Unsupervised Learning for Data Exploration Training Course

Professional Development Training Course Outline

Category	Research and Data Analysis	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today’s data-driven world, organizations are overwhelmed with vast amounts of unstructured and unlabeled data. Unsupervised Learning for Data Exploration Training Course is a cutting-edge, skills-focused program designed to equip learners with the techniques and tools required to identify hidden patterns, perform clustering, and derive actionable insights from data without labeled outcomes. With the rise in machine learning, big data analytics, and AI-powered decision making, mastering unsupervised learning has become essential for data professionals and researchers.

This comprehensive course leverages industry-standard platforms like Python, Scikit-learn, and TensorFlow to delve into clustering algorithms, dimensionality reduction, anomaly detection, and association rule mining. Whether you are a beginner or a professional looking to enhance your data science portfolio, this course offers the right mix of theoretical grounding and real-world applications through hands-on projects and detailed case studies across various sectors like finance, healthcare, retail, and cybersecurity.

Programme Curriculum

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Course Objectives

1. Understand the fundamentals of unsupervised machine learning techniques.
2. Apply clustering algorithms such as K-Means, DBSCAN, and Hierarchical Clustering.
3. Explore dimensionality reduction techniques like PCA and t-SNE.
4. Identify anomalies and outliers in large datasets using unsupervised models.
5. Gain proficiency in feature extraction and transformation.
6. Develop data visualization strategies for exploratory data analysis.
7. Utilize association rule mining to discover interesting relationships in data.
8. Integrate unsupervised learning into big data pipelines using tools like Spark MLlib.
9. Analyze real-world datasets from multiple domains.
10. Implement unsupervised learning using Python, Scikit-learn, and TensorFlow.
11. Optimize clustering results with evaluation metrics.
12. Understand ethical AI use and bias detection in unsupervised models.
13. Build a portfolio of data science projects for career advancement.

Target Audience

1. Data Scientists and Analysts
2. Machine Learning Engineers
3. AI and Big Data Professionals
4. Business Intelligence Specialists
5. Software Developers
6. Academic Researchers
7. Graduate Students in Data Science
8. IT Professionals seeking AI upskilling

Course Duration: 5 days

Course Modules

Module 1: Introduction to Unsupervised Learning

- Overview of supervised vs. unsupervised learning
- Key applications and use cases
- Tools and frameworks overview
- Exploratory Data Analysis (EDA) fundamentals
- Preprocessing data for unsupervised learning
- **Case Study:** Market segmentation using retail data

Module 2: Clustering Algorithms

- K-Means and Elbow Method
- DBSCAN and density-based clustering
- Hierarchical Clustering and dendrograms
- Choosing the right clustering approach
- Cluster validation techniques
- **Case Study:** Customer segmentation in e-commerce

Module 3: Dimensionality Reduction

- Principal Component Analysis (PCA)
- t-Distributed Stochastic Neighbor Embedding (t-SNE)
- Linear Discriminant Analysis (LDA)
- Feature selection vs. feature extraction
- Visualizing high-dimensional data
- **Case Study:** Gene expression analysis in bioinformatics

Module 4: Anomaly Detection

- Concept of anomalies and outliers
- Z-score, IQR, and Isolation Forest
- Autoencoders for anomaly detection
- Real-time anomaly detection techniques
- Evaluating detection performance
- **Case Study:** Fraud detection in financial transactions

Module 5: Association Rule Mining

- Introduction to market basket analysis
- Apriori and FP-Growth algorithms
- Rule metrics: support, confidence, lift
- Rule pruning and optimization
- Real-world applications in retail and healthcare
- **Case Study:** Drug interaction patterns in hospital datasets

Module 6: Visualization and Interpretation

- Visualizing clusters and patterns
- Interpreting results with interactive dashboards
- Python libraries: Matplotlib, Seaborn, Plotly
- Best practices for presentation
- Communicating insights to stakeholders
- **Case Study:** Visualization of user behavior on a streaming platform

Module 7: Real-World Applications

- Use cases in healthcare, cybersecurity, finance
- Case studies in anomaly detection and customer analytics
- Industry datasets and their challenges
- Deploying models to production
- Evaluation and monitoring in real-world settings
- **Case Study:** Intrusion detection using network traffic data

Module 8: Capstone Project & Portfolio Building

- Project selection and problem formulation
- End-to-end model development
- Model evaluation and refinement
- Report writing and dashboard creation
- Portfolio preparation and showcasing skills
- **Case Study:** Capstone project on user clustering in an app

Training Methodology:

- Hands-on coding exercises with Jupyter notebooks

- Live coding sessions and labs using real datasets
- Video tutorials with step-by-step algorithm explanations
- Quizzes and assignments for knowledge checks
- Interactive case study analysis and discussions
- Capstone project presentation and peer review

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com