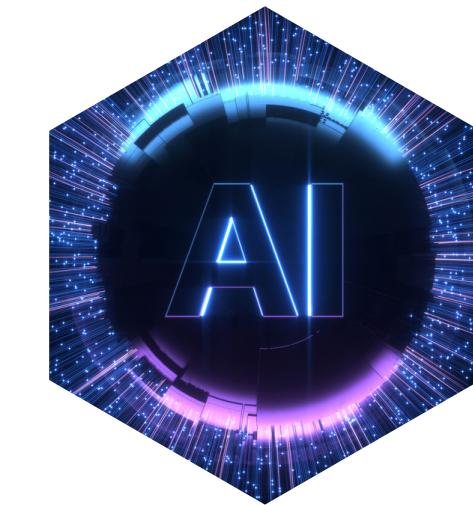


Embarking on the
Machine Learning
Journey: A Beginner's Guide

Supriya Khadka
Conversational AI Engineer, Diyo.AI





Agenda

1

What is Machine
Learning?

2

What can I do
with it?

3

How do I get
started?





What were my four years like?



Course Work

Year 1



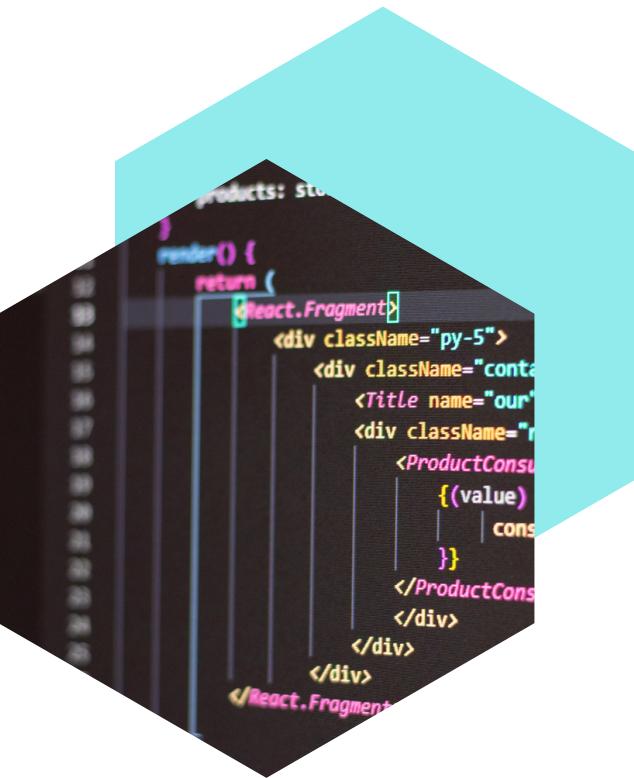


What were my four years like?



Course Work

Year I



Web Development

Year II



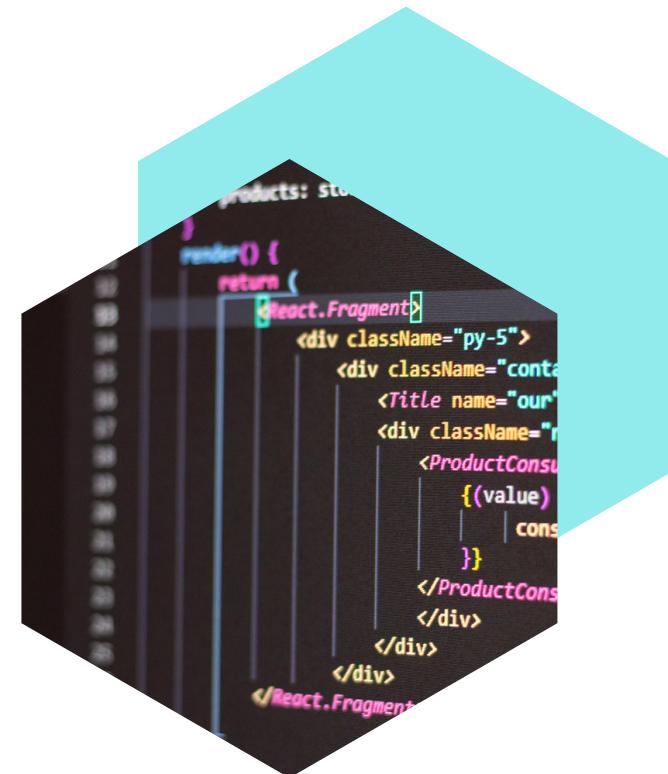


What were my four years like?



Course Work

Year I



Web Development

Year II



Blockchain

Year III



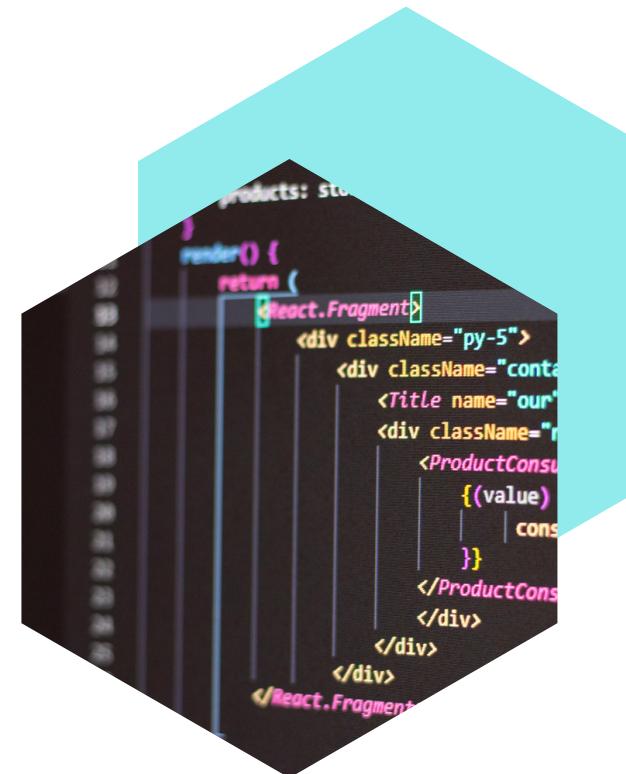


What were my four years like?



Course Work

Year I



Web Development

Year II



Blockchain

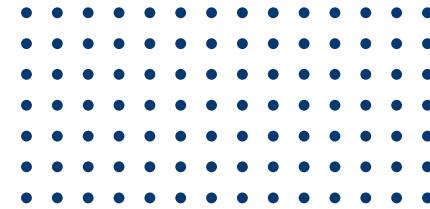
Year III



Machine Learning

Year IV





What is Machine Learning?





Machine Learning

Allowing machines to learn from data and algorithms

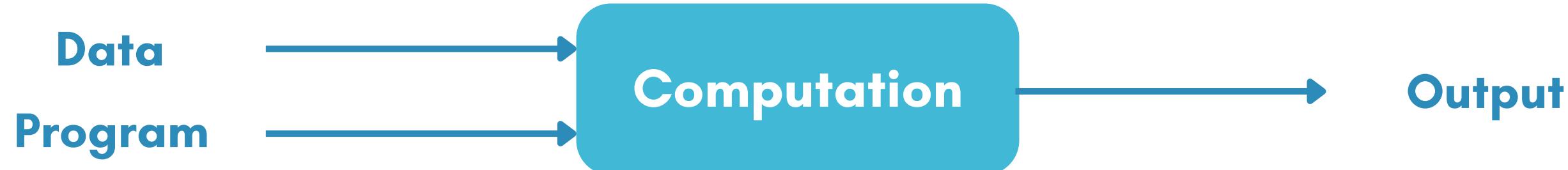
Enabling it to make decisions without being explicitly programmed





Traditional Programming vs Machine Learning

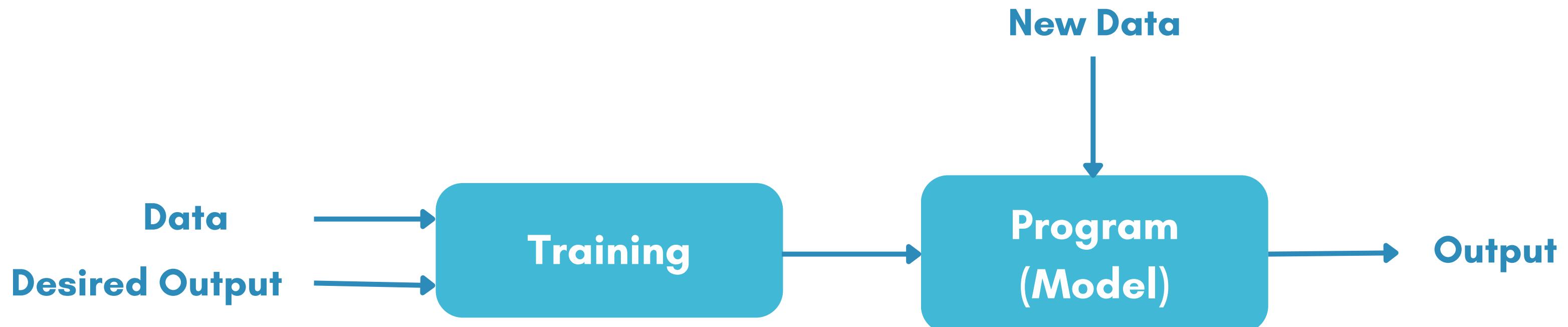
Traditional Programming





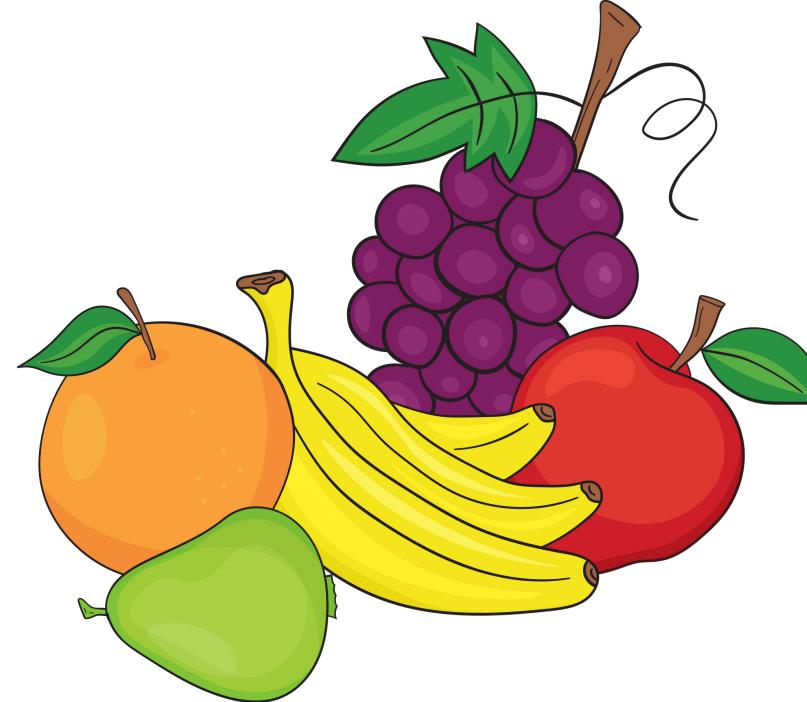
Traditional Programming vs Machine Learning

Machine Learning

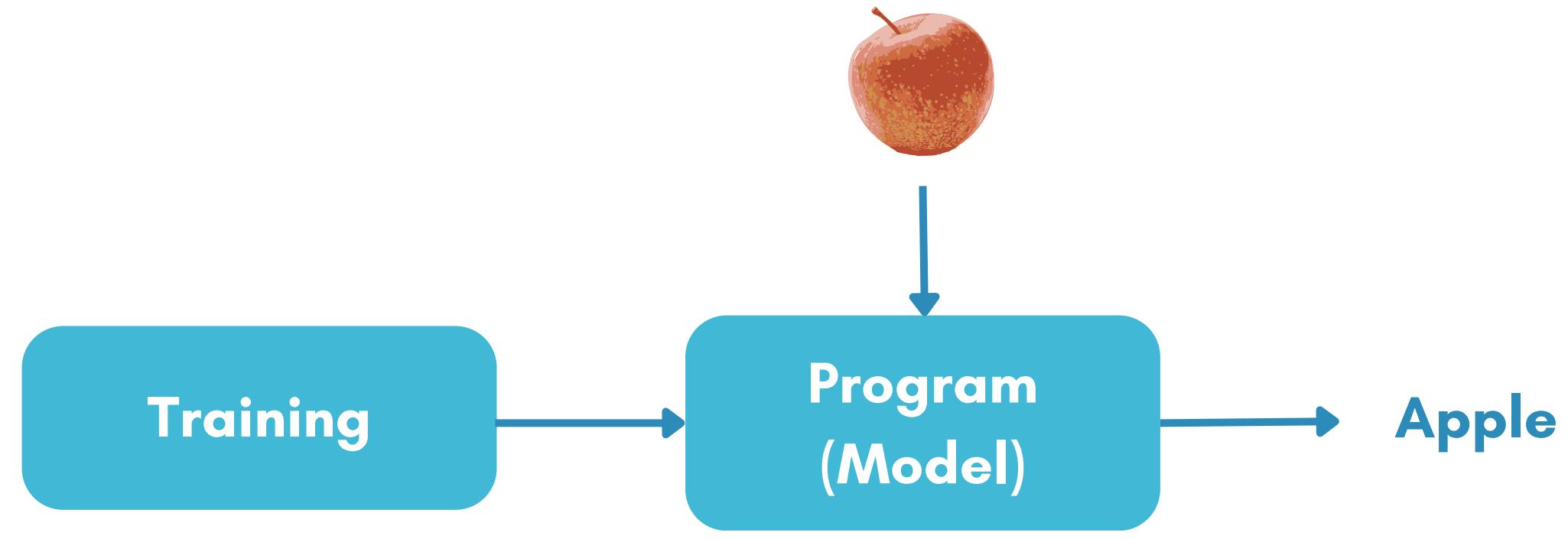




Machine Learning Example

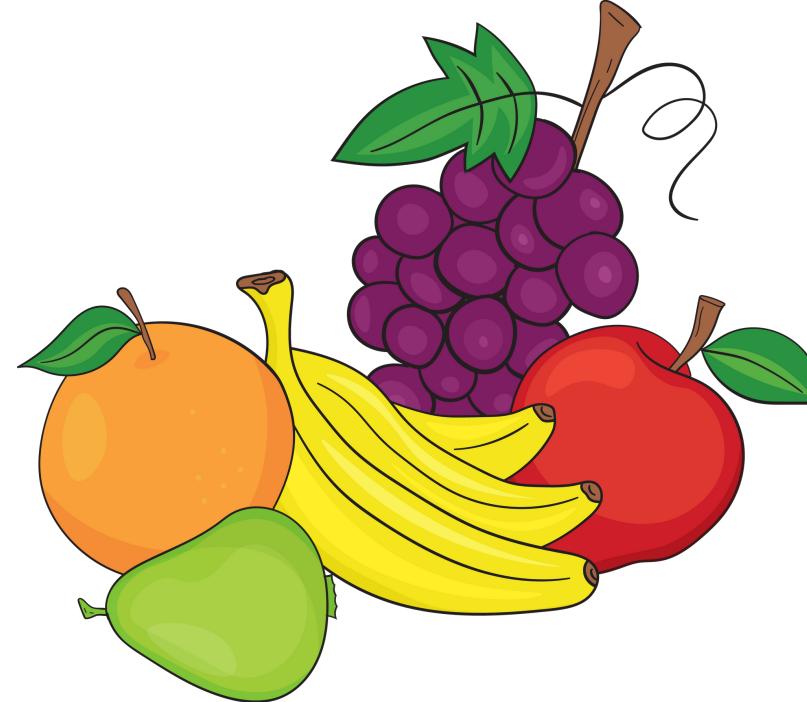


Labelled Fruit Collection

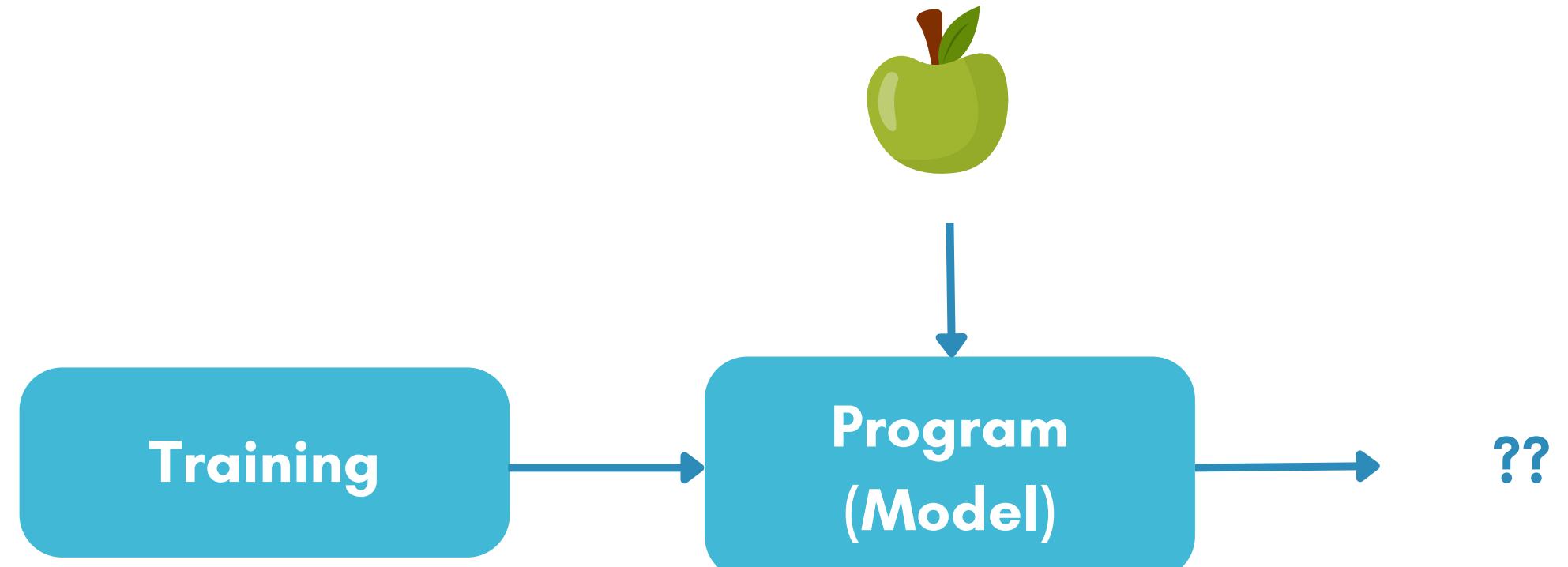




Machine Learning Example

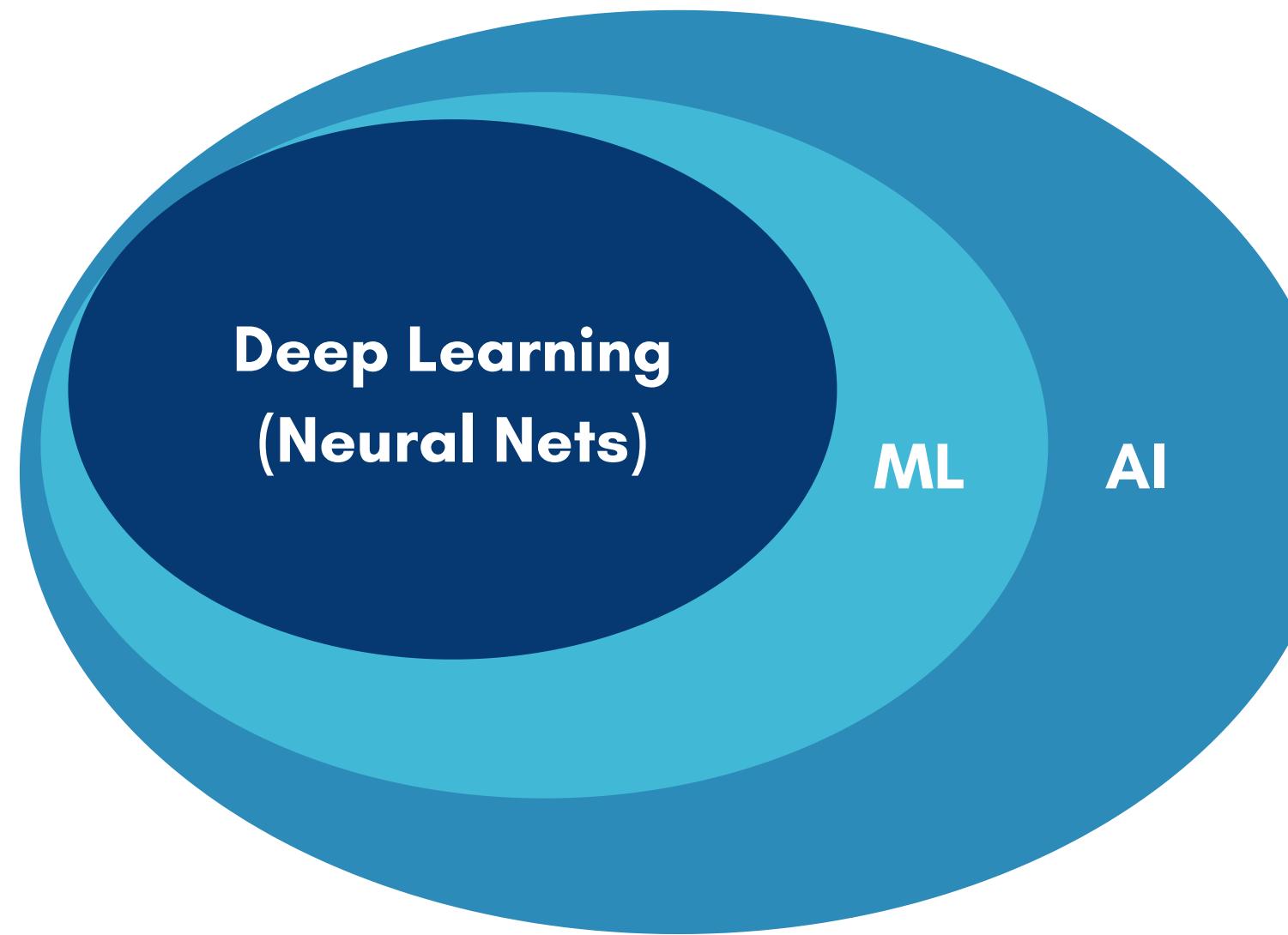


Labelled Fruit Collection





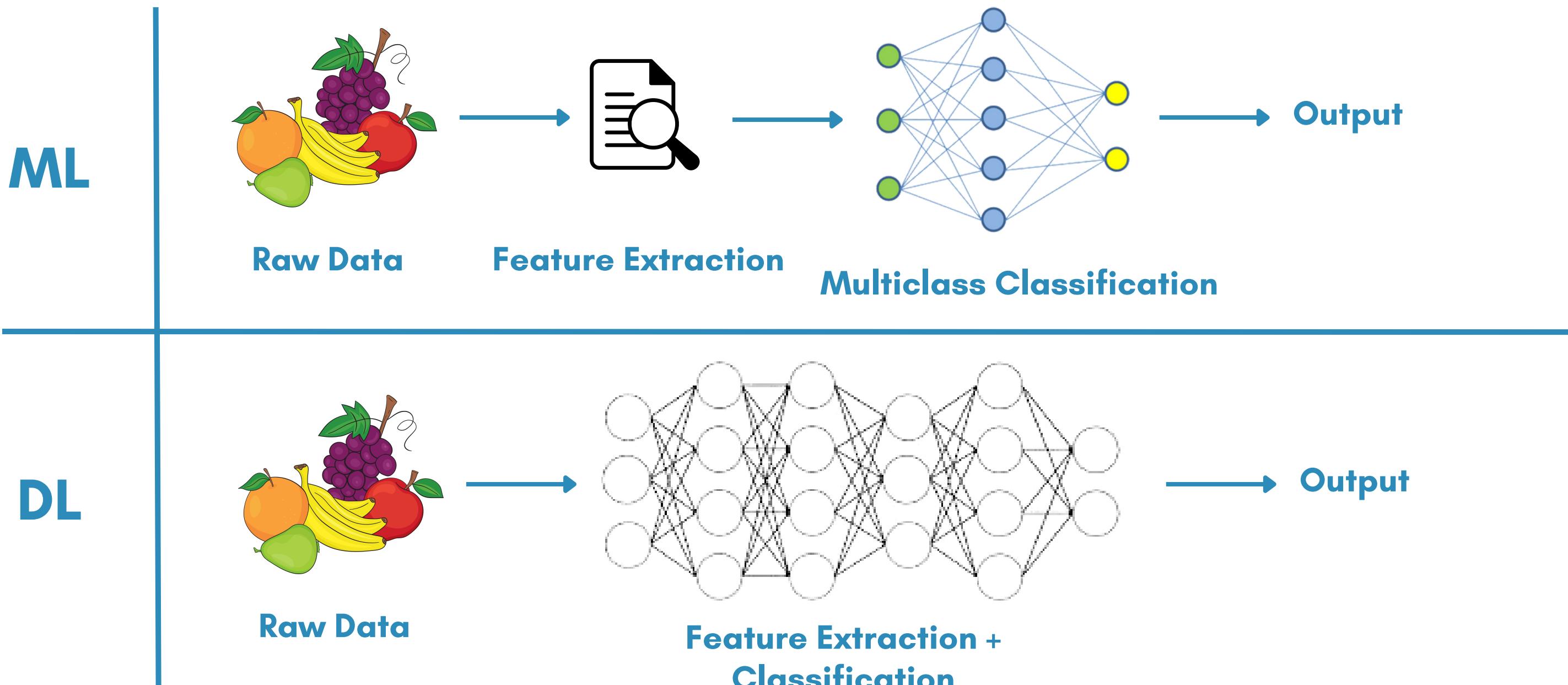
AI vs ML vs DL

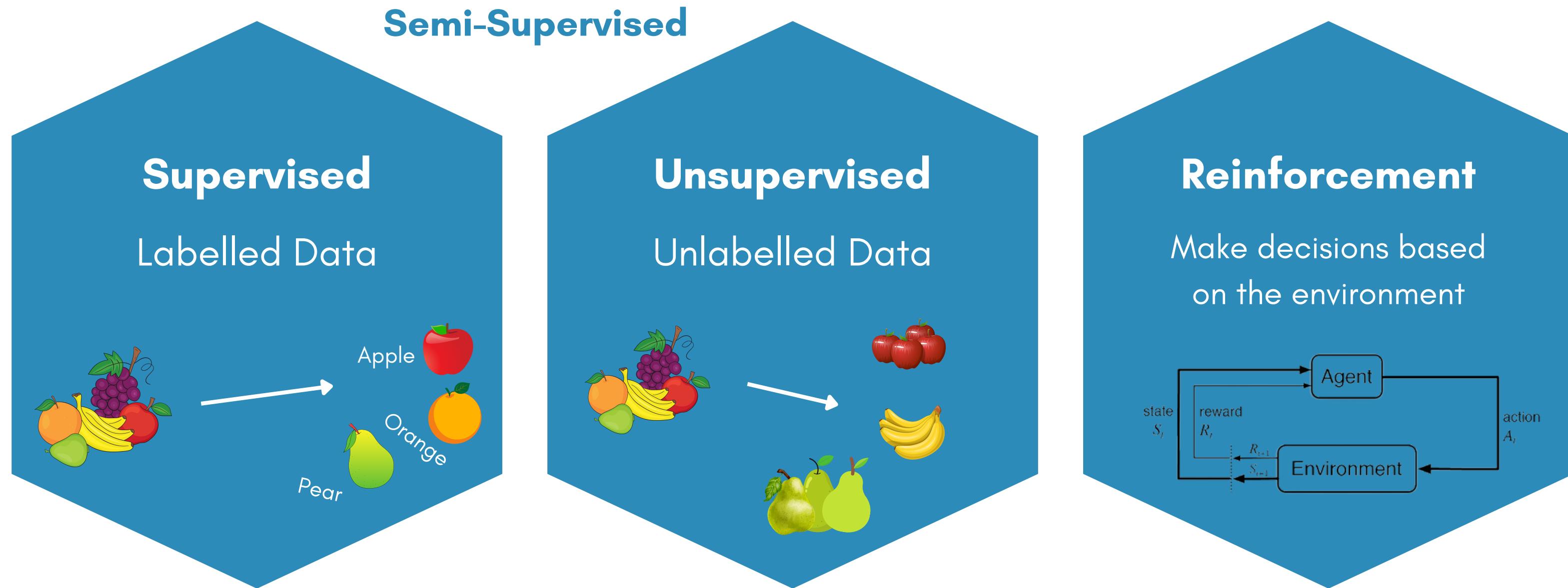


**Rule-based System,
Expert System**



Machine Learning vs Deep Learning

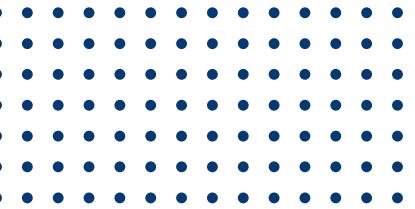




Types of Machine Learning



Machine Learning Domains





Natural Language Processing

Text Classification

Sentiment Analysis

Language Modelling

Conversational AI

Machine Translation/Transliteration

Named Entity Recognition





Computer Vision

Object Detection

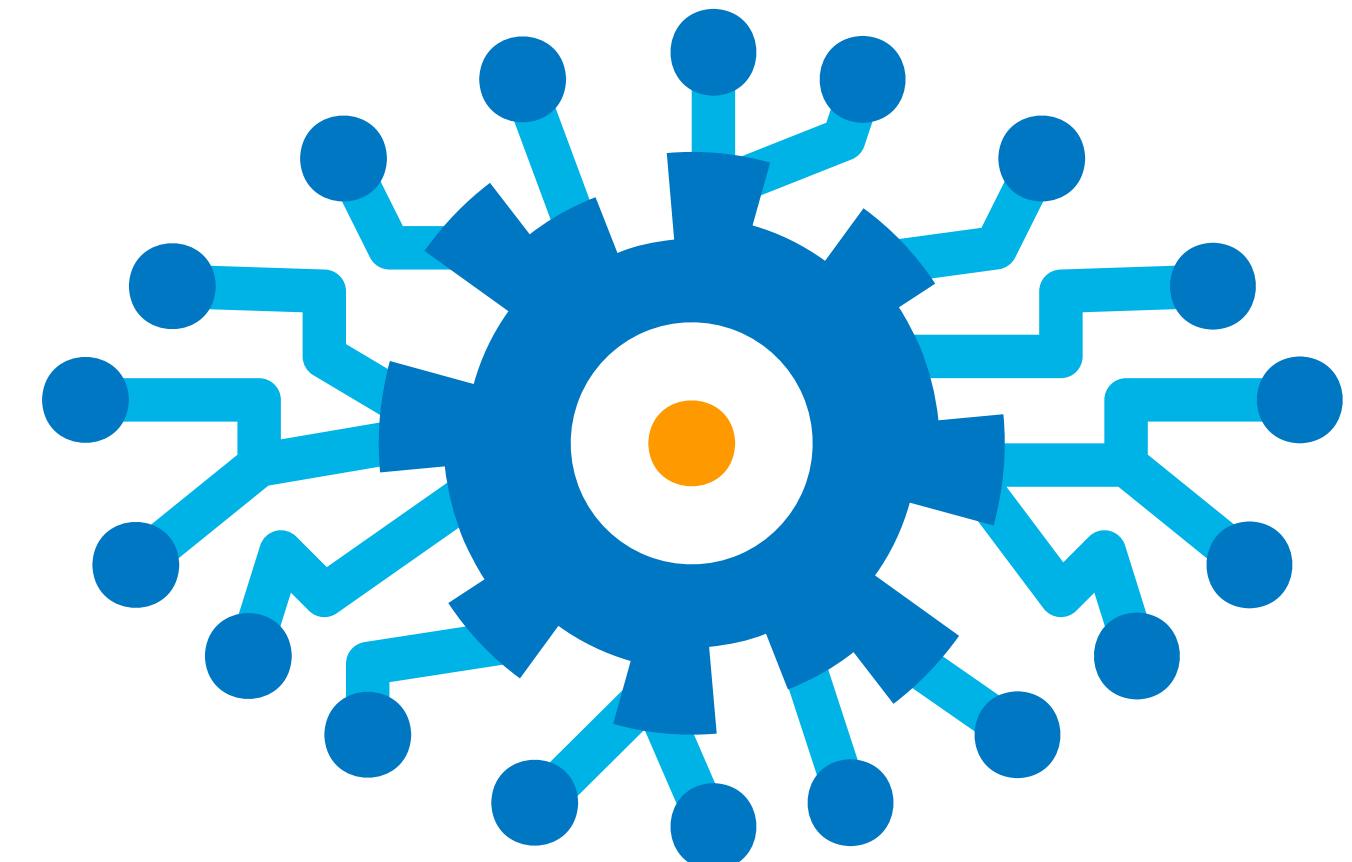
Image Classification

Semantic Segmentation

Object Tracking

Facial Recognition

Medical Imaging





Signal Processing

Speech Recognition

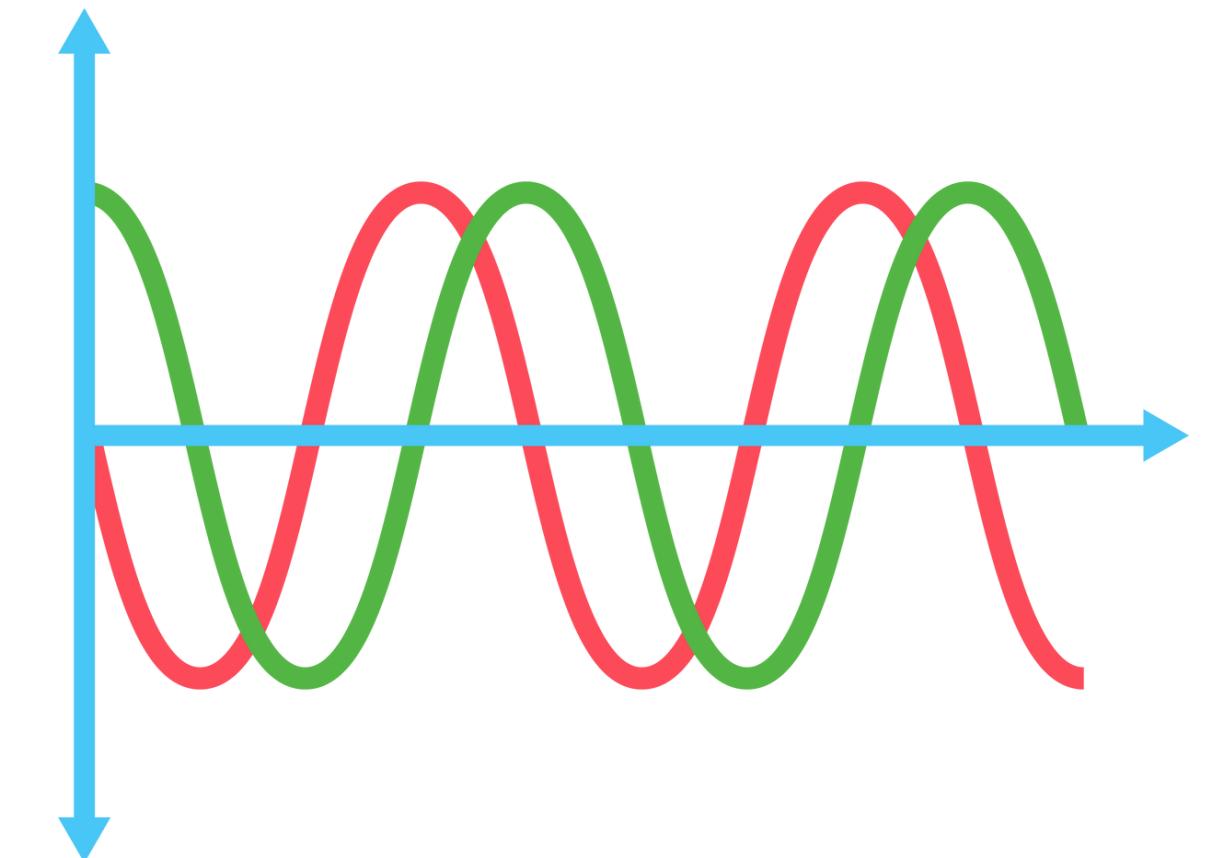
Text-to-Speech Synthesis

Image Processing

Time Series Analysis

Biomedical Signal Processing

Sensor Data Processing



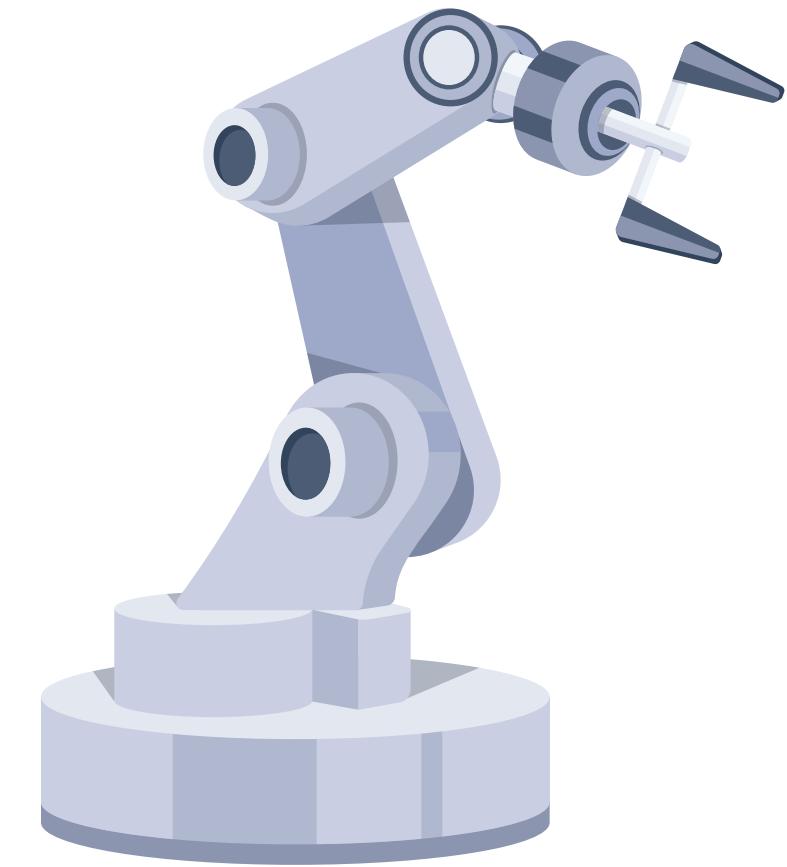
Robotics/ Simultaneous Localization and Mapping (SLAM)

Visual SLAM

Lidar SLAM

Deep Reinforcement Learning
for Navigation

Localization and Mapping in
GPS-denied Environments





Data Science

Customer Segmentation

Fraud Detection

Predictive Maintenance

Recommender Systems

*Many of the examples
mentioned previously*





Let's Play A Game!

Machine Learning: Necessity or Overkill?



Sorting a list of Numbers?



Sorting a list of Numbers?

Overkill

Speech Recognition



Speech Recognition

Necessity

Spam Email Detection



Spam Email Detection

Necessity*



Spam Email Detection

Necessity*

*unless you have predefined
thresholds



Insurance Claim Verification



Insurance Claim Verification

Underkill(?)*



Insurance Claim Verification

Expert Systems or People

*unless you have fixed predefined
criteria



Cervical Cancer Detection



Cervical Cancer Detection

Necessity*

***consider size of datasets and only
use as Decision Support System**



How to Get Started?



1

Programming Language

- Python Programming Language
- Basics of Python Programming
 - Variables and Data Types
 - Control Flow
 - Functions and OOP

-
- Documentation
 - Programiz, FreeCodeCamp
 - Coursera – Python for Everybody
 - **Literally Everywhere on the Internet**

2

Mathematics Fundamentals

- Linear Algebra – Gilbert Strang
 - Vectors, Matrices
- Calculus
 - Differentiation, Integration
- Probability and Statistics
 - Probability Theory
 - Statistical Distributions
 - Hypothesis Testing
 - Regression Analysis

-
- Engineering Course Content
 - Andrew NG – Coursera
 - **Gilbert Strang (MIT) - Linear Algebra**



3

Machine Learning Concepts

- Types of Machine Learning
- Model Training
- Gradient Descent, Regularization
- Model Evaluation and Validation
- Active Learning
- Transfer Learning

-
- **Andrew NG - Coursera**
 - MachineLearningMastery
 - "Pattern Recognition and Machine Learning" by Christopher Bishop*

*step with caution

4

Machine Learning Algorithms

- Linear Regression, Logistic Regression, Support Vector Machines, Decision Tree, Random Forest, Clustering, PCA
- Neural Network Concepts
 - CNNs, RNNs, LSTMs, Transformers
- Intuition Behind each algorithm
- Strengths and Weaknesses

-
- **Youtube Videos**
 - **Implement after studying!**
 - DeepLearning.AI
 - "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville



5

Machine Learning Libraries and Frameworks

- Scikit-Learn
- Tensorflow, Keras
- Pytorch

- **d2l.ai, Official Documentation and Youtube Tutorials**, Hugging Face
- "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron
- "Machine Learning with PyTorch and Scikit-Learn" Sebastian Raschka
- Open Source Projects/Kaggle

5

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- Open Source Projects/Kaggle

Your cue to start a project!

6

Data Preprocessing

- Feature Engineering
- Handling Missing Values
- Scaling Features
- Handling Categorical Values
- Extracting Meaningful Information

-
- "Feature Engineering for Machine Learning" on Coursera
 - See a lot of other projects to understand how it's done: **Kaggle**, **Medium Blogs**
 - **Hands-on Experience**

7

Model Evaluation

- Cross Validation
- Performance Metrics
 - Accuracy, Precision, Recall, F1 Score, AUC-ROC
 - Mean Squared Error, Mean Absolute Error
- Overfitting/Underfitting
- Bias-Variance Trade-Off

-
- Books and Courses mentioned before have all of this information
 - **Continue the project:** You will get some ideas while implementing



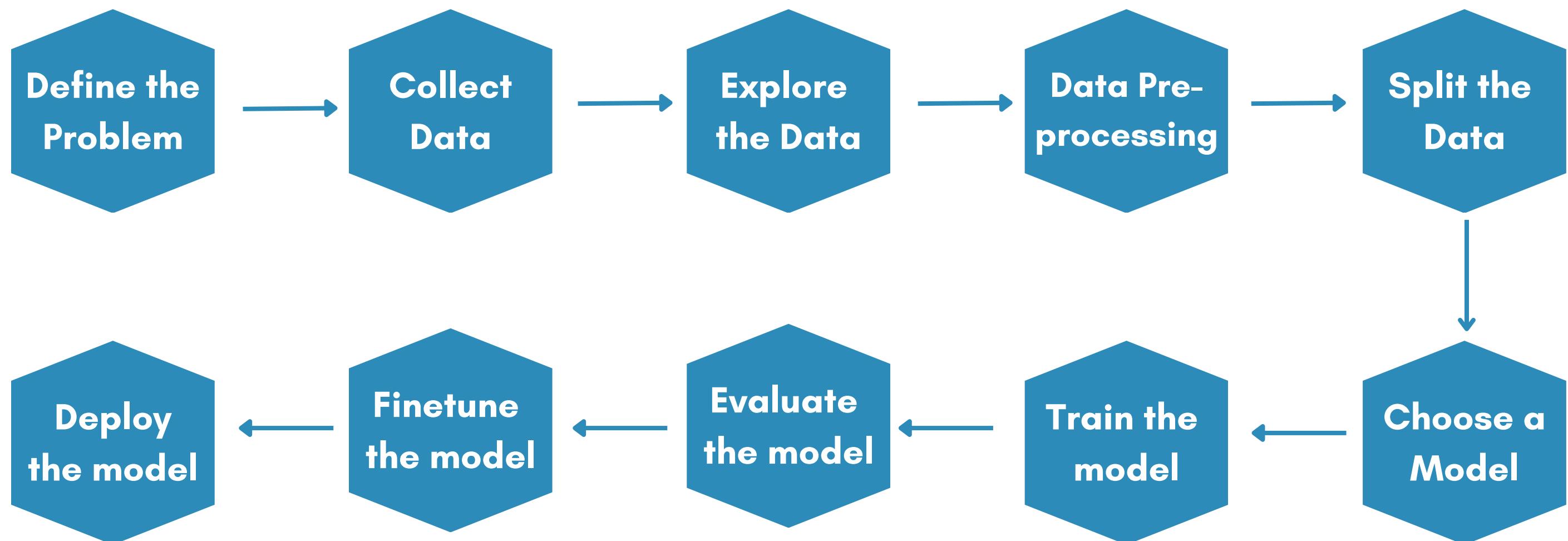
8

Practice and Projects

- Work on real-world datasets
- Implement different algorithms
- Evaluate model performance
- Machine Learning Competitions on Kaggle.com
- **Papers with Code**
- Read Research Papers ([Harvard CS197](#))
- Open Source Projects
- **Make your own Project**

Start a Project!

❖ How to start your ML Project?



You got this!



You got this!

Start Today!

