

MACHINE LEARNING LEVEL (1)

[ABAD NETWORK FOR TRAINING]

Introduction to Machine Learning

- Definition and Scope of machine learning.
- Applications of machine learning
- Types of machine learning: supervised learning, unsupervised learning, reinforcement learning.
- Components of a machine learning system
- Overview of tools and libraries such as Python, Jupyter Notebooks, etc...
- Setting up the environment and installing necessary libraries.

Mathematics and Statistics for Machine Learning

- Overview of Mathematics in Machine Learning
- Linear Algebra
- Descriptive Statistics
- Probability Concepts
- Sampling and Central Limit Theorem
- Statistical Inference
- Linear Regression and Correlation
- Regularization
- Derivative optimization in machine learning - Gradient Descent

Python language

- Introduction to Python and environment (Anaconda, etc...)
- Basic Syntax and Data Types
- Data Structures (Lists, Tuples, Dictionaries, Sets)
- Control Structures and Functions (Conditional statements, Looping constructs, Functions)
- OOP
- Working with Libraries (Pandas, NumPy, Matplotlib, etc...)
- File Handling and Exception Handling

Data Preprocessing

- Data Collection
- Exploratory Data Analysis
- Data Cleaning and Feature Scaling

Supervised Learning

Regression

- Concept of regression.
- Linear Regression algorithms such as (Simple and Multiple Linear Regression, SVR, Random Forest Regression, etc...)
- Implementing linear regression in Python.
- Evaluating Regression Models Performance
- Regression Model Selection

Gradient descent

Overfitting - Underfitting

Classification

- Concept of Classification .
- Classification algorithms such as (Logistic Regression ,k-NN, SVM ,Naive Bayes ,Decision Trees, Random Forest, etc...)
- Implementing classification algorithms in Python.
- Evaluating Classification Models Performance
- Classification Model Selection

Unsupervised Learning

Clustering

- Concept of clustering.
- Clustering algorithms such as (k-Means, Hierarchical Clustering ,etc...)
- Implementing clustering in Python.
- Evaluating Clustering Models Performance
- Clustering Model Selection

Dimensionality Reduction

- Concept of dimensionality reduction.
- Dimensionality reduction algorithms such as (PCA , LDA, etc...)
- Implementing dimensionality reduction in Python.
- Evaluating Dimensionality Reduction Models Performance

Reinforcement Learning

Concept of Reinforcement Learning.

Upper Confidence Bound (UCB)

Thompson Sampling

Evaluating Models Performance

Model Selection & Boosting

Model Selection

- Bias-Variance Tradeoff
- k-Fold Cross Validation
- Grid Search
- Bagging BootStrap(XGBoost ,Ada Boost, etc..)

Model Validation and Evaluation

Model Validation Techniques

- Splitting data into training and testing sets.
- Cross-validation techniques.

Model Evaluation Metrics

- Accuracy, precision, recall, F1 score.
- Using Python libraries to evaluate model performance.

Practical Projects and Model Deployment

Practical Machine Learning Projects

- Hands-on projects using real-world datasets.
- Building a model from start to finish.
- Model Deployment