KOENIG
step forward

KOENIG SOLUTIONS · COURSE OUTLINE

ML with Python: Scikit-learn, Regression & Clustering

Learn to build machine learning models with Scikit-learn, covering regression, classification, clustering and association rule mining.

5 Days	13	80	20
DURATION	MODULES	TOPICS	HANDS-ON ACTIVITIES

COURSE OVERVIEW

This course covers the fundamentals of machine learning and the Scikit-learn library, alongside the underlying linear algebra, probability and statistics concepts. It then addresses data pre-processing, exploratory data analysis and feature engineering, followed by performance metrics and parameter tuning. The course proceeds through supervised learning methods including linear, multiple and polynomial regression, support vector machines, logistic regression and ensemble techniques such as decision trees, random forests, bagging and boosting. It concludes with unsupervised learning techniques, including K-Means clustering and association rule mining with the Apriori algorithm.

WHO THIS COURSE IS FOR

Data Analysts | **Machine Learning Engineers** | **Data Scientists** | **Python Developers** | **Statisticians**

LEARNING OBJECTIVES

- Explain core concepts and types of machine learning
- Apply Scikit-learn conventions to train models
- Describe linear algebra and probability foundations for machine learning
- Interpret descriptive and inferential statistics measures
- Apply data cleaning and missing value handling techniques
- Build regression and classification models using Scikit-learn
- Evaluate models using confusion matrices and cross validation
- Implement K-Means clustering and Apriori association rule mining

COURSE SYLLABUS

13 Modules, 80 Topics

01

Introduction to Machine Learning

TOPICS

Basics of Machine Learning · What and why Machine Learning · Applications of Machine Learning · Types of Machine Learning · Main Challenges of Machine Learning

02

Demo

Scikit Learn

TOPICS

Introduction to Scikit Learn · Features of Scikit-Learn · Conventions · Implementation Steps

03

Demo

Linear Algebra

TOPICS

Vectors (2D,3D) · Dot Product · Hyperplane · Square, Rectangle · Hypercube

03

Demo

Probability

TOPICS

- Data types and its measures
- Random Variables, its application with variables
- Probability - Application with examples
- Probability distribution with examples
- Sampling Funnel - why and how

04

4 Demos

Statistics

TOPICS

- What is Statistics
- Basic Terminologies in Statistics
- Types of Statistics
- Descriptive Statistics
- Measure of Central Tendency (Mean, median, mode)
- Measures of dispersion (Variance, Standard Deviation, Range - its derivation)
- Measures of Skewness & kurtosis
- Inferential Statistics

05

2 Demos

Data pre-processing

TOPICS

Is your data clean? · What is Data Pre processing? · Data cleaning techniques · Handling Missing data · Handling Categorical data

06

Demo

Exploratory Data Analysis (EDA)

TOPICS

- Introduction
- 2D Scatter-plot
- 3D Scatter-plot
- Pair plots
- Univariate, Bivariate and Multivariate
- Histogram
- Box-plot
- Variance, Standard Deviation
- Median
- IQR (InterQuartile Range)

07

Demo

Feature Engineering

TOPICS

- Introduction
- Need for Feature Engineering in Machine Learning
- Steps in Feature Engineering
- Feature Engineering Techniques

08

Performance Metrics & Parameter Tuning

TOPICS

Confusion Matrix · ROC Curve · Cross Validation in Machine Learning · K fold Cross Validation & Grid search

09

4 Demos

Supervised Learning - Regression I

TOPICS

- Linear Regression - Mathematical Intuition
- Programming of Linear Regression in Python-scikit learn
- Multiple Linear Regression
- Multiple Linear Regression - Mathematical Intuition
- Polynomial Regression
- Support Vector Machines
- Implementation of SVM In Python
- Various Kernels in Support Vector Machines

10

3 Demos

Supervised Learning - Classification

TOPICS

- Difference between regression and classification
- Various Algorithms in Classification
- Logistic Regression
- Naive Bayes
- Ensemble Techniques
- Introduction to Decision Trees
- Introduction to Random Forest
- Bagging
- Boosting
- Developing a Random Forest Model in Python
- Mini Project

11

Demo

UnSupervised Learning - Clustering

TOPICS

- Unsupervised Learning
- Types of Unsupervised Learning
- Applications of Unsupervised Learning
- Introduction to Clustering Algorithms
- Types of Clustering Algorithms
- What is K-Means Clustering?
- Implementation of K-Means Clustering
- Improving Models

12

Demo

UnSupervised Learning - Association Rule Mining

TOPICS

What is Association Rule Mining? · Algorithms in Association Rule Mining · Implementation of Apriori in Python

NOTES

- No of DEMOs - 20
- Topics Covering: Fundamental of ML, Mathematics & Statistics for ML, Data Preprocessing, EDA, Feature Engineering, ML Models - Supervised & Unsupervised Learning, Natural Language Processing

HANDS-ON ACTIVITIES

Practise What You Learn

#	MODULE	ACTIVITY
02	**Scikit Learn**	Demo 1 - Scikit-Learn Introduction and model training
03	**Linear Algebra**	Demo 2 - Linear Algebra Concept
03	**Probability**	Demo 3 - Probability Concepts
04	**Statistics**	■ Demo 4 - Descriptive_Statistics ■ Demo 5 - Statistics methods ■ Demo 6 - Correlation ■ Demo 7 - Distribution function
05	**Data pre-processing**	■ Demo 8 - Missing value imputation by Mean, Median ■ Demo 9 - Handling Categorical Value
06	**Exploratory Data Analysis (EDA)**	Demo 10 - EDA using Iris dataset
07	**Feature Engineering**	Demo 11 - Feature Transformation and Encoding
09	**Supervised Learning - Regression I**	■ Demo 12 - Simple Linear Regression ■ Demo 13 - Multi Linear Regression ■ Demo 14 - Polynomial Regression ■ Demo 15 - Implement SVM
10	**Supervised Learning - Classification**	■ Demo 16 - Logistic Regression ■ Demo 17 - Naive Bayes ■ Demo 18 - Ensemble Techniques
11	**UnSupervised Learning - Clustering**	Demo 19 - K-mean Implementation
12	**UnSupervised Learning - Association Rule Mining**	Demo 20 - Implementation of Apriori

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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