

ML: SVM, Decision Trees & K-Means

13

MODULES

47

TOPICS

12

HANDS-ON ACTIVITIES

LEARNING OBJECTIVES

- Describe the machine learning landscape and common applications
- Explain core statistics such as covariance and confusion matrices
- Apply feature engineering techniques to prepare and clean data
- Build linear and logistic regression models and evaluate performance
- Implement SVM classification with kernels for churn prediction
- Build decision trees and random forests for classification problems
- Apply Naive Bayes classification to use cases such as spam filtering
- Implement K-Means clustering and principal component analysis

13 Modules, 47 Topics

01

Machine Learning (ML) Overview

TOPICS

- Machine Learning landscape
- Machine Learning applications
- Understanding ML algorithms & models (supervised and unsupervised)

02

Machine Learning Environment

TOPICS

Introduction to Jupyter notebooks / R-Studio

Lab

03

Machine Learning Concepts

TOPICS

Statistics Primer · Covariance, Correlation, Covariance Matrix · Errors, Residuals · Overfitting / Underfitting · Cross validation, bootstrapping · Confusion Matrix · ROC curve, Area Under Curve (AUC)

Lab

04

Feature Engineering (FE)

TOPICS

Preparing data for ML · Extracting features, enhancing data · Data cleanup · Visualizing Data

2 Labs

05

Linear Regression

TOPICS

Simple Linear Regression · Multiple Linear Regression · Running LR · Evaluating LR model performance · **Use case:** House price estimates

Lab

06

Logistic Regression

TOPICS

- Understanding Logistic Regression
- Calculating Logistic Regression
- Evaluating model performance
- **Use case:** credit card application, college admissions

Lab

07**Lab**

Classification: SVM (Supervised Vector Machines)

TOPICS

SVM concepts and theory · SVM with kernel · **Use case:** Customer churn data

08**Lab**

Classification: Decision Trees & Random Forests

TOPICS

- Theory behind trees
- Classification and Regression Trees (CART)
- Random Forest concepts
- **Use case:** predicting loan defaults, estimating election contributions

09**Lab**

Classification: Naive Bayes

TOPICS

Theory behind Naive Bayes · Running NB algorithm · Evaluating NB model · **Use case:** spam filtering

10**Lab**

Clustering (K-Means)

TOPICS

- Theory behind K-Means
- Running K-Means algorithm
- Estimating the performance
- **Use case:** grouping cars data, grouping shopping data

11**Lab**

Principal Component Analysis (PCA)

TOPICS

Understanding PCA concepts · PCA applications · Running a PCA algorithm · Evaluating results · **Use case:** analyzing retail shopping data

12

Lab

Recommendation (Collaborative Filtering)

TOPICS

- Recommender systems overview
- Collaborative Filtering concepts
- **Use case:** movie recommendations, music recommendations

13

Final Workshop (Time Permitting)

HANDS-ON ACTIVITIES

Practise What You Learn

#	MODULE	ACTIVITY
02	Machine Learning Environment	Lab: Getting familiar with ML environment
03	Machine Learning Concepts	Lab: Basic stats
04	Feature Engineering (FE)	LAB ■ Data cleanup ■ Visualizing data
05	Linear Regression	Lab: Lab
06	Logistic Regression	Lab: Lab
07	Classification: SVM (Supervised Vector Machines)	Lab: Lab
08	Classification: Decision Trees & Random Forests	Labs: Labs
09	Classification: Naive Bayes	Lab: Lab
10	Clustering (K-Means)	Lab: Lab
11	Principal Component Analysis (PCA)	Lab: Lab
12	Recommendation (Collaborative Filtering)	Lab: Lab

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

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