DATA SCIENCE WITH AI & ML COURSE - 12 MONTHS

MODULE 1: INTRODUCTION TO DATA SCIENCE S AI
- ✓ Understanding Data Science, AI, and ML
- ✓ Key Differences: AI vs ML vs Data Science vs Deep Learning
- ✓ Real-world applications and case studies
- ✓ Overview of the data science workflow

MODULE 2: PYTHON FOR DATA SCIENCE
- ✓ Python basics: Variables, data types, operators
- ✓ Control structures: if-else, loops
- ✓ Functions C modules
- ✓ Libraries for Data Science: NumPy, Pandas, Matplotlib, Seaborn
- ✓ Working with Jupyter Notebook

MODULE 3: DATA WRANGLING S PREPROCESSING
- ✓ Importing and exporting data (CSV, Excel, SQL, APIs)
- ✓ Handling missing data and duplicates
- ✓ Data transformation and normalization
- ✓ Feature engineering and encoding categorical data
- ✓ Outlier detection and treatment

MODULE 4: EXPLORATORY DATA ANALYSIS (EDA)
- ✓ Descriptive statistics (mean, median, mode, variance, std deviation)
- ✓ Data visualization techniques
- ✓ Correlation and causation analysis
- ✓ Using Seaborn, Matplotlib, and Plotly for interactive graphs

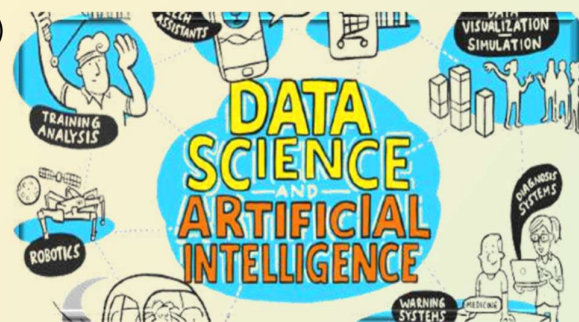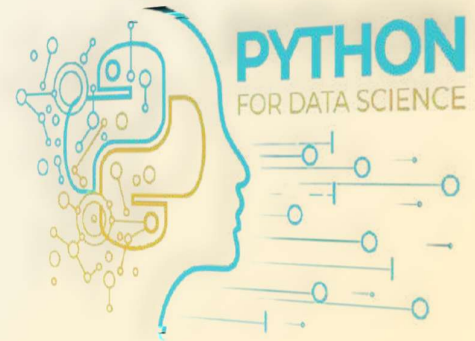## MODULE 5: STATISTICS S PROBABILITY FOR DATA SCIENCE
- ✓ Probability basics and distributions
- ✓ Hypothesis testing (t-test, chi-square, ANOVA)
- ✓ Confidence intervals and p-values
- ✓ Sampling methods and biases

MODULE 6: MACHINE LEARNING FUNDAMENTALS
- ✓ Introduction to ML: supervised vs unsupervised
- ✓ Regression models: Linear, Multiple, Polynomial
- ✓ Classification models: Logistic Regression, Decision Trees, Random Forests, Naive Bayes, KNN
- ✓ Clustering: K-Means, Hierarchical, DBSCAN
- ✓ Model evaluation metrics: accuracy, precision, recall, F1-score, ROC-AUC

MODULE 7: ADVANCED MACHINE LEARNING
- ✓ Ensemble learning (Bagging, Boosting, XGBoost, LightGBM, CatBoost)
- ✓ Feature selection and dimensionality reduction (PCA, LDA)
- ✓ Hyperparameter tuning (GridSearchCV, RandomizedSearchCV)
- ✓ Cross-validation techniques

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MODULE 8: DEEP LEARNING S NEURAL NETWORKS

- ✓ Introduction to Neural Networks
- ✓ Activation functions C backpropagation
- ✓ Building models with TensorFlow C Keras
- ✓ Convolutional Neural Networks (CNNs) for image data
- ✓ Recurrent Neural Networks (RNNs), LSTMs for sequence data

MODULE 9: NATURAL LANGUAGE PROCESSING (NLP)

- ✓ Text preprocessing (tokenization, stopword removal, stemming, lemmatization)
- ✓ Bag of Words C TF-IDF
- ✓ Sentiment analysis
- ✓ Text classification models
- ✓ Introduction to Transformers (BERT, GPT)

MODULE 10: AI APPLICATIONS S PROJECTS

- ✓ AI-powered chatbots
- ✓ Recommendation systems
- ✓ Predictive analytics in business
- ✓ AI in healthcare, finance, and retail

MODULE 11: BIG DATA S CLOUD INTEGRATION

- ✓ Introduction to Big Data C Hadoop ecosystem
- ✓ Spark for Data Processing
- ✓ Cloud platforms for AI C ML: AWS, Azure, Google Cloud
- ✓ Deploying models in the cloud

MODULE 12: MODEL DEPLOYMENT S MLOPS

- ✓ Saving C loading models (Pickle, Joblib)
- ✓ Flask/FastAPI for deploying ML models
- ✓ Introduction to MLOps concepts
- ✓ Model monitoring and retraining

MODULE 13: CAPSTONE PROJECTS

- ✓ Predictive sales forecasting
- ✓ AI-powered sentiment analysis tool
- ✓ Image classification for medical diagnostics
- ✓ Fraud detection system

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