why ML?

- **Email Spam Filtering:**
- **Product Recommendations:**
- **Predictive Text and Autocorrect:**
- **Image Recognition in Social Media:**
- **Voice Assistants:**
- **Fraud Detection in Banking:**
- **Traffic Prediction and Navigation:**
- **Health Monitoring and Diagnostics:**
- **Recommendation Systems for Streaming Services:**
- **Predictive Maintenance in Manufacturing:**

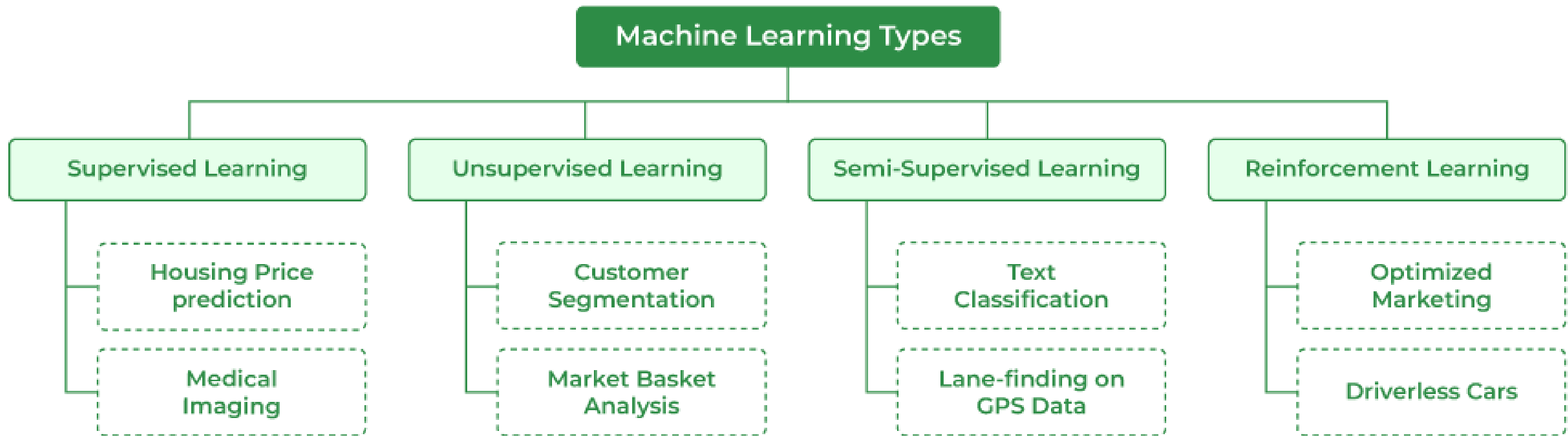


Machine Learning - Introduction

ML Study



Machine Learning - Types



Machine Learning - Types



Supervised Learning:

- In supervised learning, the model is trained on labeled data, where each input is associated with a corresponding output label.
- Examples: Classification (e.g., spam detection, image recognition) and Regression (e.g., predicting house prices, stock prices).

Unsupervised Learning:

- Unsupervised learning deals with unlabeled data, where the model learns patterns and structures without explicit supervision.
- Examples: Clustering (e.g., customer segmentation, anomaly detection) and Association (e.g., market basket analysis, recommendation systems).

Semi-supervised Learning:

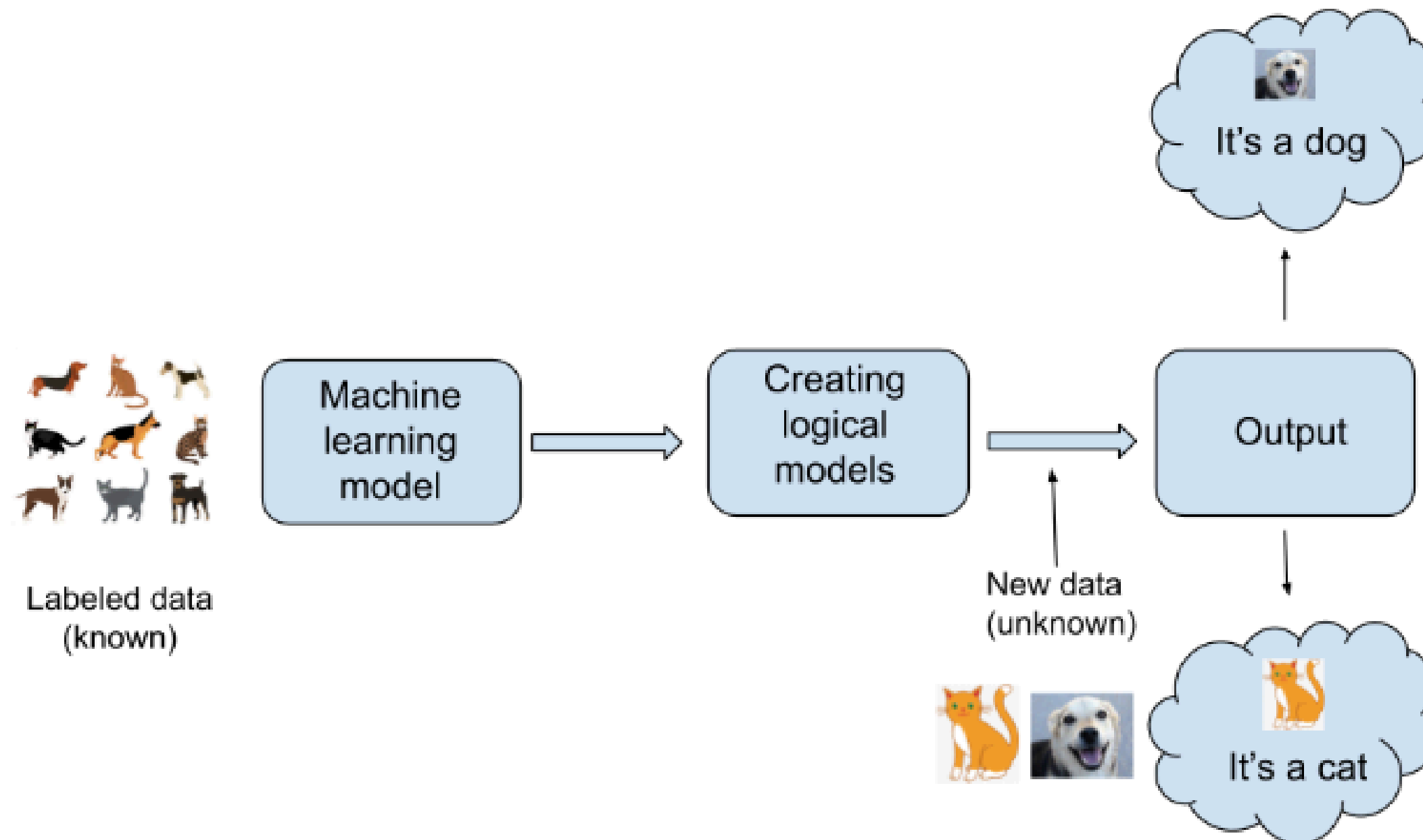
- Semi-supervised learning combines elements of supervised and unsupervised learning, where the model is trained on a mix of labeled and unlabeled data.
- Example: Training a model with a small labeled dataset and a large unlabeled dataset to improve performance.

Reinforcement Learning:

- Reinforcement learning involves training an agent to make decisions by interacting with an environment and receiving rewards or penalties based on its actions.
- Examples: Game playing (e.g., AlphaGo), robotics control, and autonomous driving.

Machine Learning - Supervised

ML Study



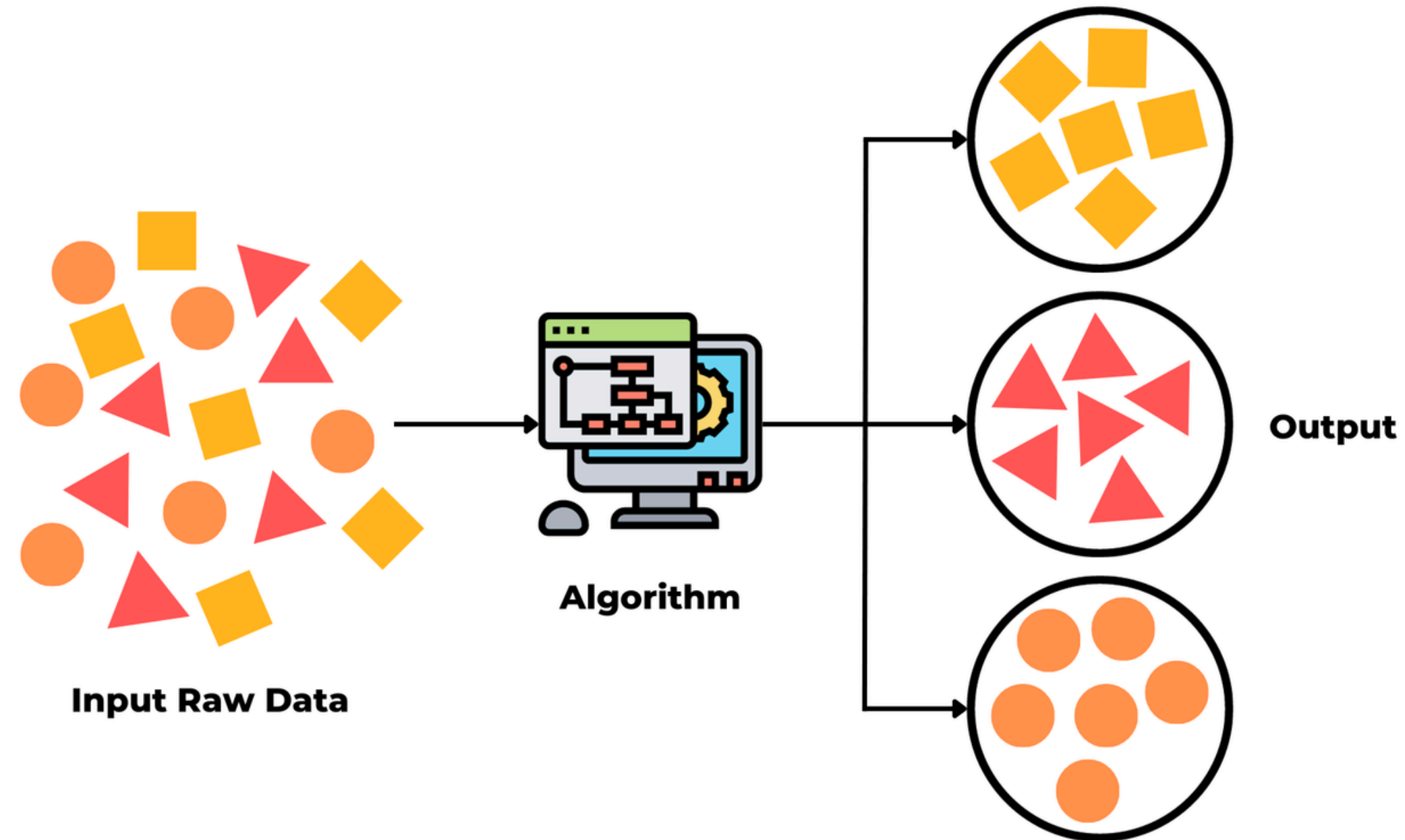
Machine Learning - Supervised

ML Study



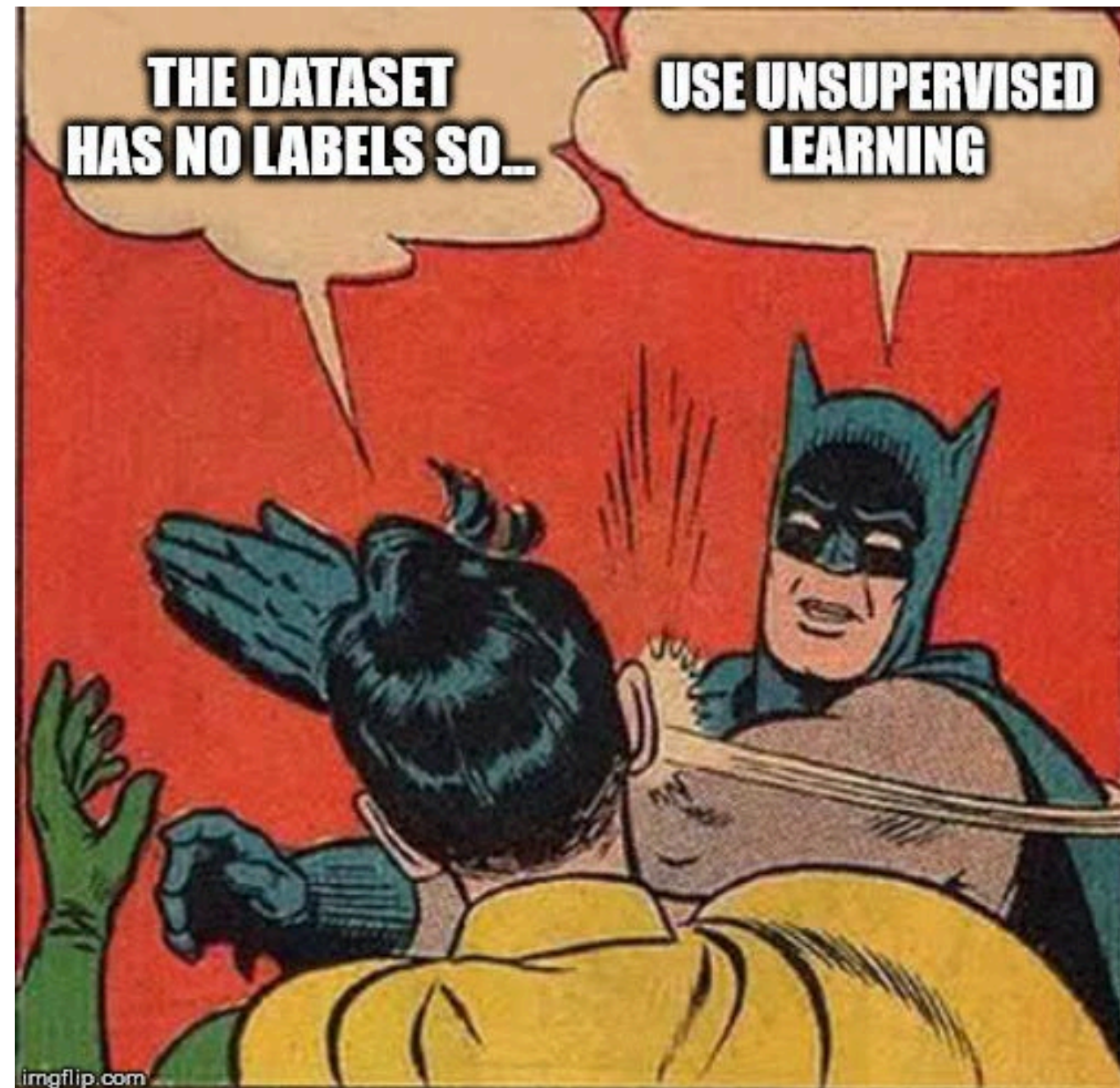
Machine Learning - Unsupervised

ML Study

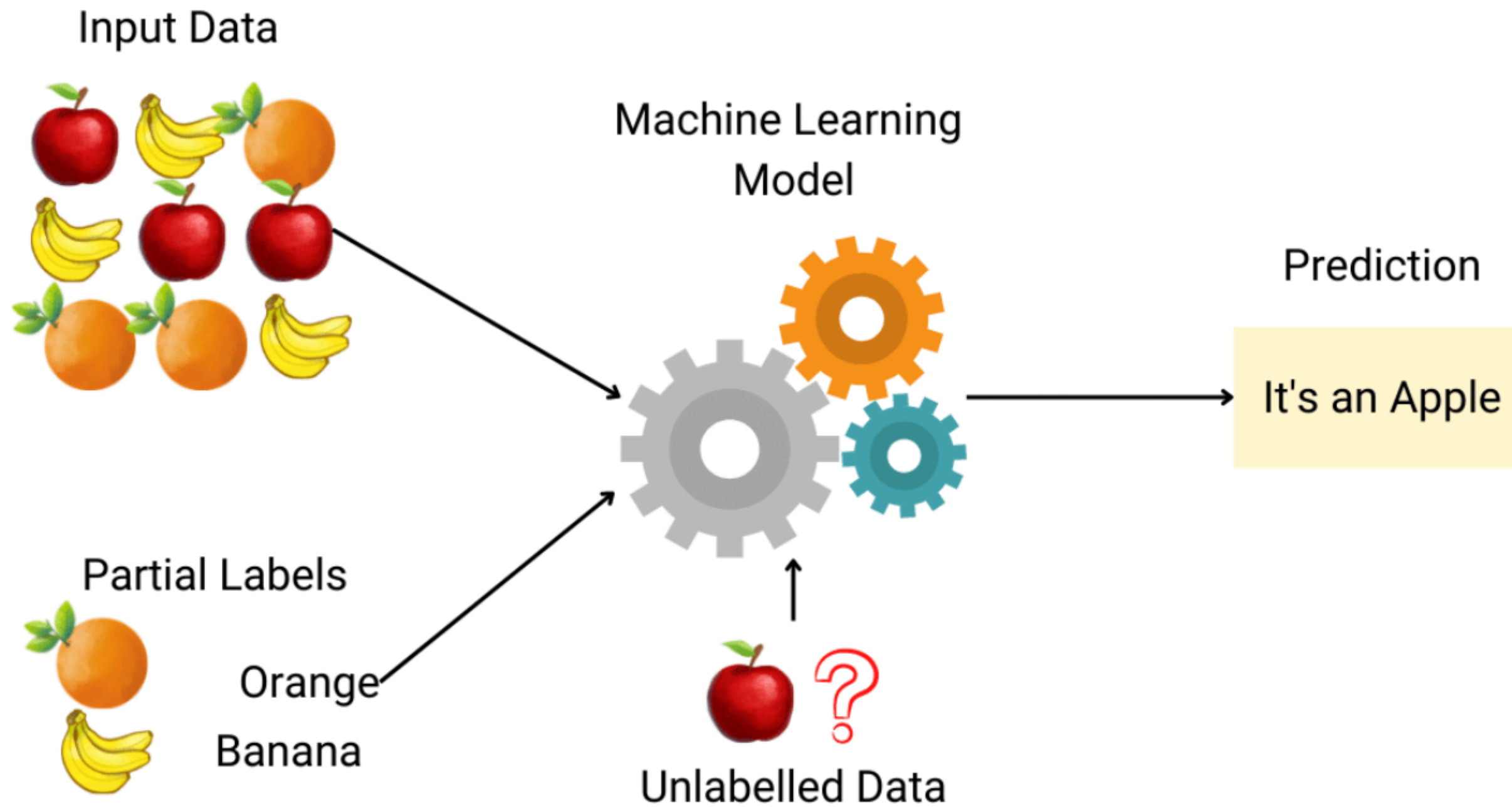


Machine Learning - Unsupervised

ML Study



Machine Learning - Semi-Supervised



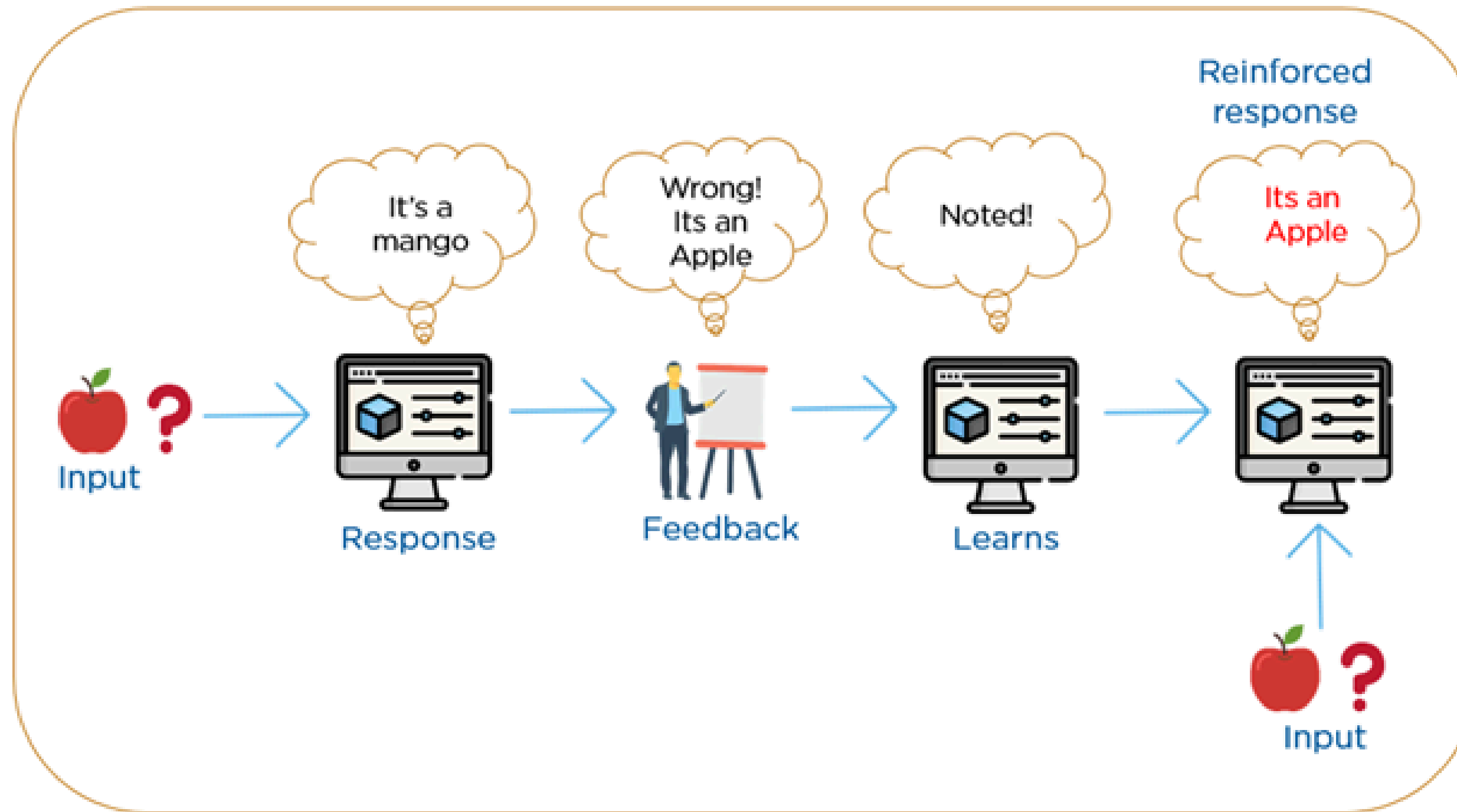
Machine Learning - Semi-Supervised

ML Study



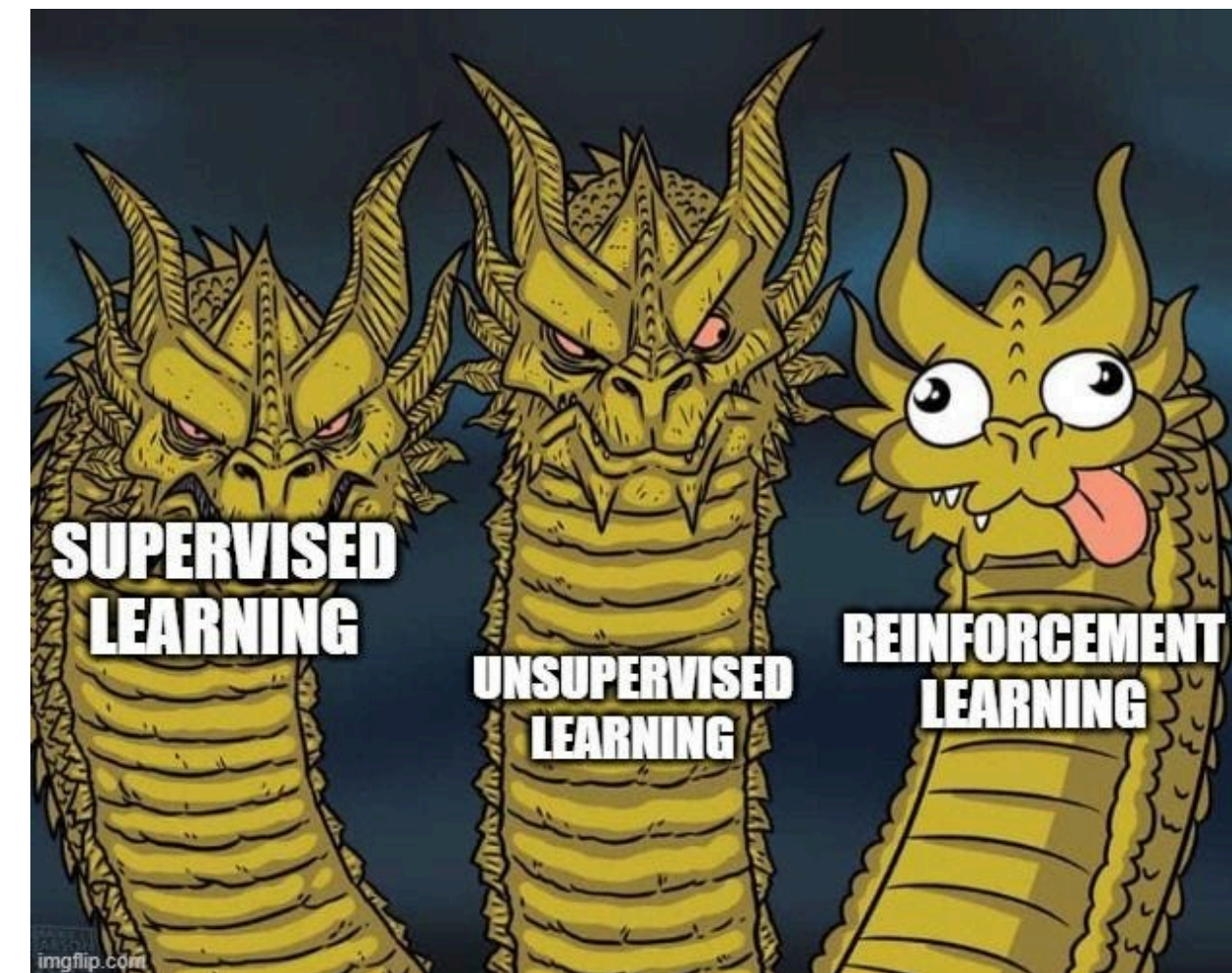
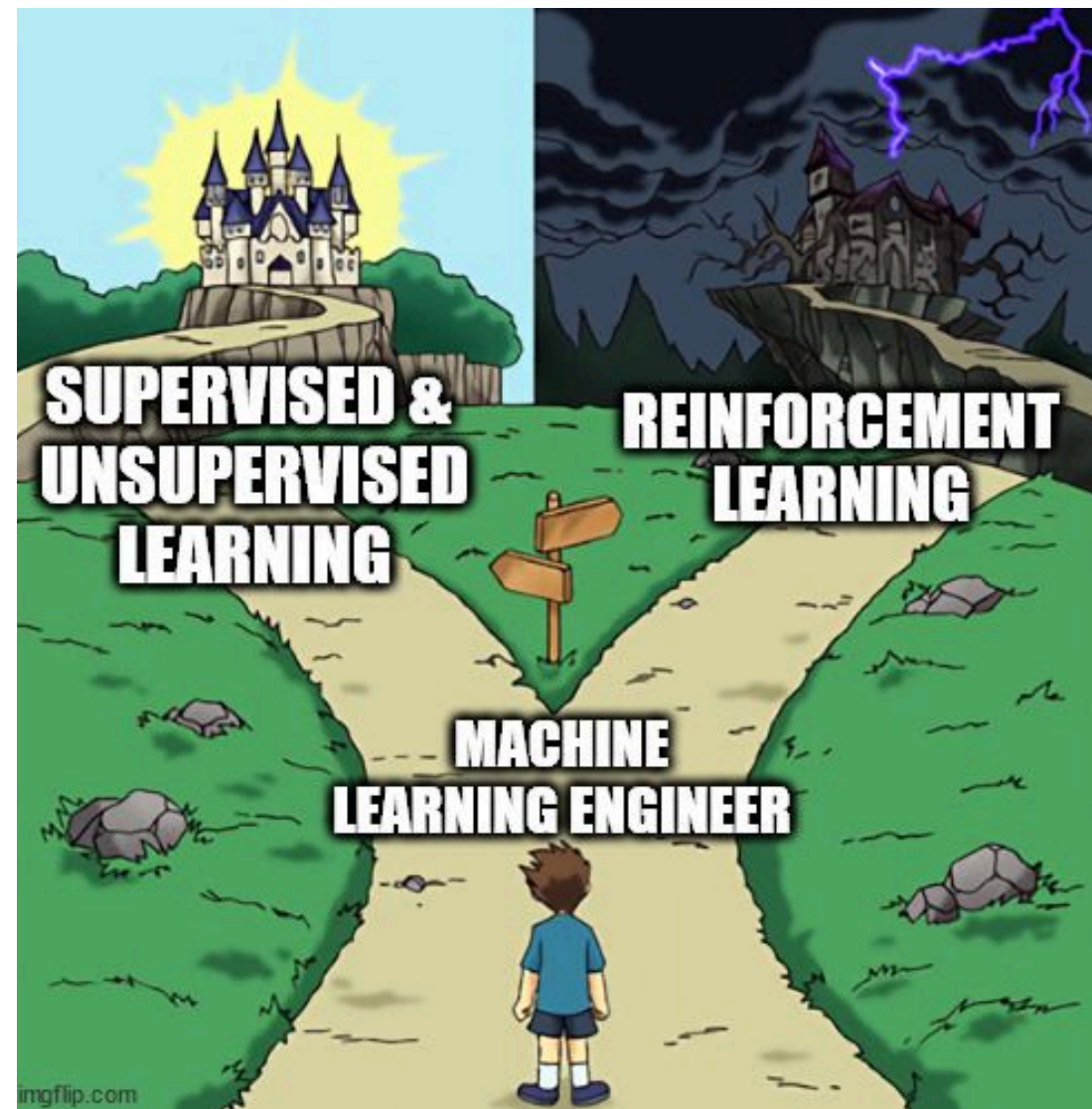
Machine Learning - Reinforcement Learning

ML Study



Machine Learning - Reinforcement Learning

ML Study



Machine Learning - Important Terms



Basic ML Terms:

- **Algorithm:**
 - Notation: A
 - Example: Linear Regression algorithm predicts house prices based on features.
- **Model:**
 - Notation: M
 - Example: Trained Linear Regression model predicts house prices.
- **Dataset:**
 - Notation: D
 - Example: Housing dataset contains house features and labels.
- **Feature:**
 - Notation: X
 - Example: Feature matrix with columns like size, bedrooms, and location.
- **Label:**
 - Notation: Y
 - Example: House prices are the labels for each house in the dataset.
- **Training Set:**
 - Notation: D(train)
 - Example: Training set contains 80% of the housing dataset.
- **Validation Set:**
 - Notation: D(val)
 - Example: Validation set used to tune hyperparameters during training.
- **Test Set:**
 - Notation: D(test)
 - Example: Test set used to evaluate model performance.

Machine Learning - Important Terms



Student ID	Exam 1 Score	Exam 2 Score	Study Hours	Pass/Fail
1	85	90	8	Pass
2	70	75	6	Pass
3	60	65	4	Fail
4	90	95	10	Pass
5	75	80	7	Pass

Thank You!