

Understanding Machine Learning

- **Artificial Intelligence (AI):** Advanced prediction and decision-making performed by computers based on data and rules.
- **Machine Learning (ML):** A field of AI that uses data and algorithms to make predictions or classifications without explicit programming.
- **Supervised Learning:** A type of ML where algorithms are trained on labeled datasets to make predictions about unseen data.
- **Unsupervised Learning:** A type of ML where algorithms identify patterns and groupings in unlabeled datasets.
- **Regression:** A supervised learning technique that predicts continuous numerical values, such as house prices or stock values.
- **Classification:** A supervised learning technique that assigns labels or categories to data, such as spam detection or image recognition.
- **Deep Learning:** A subfield of ML that uses neural networks with many layers to model complex patterns in data.
- **Feature:** An individual measurable property or characteristic used as input for an ML model.
- **Label:** The known output or result in supervised learning, used to train a model.
- **Target Variable:** The specific outcome that an ML model is designed to predict.
- **Training Set:** The portion of data used to teach an ML model how to make predictions.
- **Test Set:** A separate portion of data used to evaluate how well an ML model performs.
- **Feature Engineering:** The process of selecting, transforming, or creating input features to improve a model's performance.
- **Overfitting:** A modeling error where an ML model performs well on training data but poorly on new data because it has learned noise rather than patterns.
- **Underfitting:** A modeling error where an ML model is too simple and fails to capture patterns in the data.
- **Model Tuning:** The process of adjusting parameters or hyperparameters to improve an ML model's performance.
- **Confusion Matrix:** A table used to evaluate classification models by comparing predicted versus actual outcomes.
- **Accuracy:** A performance metric measuring the proportion of correctly predicted observations.
- **Precision:** The fraction of positive predictions that are actually correct.
- **Recall:** The fraction of actual positives correctly identified by the model.
- **True Positive / True Negative:** Correctly predicted positive or negative outcomes.
- **False Positive / False Negative:** Incorrectly predicted outcomes where the model mislabels the data.
- **Clustering:** An unsupervised learning technique that groups data points based on similarity.
- **Dimensionality Reduction:** Techniques (e.g., PCA) used to reduce the number of features while preserving essential information.
- **Neural Network:** A computational model inspired by the brain, consisting of layers of nodes (neurons) that process data.
- **Reinforcement Learning:** A learning approach where agents take actions in an environment and learn from feedback in the form of rewards or penalties.
- **Explainability (ML):** The ability to understand and interpret how an ML model makes predictions.
- **Workflow (ML):** The iterative process of preparing data, training models, evaluating results, and tuning for improvements.