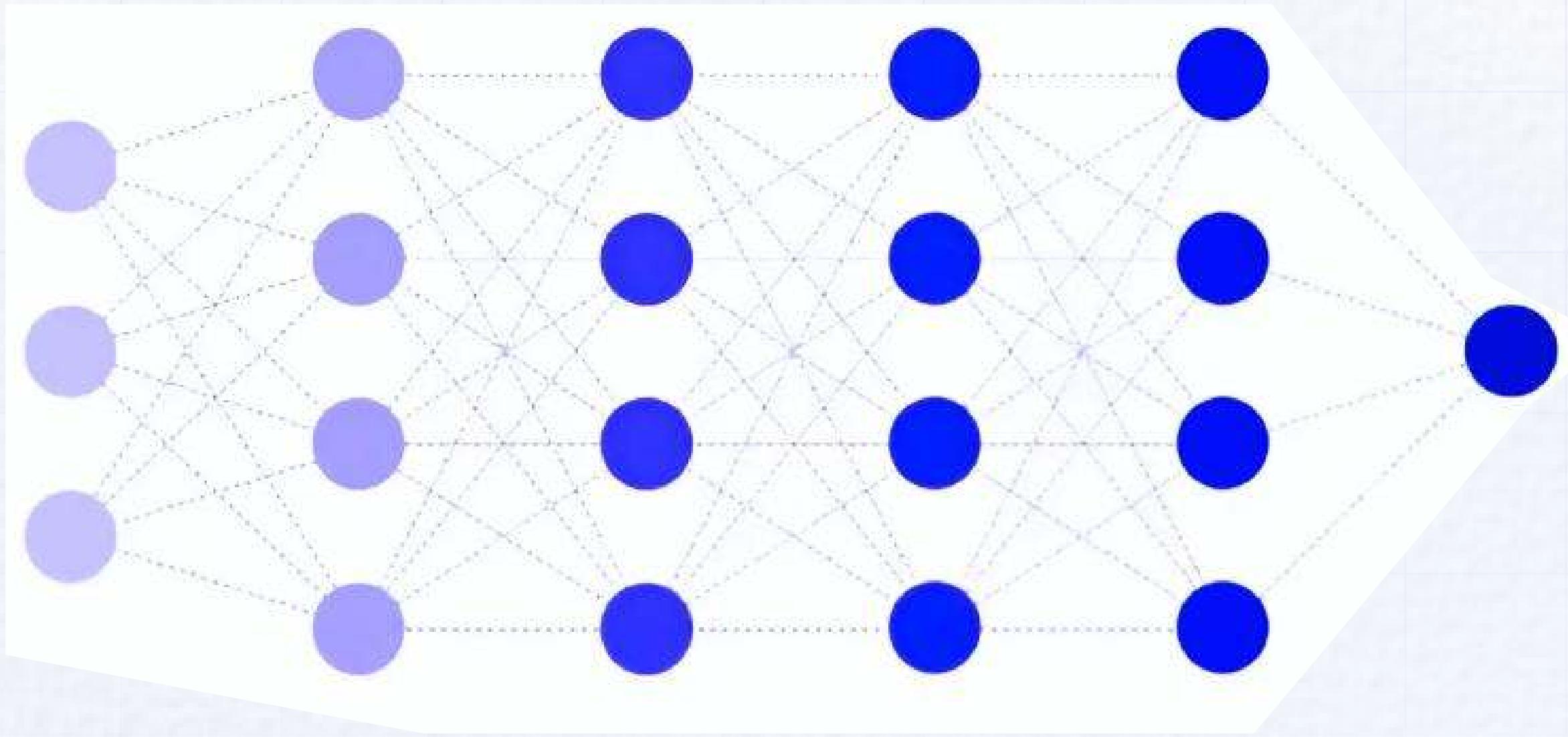


MASTER
**SUPERVISED &
UNSUPERVISED**
LEARNING



In Just 30 Days



Disclaimer

Everyone learns uniquely.

Learn Supervised &
Unsupervised Learning in a structured
manner and master it by practically
applying your skills.

This Doc will help you with the same.



DAY 1-5

Introduction to Machine Learning

Day 1

Overview of Machine Learning



Topic Details:

- Understand the basic concepts of machine learning, types of learning, and applications.



Practice Questions:

- What are the different types of machine learning?
- Explain the difference between supervised and unsupervised learning.



Resources:

- [Introduction to Machine Learning](#)
- [Machine Learning Crash Course](#)

Day 2

Supervised vs Unsupervised Learning

→ Topic Details:

- Detailed comparison between supervised and unsupervised learning, with real-world examples.

❓ Practice Questions:

- Compare supervised and unsupervised learning with examples.
- What are some common applications of unsupervised learning?

📋 Resources:

- [Supervised vs Unsupervised Learning](#)

Day 3

Data Preprocessing and Feature Engineering

→ Topic Details:

- Importance of data preprocessing, techniques for handling missing values, feature scaling, and encoding categorical variables.

💡 Practice Questions:

- Why is data preprocessing important?
- Explain different techniques for feature scaling.

(Resources:

- [Data Preprocessing Techniques](#)
- [Feature Engineering for Machine Learning](#)

Day 4

Understanding Metrics for Supervised Learning

→ Topic Details:

- Introduction to evaluation metrics like accuracy, precision, recall, F1 score, and ROC-AUC.

❓ Practice Questions:

- Define precision and recall.
- How do you interpret an ROC curve?

(Resources):

- [Classification Metrics](#)
- [Understanding ROC Curves](#)

Day 5

Basics of Linear Regression

Topic Details:

- Introduction to linear regression, assumptions, and how it works.

Practice Questions:

- What are the assumptions of linear regression?
- Explain the concept of the cost function in linear regression.

Resources:

- [Linear Regression Tutorial](#)



DAY 6-10

Supervised Learning Algorithms

Day 6

Logistic Regression

→ Topic Details:

- Introduction to logistic regression, its application in classification problems.

❓ Practice Questions:

- What is logistic regression?
- How do you interpret the coefficients of a logistic regression model?

(Resources:

- [Logistic Regression Explained](#)

Day 7

Decision Trees

→ Topic Details:

- Understanding decision trees, entropy, information gain, and tree pruning.

❓ Practice Questions:

- Explain entropy and information gain.
- What is tree pruning and why is it important?

(Resources:

- [Decision Trees](#)

Day 8

Random Forests

→ Topic Details:

- Ensemble learning, how random forests work, and their advantages over single decision trees.

❓ Practice Questions:

- What is ensemble learning?
- How does a random forest work?

(Resources):

- [Random Forest Algorithm](#)

Day 9

Support Vector Machines (SVM)

→ Topic Details:

- Introduction to SVM, the concept of the hyperplane, and kernel trick.

❓ Practice Questions:

- What is a support vector machine?
- Explain the kernel trick.

(Resources):

- [SVM Explained](#)

Day 10

K-Nearest Neighbors (KNN)

Topic Details:

- Basics of KNN, how it works, and choosing the right value of K.

Practice Questions:

- What is KNN and how does it work?
- How do you choose the value of K in KNN?

Resources:

- [KNN Tutorial](#)



DAY 11-15

Advanced Supervised Learning Algorithms

Day 11

Gradient Boosting Machines (GBM)

→ Topic Details:

- Introduction to gradient boosting, how GBM works, and its advantages.

❓ Practice Questions:

- What is gradient boosting?
- Explain the concept of boosting in machine learning.

(Resources:

- [Gradient Boosting Explained](#)

Day 12

XGBoost

→ Topic Details:

- Understanding XGBoost, its implementation, and why it's popular in competitions.

❓ Practice Questions:

- What makes XGBoost different from other boosting algorithms?
- How do you tune hyperparameters in XGBoost?

(Resources:

- [XGBoost Guide](#)

Day 13

Neural Networks for Supervised Learning

Topic Details:

- Basics of neural networks, architecture, and backpropagation.

Practice Questions:

- What is a neural network?
- Explain the process of backpropagation.

Resources:

- [Neural Networks Tutorial](#)

Day 14

Regularization Techniques

→ Topic Details:

- Understanding overfitting, underfitting, and regularization techniques like L1 and L2.

❓ Practice Questions:

- What is the difference between L1 and L2 regularization?
- How do regularization techniques help in machine learning?

(Resources:

- [Regularization in Machine Learning](#)

Day 15

Model Evaluation and Cross-Validation

Topic Details:

- Importance of cross-validation, different methods of cross-validation.

Practice Questions:

- What is cross-validation and why is it important?
- Explain different types of cross-validation.

Resources:

- [Cross-Validation Techniques](#)



DAY 16-20

Unsupervised Learning Algorithms

Day 16

Introduction to Unsupervised Learning

→ Topic Details:

- Overview of unsupervised learning, its applications, and types.

❓ Practice Questions:

- What are the main differences between supervised and unsupervised learning?
- Give examples of applications of unsupervised learning.

(Resources:

- [Unsupervised Learning Guide](#)

Day 17

K-Means Clustering

→ Topic Details:

- Understanding K-means algorithm, choosing the number of clusters, and implementation.

❓ Practice Questions:

- Explain the K-means clustering algorithm.
- How do you determine the number of clusters in K-means?

(Resources:

- [K-Means Clustering](#)

Day 18

Hierarchical Clustering

Topic Details:

- Introduction to hierarchical clustering, dendograms, and linkage criteria.

Practice Questions:

- What is hierarchical clustering?
- Explain the concept of dendograms in hierarchical clustering.

Resources:

- [Hierarchical Clustering Explained](#)

Day 19

Principal Component Analysis (PCA)

→ Topic Details:

- Understanding PCA, dimensionality reduction, and feature extraction.

❓ Practice Questions:

- What is PCA and why is it used?
- Explain the process of dimensionality reduction using PCA.

(Resources):

- [PCA Tutorial](#)

Day 20

Anomaly Detection

Topic Details:

- Introduction to anomaly detection, common techniques, and applications.

Practice Questions:

- What is anomaly detection?
- Describe common techniques used for anomaly detection.

Resources:

- [Anomaly Detection Techniques](#)



DAY 21-25

Advanced Unsupervised Learning Algorithms

Day 21

Association Rule Learning

→ Topic Details:

- Basics of association rule learning, support, confidence, and lift.

❓ Practice Questions:

- What is association rule learning?
- Explain the metrics used in association rule learning.

(Resources:

- Association Rule Learning

Day 22

DBSCAN Clustering

→ Topic Details:

- Understanding DBSCAN, its advantages, and how it differs from K-means.

❓ Practice Questions:

- What is DBSCAN and how does it work?
- Compare DBSCAN with K-means clustering.

(Resources:

- [DBSCAN Explained](#)

Day 23

Gaussian Mixture Models (GMM)

Topic Details:

- Introduction to GMM, its applications, and how it models data.

Practice Questions:

- What is a Gaussian Mixture Model?
- How does GMM differ from K-means?

Resources:

- [GMM Tutorial](#)

Day 24

T-SNE for Data Visualization

Topic Details:

- Understanding T-SNE, its use in data visualization, and interpretation.

Practice Questions:

- What is T-SNE and how is it used?
- Explain the process of visualizing high-dimensional data using T-SNE.

Resources:

- [T-SNE Explained](#)

Day 25

Autoencoders

→ Topic Details:

- Basics of autoencoders, how they work, and their applications in unsupervised learning.

❓ Practice Questions:

- What are autoencoders?
- Describe an application of autoencoders in unsupervised learning.

(Resources:

- [Autoencoders Tutorial](#)



Practical Projects and Applications

Day 26

Project - Predicting Housing Prices (Supervised)

→ Topic Details:

- Implementing a regression model to predict housing prices.

❓ Practice Questions:

- What features would you consider for predicting housing prices?
- Explain the steps you would take to build this model.

(Resources:

- [Housing Prices Prediction](#)

Day 27

Project - Customer Segmentation (Unsupervised)

→ Topic Details:

- Using clustering techniques to segment customers based on purchasing behavior.

❓ Practice Questions:

- How would you approach customer segmentation using K-means?
- What metrics would you use to evaluate your clustering model?

(Resources:

- [Customer Segmentation Project](#)

Day 28

Project - Fraud Detection (Supervised)

→ Topic Details:

- Implementing a classification model to detect fraudulent transactions.

❓ Practice Questions:

- What features are important for fraud detection?
- How would you handle imbalanced datasets in this project?

(Resources):

- [Fraud Detection Project](#)

Day 29

Project - Anomaly Detection in Network Traffic (Unsupervised)

→ Topic Details:

- Using anomaly detection techniques to identify unusual network traffic patterns.

❓ Practice Questions:

- Describe a method for detecting anomalies in network traffic.
- What challenges might you face in this project?

(Resources:

- [Network Traffic Anomaly Detection](#)

Day 30

Final Review and Next Steps

Topic Details:

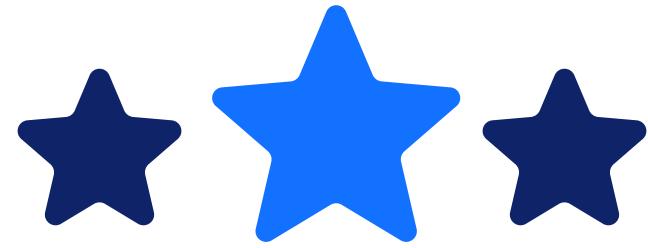
- Review key concepts, consolidate learning, and explore advanced topics and future learning paths.

Practice Questions:

- What are the key takeaways from this 30-day journey?
- How would you apply what you've learned to real-world problems?

Resources:

- [Advanced Machine Learning Courses](#)



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