Feature Engineering and Selection for ML Models 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 the ever-evolving landscape of machine learning, the ability to craft and select the most predictive features is a critical determinant of model success. Feature Engineering and Selection for ML Models Training Course equips learners with the hands-on skills needed to transform raw data into meaningful predictors. With a focus on both traditional and modern feature engineering techniques, participants will gain mastery over how to optimize their datasets for high-performance machine learning algorithms across various domains.

The training is ideal for those aiming to boost model accuracy, reduce overfitting, and speed up training times by leveraging the latest tools and frameworks such as Python, Scikit-learn, Pandas, and feature tools. Through real-world case studies and interactive exercises, this course bridges the gap between data preprocessing and model deployment, giving professionals the confidence to deploy smarter, leaner, and more robust models.

Programme Curriculum

Feature Engineering and Selection for ML Models Training Course

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professionals the confidence to deploy smarter, leaner, and more robust models.

Course Objectives

1. Understand the role of feature engineering in machine learning model performance
2. Apply automated feature engineering using modern libraries
3. Master data preprocessing techniques (scaling, encoding, imputation)
4. Implement feature extraction methods for text, images, and time series
5. Analyze and apply feature selection algorithms (filter, wrapper, embedded)
6. Leverage domain knowledge for custom feature creation
7. Evaluate feature importance with tree-based models and SHAP values
8. Conduct dimensionality reduction using PCA, t-SNE, UMAP
9. Integrate feature pipelines in Scikit-learn and ML workflows
10. Optimize data for deep learning models
11. Handle imbalanced data and rare categories in features
12. Perform time-based feature engineering for temporal data
13. Apply feature engineering in production environments

Target Audience

1. Data Scientists
2. Machine Learning Engineers
3. Data Analysts
4. AI/ML Enthusiasts
5. Software Developers
6. Business Intelligence Professionals
7. Research Analysts
8. Graduate Students in Data Science

Course Duration: 5 days

Course Modules

Module 1: Introduction to Feature Engineering

- Importance of feature engineering in ML
- Types of features: numerical, categorical, time-based
- Feature engineering lifecycle
- Data cleaning & preprocessing overview
- Common pitfalls in feature engineering
- **Case Study**: Improving a credit scoring model using feature crafting

Module 2: Automated Feature Engineering

- Introduction to featuretools and feature generation
- Deep Feature Synthesis (DFS)
- Handling entity relationships
- Feature primitives and transformations
- Integration with AutoML platforms
- **Case Study**: Auto-feature generation for customer churn prediction

Module 3: Handling Categorical and Missing Data

- Encoding techniques: One-hot, Label, Target, Frequency
- Treating rare categories

- Missing value imputation strategies
- Custom encoder creation
- Category embeddings for deep learning
- **Case Study**: Predicting loan default with categorical data

Module 4: Feature Selection Techniques

- Filter methods: correlation, mutual information
- Wrapper methods: RFE, recursive selection
- Embedded methods: LASSO, tree-based models
- Feature importance and selection metrics
- Selecting features for interpretability
- **Case Study**: Fraud detection using optimal feature subsets

Module 5: Feature Transformation and Scaling

- Normalization and standardization
- Log, Box-Cox, and power transforms
- Binning and polynomial features
- Handling outliers through transformation
- Quantile transforms and robust scaling
- **Case Study**: Revenue prediction using transformed sales data

Module 6: Dimensionality Reduction

- PCA: theory and implementation
- t-SNE and UMAP for visualization
- Feature aggregation and fusion
- Low-rank approximation techniques
- Use in noise reduction and runtime improvement
- **Case Study**: Reducing dimensions in image classification dataset

Module 7: Feature Engineering for Temporal Data

- Lag, rolling window, and time since events
- Date/time feature extraction
- Seasonal trends and holiday encoding
- Working with time zones and frequency
- Time-aware validation strategies
- **Case Study**: Forecasting product demand with time-based features

Module 8: Model Pipeline Integration and Deployment

- Building feature pipelines in Scikit-learn
- Model serialization and reproducibility
- Integrating feature logic into APIs
- Monitoring feature drift
- Feature versioning for ML Ops
- **Case Study**: Deploying a production model with engineered features

Training Methodology

- Instructor-led online interactive sessions
- Practical lab-based exercises using Python and Scikit-learn
- Hands-on guided coding for real-world case studies
- Quizzes and assignments for each module

- Group discussions and peer review feedback
- Final project involving a complete ML workflow with feature engineering

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
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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