MACHINE LEARNING (ML)

Zetlan Technologies

e-Learning Course

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COURSE MODULES

Module 1: Introduction to Machine Learning

- What is Machine Learning?
- Types of Machine Learning:
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
- Applications of ML in Real-World Scenarios
- Overview of Python Libraries for ML (NumPy, Pandas, Matplotlib)

Module 2: Data Preprocessg & Exploratry Data Analysis

- Understanding Data: Features, Labels, Training & Testing Sets
- Handling Missing Values and Outliers
- Feature Scaling (Normalization & Standardization)
- Encoding Categorical Variables
- Data Visualization Techniques
- Dimensionality Reduction (PCA, t-SNE, LDA)

Module 3: Supervised Learning - Regression

- Linear Regression
- Multiple Linear Regression
- Polynomial Regression
- Ridge & Lasso Regression
- Evaluation Metrics: RMSE, R^2 Score

Module 4: Supervised Learning - Classification

- Logistic Regression
- k-Nearest Neighbors (KNN)
- Support Vector Machines (SVM)
- Decision Trees
- Random Forests
- Naïve Bayes
- Model Evaluation Metrics: Accuracy, Precision, Recall, F1-score)

Module 5: Unsupervised Learning

- Clustering Techniques:
  - k-Means Clustering
  - Hierarchical Clustering
  - DBSCAN
- Association Rule Learning (Apriori, FP-Growth)
- Anomaly Detection Techniques

Module 6: Feature Engineering & Model Optimization

- Feature Selection Techniques
- Hyperparameter Tuning (Grid Search, Random, Bayesian Optimizatn)
- Cross-Validation Techniques
- Handling Imbalanced Datasets

Module 7: Neural Networks and Deep Learning

- Introduction to Neural Networks
- Forward & Backpropagation & Activation Functions
- Introduction to Deep Learning Frameworks (TensorFlow, Keras)
- Building and Training a Neural Network
- Convolutional Neural Networks (CNNs) for Image Classification
- Recurrent Neural Networks (RNNs) & LSTMs for Time Series & NLP

Module 8: Reinforcement Learning

- Introduction to Reinforcement Learning
- Markov Decision Process (MDP)
- Q-Learning & Deep Q Networks (DQN)
- Policy Gradient Methods

Module 9: Natural Language Processing (NLP)

- Text Preprocessing (Tokenizatn, Lemmatizatn, Stopwords Removal)
- Bag of Words, TF-IDF, Word Embeddings (Word2Vec, GloVe)
- Sentiment Analysis
- Named Entity Recognition (NER)
- Transformer Models (BERT, GPT)

Module 10: Model Deployment and Real-World Applicatns

- Model Deployment with Flask and FastAPI
- Cloud Deployment (AWS, Google Cloud, Azure)
- Building ML Pipelines
- Introduction to MLOps