

MACHINE LEARNING

A Comprehensive Guide for Beginners

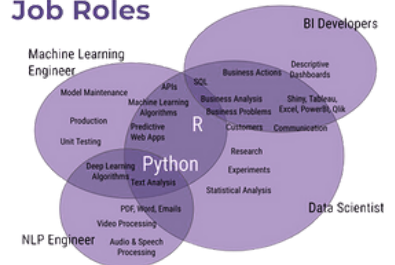
A BEGINNER'S GUIDE TO MACHINE LEARNING WORKFLOW

Project Setup	Data Preparation	Modeling	Project Setup
✓ Understand the Business Goals - Speak with stakeholders to understand the problem, objectives, and constraints. - Determine how machine learning (ML) can help and select a suitable solution approach. ✓ Choose the Solution to Your Problem - Define whether supervised, unsupervised, or reinforcement learning is the best approach. - Identify the most effective ML models for the problem.	✓ Data Collection - Gather structured/unstructured data from public sources, databases, APIs, or user-generated content. ✓ Data Cleaning - Remove duplicates, correct errors, handle missing values, and standardize data. ✓ Feature Engineering - Extract relevant features to improve model accuracy. - Convert categorical data into numerical representations for better processing. ✓ Split the Data - Divide into training (70-80%), validation (10-15%), and testing (10-15%) to ensure reliable results.	✓ Hyperparameter Tuning - Adjust model parameters to optimize performance (e.g., learning rate, batch size). ✓ Train the Model - Use algorithms like decision trees, neural networks, or regression models to learn patterns. ✓ Make Predictions - Use trained models to generate insights and predictions. ✓ Assess Model Performance - Measure performance using accuracy, precision, recall, and F1-score.	✓ Deploy the Model - Integrate the model into an application, website, or cloud service. ✓ Monitor Model Performance - Regularly check real-time accuracy, drift, and bias. ✓ Improve the Model - Continuously retrain with new data and feedback.



Computers analyze data to improve predictions and decision-making over time, commonly used in tasks such as image recognition and recommendation systems.

Machine Learning Job Roles



1 Understanding the Problem

2 Preparing the Data

3 Converting the Data

8 Retirement or Replacement

ML WORKFLOW IN A NUTSHELL

4 Processing the Data

7 Inference & Deployment

6 Evaluation

5 Training the Machine

3 TYPES OF MACHINE LEARNING

Supervised Learning

- Labeled Data
- Direct Feedback
- Predict outcome / future

Unsupervised Learning

- No labels
- No feedback
- Find hidden structure in data

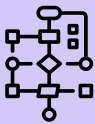
Reinforcement Learning

- Decision Process
- Reward system
- Learn series of actions

AI TERMS EXPLAINED

Algorithm

A step-by-step set of rules for solving problems or making decisions.



Data

Raw information used to train and evaluate machine learning models.



Model

A trained ML system that learns patterns and makes predictions.



Training

The process of teaching a model by exposing it to data.



Supervised Learning



Unsupervised Learning

ML finds patterns in unlabeled data (e.g., customer segmentation).



Neural Network

An ML model inspired by the human brain to recognize patterns.



Feature

A measurable attribute used by ML models for predictions.



ML trained with labeled predictions (e.g., spam detection). Grouping similar data points in unsupervised learning.



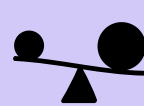
Accuracy

A measure of how often a model predicts correctly.



Bias

Systematic errors in a model due to imbalanced data.



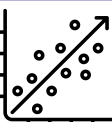
Validation

Testing a model on unseen data to check generalization.



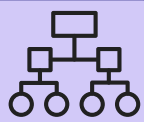
Regression

Predicting continuous values (e.g., house prices).



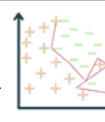
Classification

Assigning data to categories (e.g., spam or not spam).



Overfitting

When a model memorizes training data, causing poor real-world performance.



Label

The correct answer or output that the model is trying to learn and predict from the data.

