

# SUPERVISED LEARNING

# WHAT IS SL?

Supervised learning is a type of machine learning where the algorithm is trained on a labeled dataset, learning patterns to make predictions or decisions on new, unseen data.

Supervised learning is a machine learning technique that is widely used in various fields such as finance, healthcare, marketing, and more. It is a form of machine learning in which the algorithm is trained on labeled data to make predictions or decisions based on the data inputs. In supervised learning, the algorithm learns a mapping between the input and output data. This mapping is learned from a labeled dataset, which consists of pairs of input and output data. The algorithm tries to learn the relationship between the input and output data so that it can make accurate predictions on new, unseen data.

# WHY SUPERVISED LEARNING

Use supervised learning when labeled data exists and prediction accuracy matters for tasks like classification or regression. It excels in scenarios requiring precise mapping from inputs to known outputs, outperforming unsupervised methods on defined goals. This approach minimizes errors through iterative training, ideal for real-world applications with historical data.

# HOW IT WORKS

- Collect data with labels (e.g., study hours and pass/fail results).
- Split: 80% for training, 20% for testing.
- Train: Feed data to an algorithm (like decision trees) to spot patterns.
- Test: Check predictions against held-out data for accuracy.
- Tweak and deploy: Adjust until it nails 90%+ right, then use on new inputs. Repeat training cuts errors over time, like practicing a skill.

# SL'S TYPES

Supervised Learning can be applied to two main types of problems :-

Classification - Predicts discrete categories or labels from data. Algorithms learn boundaries from labeled examples to assign new data to classes like "spam" or "real news."

- Binary: Two classes (e.g., pass/fail, like logistic regression you practiced).
- Multi-class: Multiple classes (e.g., dog/cat/bird in images).
- Common algorithms: Logistic Regression, Decision Trees, SVM, KNN, Naive Bayes, Random Forest.



Regression - Predicts continuous numeric values, like prices or temperatures. Models fit a line or curve to data points for ongoing forecasts.

Examples: House price from size/location, stock trends, student scores from study hours.

Common algorithms: Linear Regression, Decision Trees, SVM Regression, Neural Networks, Gradient Boosting.



# EXAMPLES OF SL

- Recommendation Systems: Recommendation systems use supervised learning to analyze patterns and relationships between input and output variables in labeled data, the algorithm learns to make predictions.
- Image and Speech Recognition: Supervised machine learning is used to locate, categorize and isolate objects from images or videos. The primary goal of image or object recognition is to identify the image accurately
- Fraud Detection: Supervised learning can be used to detect fraudulent transactions by training a model on historical transaction data where fraudulent transactions are labeled.

# THANK YOU