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MERN STACK

PYTHON



JAVA

QA, SALESFORCE, DA, DS, AI\ML



AI-POWERED CORPORATE DATA SCIENCE MACHINE LEARNING

Duration: 100+HRS

Course Highlight:

PYTHON, ADVANCE PYTHON, PYTHON DSA, SQL, ADVANCE SQL, NUMPY, SCIPY, PANDAS, MATPLOTLIB, SCIKIT-LEARN, MACHINE LEARNING, DEEP LEARNING BASIC, NLP

Module 1: Introduction to Data Science & Python

- What is Data Science, ML, AI?
- Role of Python in Data Science
- Python Installation (Anaconda, Jupyter, VS Code)
- Python Refresher: Variables, Data Types, Control Flow, Functions

Module 2: SQL for Data Analytics

- Database Basics (RDBMS, Primary Key, Foreign Key)
- SQL Basics: SELECT, WHERE, ORDER BY, GROUP BY
- Joins: INNER, LEFT, RIGHT, FULL
- Subqueries & CTEs
- Window Functions (ROW_NUMBER, RANK, LEAD, LAG)
- Stored Procedures & Views
- Performance Optimization (Indexes, Query Plans)
- Hands-on with MySQL / PostgreSQL / MS SQL Server

Module 3: Statistics & Probability for Analytics

- Descriptive Statistics (Mean, Median, Mode, Variance, Std. Dev.)
- Probability & Distributions (Normal, Binomial, Poisson)
- Hypothesis Testing (t-test, ANOVA, Chi-square)
- Correlation & Regression Analysis
- Sampling Techniques & Bias
- Statistical Significance in Business Decisions

Module 4: Python basic to advance

- Introduction to Python
- Python Basics
- Control Flow
- Strings in Python
- Data Structures
- Functions
- Modules & Packages
- File Handling
- Exception Handling
- Object-Oriented Programming (OOP)
- Advanced Python Concepts(Monkey patching, decorator, serialization)
- Python for Data Handling

Module 5: NumPy

- Introduction to NumPy & ndarrays
- Creating & Inspecting Arrays
- Indexing, Slicing & Reshaping
- Array Operations & Broadcasting
- Mathematical & Statistical Functions
- Random Number Generation
- Advanced Indexing (Boolean, Fancy)
- Linear Algebra with NumPy
- Sorting, Searching & Data Handling
- File I/O (save, load, CSV handling)
- Performance Optimization (Vectorization)
- NumPy with Real Data (Integration with Pandas, Matplotlib)
- Mini Projects & Case Studies

Module 6: SCIPY

- Introduction to SciPy & Ecosystem
- Working with SciPy Sub-packages (overview)
- SciPy Constants & Special Functions
- Linear Algebra (scipy.linalg)
- Optimization (scipy.optimize)
- Integration & Differentiation (scipy.integrate)
- Interpolation (scipy.interpolate)
- Fourier Transforms (scipy.fftpack / scipy.fft)
- Signal Processing (scipy.signal)
- Statistics & Probability (scipy.stats)
- Sparse Matrices (scipy.sparse)
- Spatial Data & Distance Metrics (scipy.spatial)
- File I/O with SciPy (scipy.io – MATLAB, WAV, etc.)
- Real-World Applications & Mini Projects

Module 7: Pandas

- Introduction to Pandas & DataFrames
- Series & DataFrame Basics
- Creating & Reading Data (CSV, Excel, JSON, SQL)
- Indexing, Slicing & Subsetting Data
- Data Exploration (head, tail, info, describe)
- Handling Missing Data (dropna, fillna)
- Data Cleaning & Transformation (replace, apply, map, astype)
- Filtering & Conditional Selection
- Sorting & Ranking
- GroupBy & Aggregations
- Merging, Joining & Concatenation
- Pivot Tables & Crosstab
- Working with Dates & Time Series
- Window Functions (rolling, expanding, ewm)
- Input/Output Operations (CSV, Excel, SQL, JSON, Pickle)
- Integration with NumPy & Matplotlib
- Performance Optimization (vectorization, categorical, memory usage)
- Real-World Applications & Mini Projects

Module 8: Data Visualization

- Matplotlib: Line, Bar, Histogram, Scatter Plots
- Seaborn: Heatmaps, Pairplots, Distribution Plots
- Plotly: Interactive Dashboards & Graphs
- Advanced Visualizations (Box, Violin, Bubble, Geo Maps)
- Storytelling with Data

Module 9: Introduction to Machine Learning

- What is ML? Types (Supervised, Unsupervised, Reinforcement)
- ML Workflow (Data Collection → Model → Evaluation → Deployment)
- Introduction to Scikit-learn
- Train/Test Split & Cross Validation
- Performance Metrics (Accuracy, Precision, Recall, F1, AUC)

Module 10: Supervised Learning – Regression

- Linear Regression (Simple & Multiple)
- Polynomial Regression
- Regularization (Lasso, Ridge, ElasticNet)
- Evaluation Metrics (MSE, RMSE, R² Score)
- Case Study: Predicting House Prices

Module 11: Supervised Learning – Classification

- Logistic Regression
- k-Nearest Neighbors (kNN)
- Decision Trees & Random Forest
- Support Vector Machines (SVM)
- Naive Bayes Classifier
- Case Study: Spam Detection / Customer Churn

Module 12: Unsupervised Learning & Reinforcement Learning

- Clustering (K-Means, Hierarchical, DBSCAN)
- Dimensionality Reduction (PCA, t-SNE)
- Association Rule Learning (Apriori, FP-Growth)
- Anomaly Detection
- Case Study: Market Basket Analysis
- Reinforcement Learning: Agent, Environment, State, Action, Reward, Exploration vs Exploitation.
- Algorithms: MDP, Q-Learning, SARSA, TD, Monte Carlo, Deep RL (DQN, Policy Gradient, Actor-Critic).

Module 13: Ensemble Learning & Advanced ML

- Bagging, Boosting (AdaBoost, Gradient Boosting, XGBoost, LightGBM, CatBoost)
- Stacking & Voting Classifiers
- Feature Importance & Model Interpretability (SHAP, LIME)

Module 14: Neural Networks & Deep Learning (Intro)

- Introduction to Neural Networks
- Activation Functions & Backpropagation
- Using TensorFlow & Keras
- Deep Learning Models: ANN, CNN, RNN (basics)
- Case Study: Image Classification / Sentiment Analysis

Module 15: Natural Language Processing (NLP)

- Text Preprocessing (Tokenization, Stopwords, Stemming, Lemmatization)
- Bag of Words, TF-IDF, Word Embeddings (Word2Vec, GloVe)
- Sentiment Analysis
- Named Entity Recognition (NER)
- Case Study: Chatbot / Review Analysis

Module 16: Time Series Analysis

- Time Series Components (Trend, Seasonality, Noise)
- Moving Average & Exponential Smoothing
- ARIMA, SARIMA, Prophet
- Case Study: Stock Market Forecasting / Sales Forecasting

Module 17: Model Deployment

- Saving & Loading Models (Pickle, Joblib)
- REST APIs with Flask/FastAPI
- Deployment on Heroku, AWS, GCP
- Introduction to MLOps (CI/CD for ML Models)
- Model Monitoring & Retraining

Module 18: AI-Powered Data Science

- AutoML Tools (H2O.ai, Auto-Sklearn, PyCaret)
- AI APIs Integration (OpenAI, Hugging Face)
- Generative AI for Data Science (Synthetic Data Creation)
- Explainable AI (XAI)

Module 19: Real-time Projects

- End-to-End Data Science Project (EDA → ML → Deployment)
- Real-time Projects:
 - a. Customer Churn Prediction
 - b. Credit Risk Modeling
 - c. Recommendation System
 - d. Sales Forecasting with Time Series
 - e. NLP-based Sentiment Analysis

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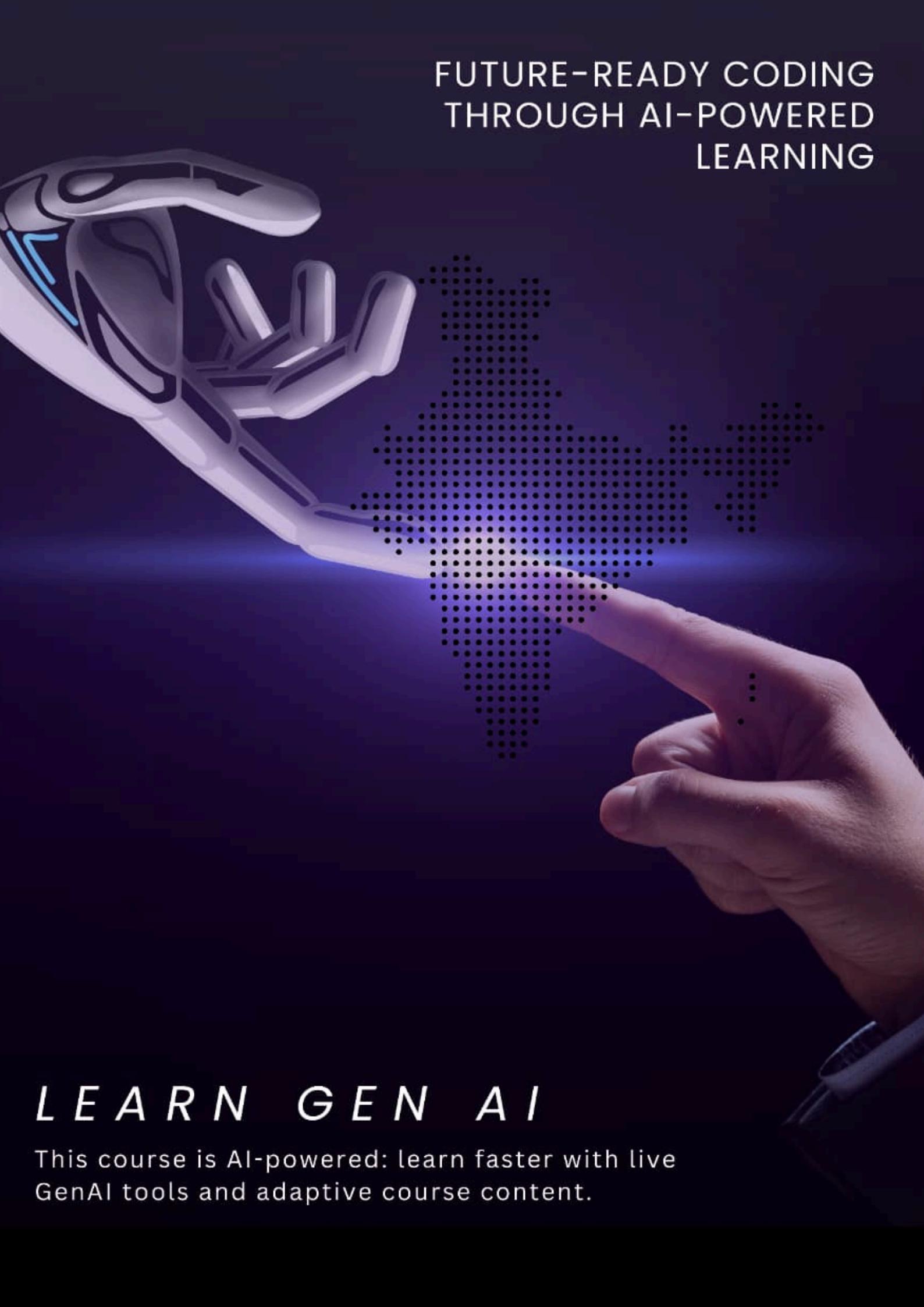
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