

TechSol

We Build Professionals

MACHINE LEARNING

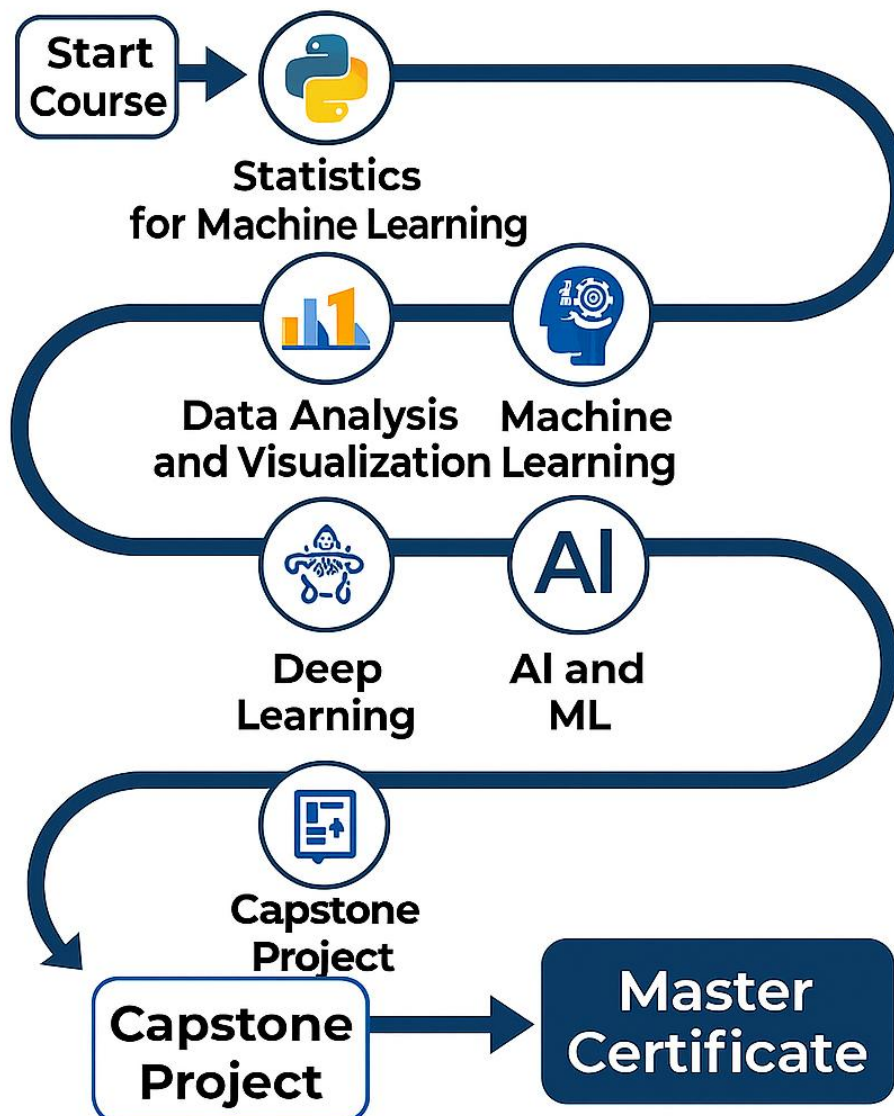
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Part

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Modules of Machine Learning



1:

Foundations

❖ Introduction to Machine Learning

- What is Machine Learning?
- Applications of Machine Learning
- Types of Machine Learning (Supervised, Unsupervised, Reinforcement)
- Challenges and Opportunities in Machine Learning

❖ Python for Machine Learning

- Why Python for Machine Learning?
- Setting Up the Environment (Anaconda, Jupyter Notebooks, VSCode)
- Essential Python Libraries for Machine Learning (NumPy, Pandas, Matplotlib, Scikit-learn)

❖ Mathematics for Machine Learning

- Linear Algebra Basics
- Probability and Statistics
- Calculus Essentials
- Gradient Descent Explained

❖ Data Understanding and Preprocessing

- Data Collection and Exploration
- Handling Missing Data
- Data Normalization and Scaling
- Feature Engineering and Selection
- Splitting Data into Training and Testing Sets

Part 2: Supervised Learning

❖ Regression Models

- Simple Linear Regression
- Multiple Linear Regression
- Polynomial Regression
- Evaluating Regression Models (MAE, MSE, RMSE)

❖ **Classification Models**

- Logistic Regression
- k-Nearest Neighbors (k-NN)
- Decision Trees and Random Forests
- Support Vector Machines (SVM)
- Model Evaluation Metrics (Accuracy, Precision, Recall, F1 Score, ROC Curve)

❖ **Model Tuning**

- Hyperparameter Optimization (Grid Search, Random Search)
- Cross-Validation Techniques
- Overfitting and Underfitting

Part 3: Unsupervised Learning

❖ **Clustering Techniques**

- k-Means Clustering
- Hierarchical Clustering
- DBSCAN
- Applications of Clustering
- 8. Dimensionality Reduction
- Principal Component Analysis (PCA)
- t-SNE
- Linear Discriminant Analysis (LDA)

Part 4: Advanced Topics

❖ **Neural Networks**

- Introduction to Neural Networks
- Building a Neural Network from Scratch with Python
- Forward and Backpropagation Explained

❖ **Deep Learning with TensorFlow and Keras**

- Understanding TensorFlow Basics

- Building Deep Learning Models
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)

❖ Reinforcement Learning

- Fundamentals of Reinforcement Learning
- Q-Learning and Deep Q-Learning
- Practical Applications of Reinforcement Learning

Part 5: Model Optimization

❖ Model Tuning

- Hyperparameter Optimization (Grid Search, Random Search)
- Cross-Validation Techniques
- Overfitting and Underfitting

❖ Deployment of Machine Learning Models

- Exporting Models
- Building APIs for ML Models with Flask/Django
- Deploying Models on Cloud Platforms (AWS, Google Cloud, Azure)