

Machine Learning Essentials Training

Course Contents

Section 1: Machine Learning (ML) Overview

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

Section 2: Machine Learning Environment

- Introduction to Jupyter notebooks / R-Studio
 - Lab: Getting familiar with ML environment

Section 3: Machine Learning Concepts

- Statistics Primer
- Covariance, Correlation, Covariance Matrix
- Errors, Residuals
- Overfitting / Underfitting
- Cross validation, bootstrapping
- Confusion Matrix
- ROC curve, Area Under Curve (AUC)
 - Lab: Basic stats

Section 4: Feature Engineering (FE)

- Preparing data for ML
- Extracting features, enhancing data
- Data cleanup
- Visualizing Data
 - Lab : data cleanup
 - Lab: visualizing data

Section 5: Linear regression

- Simple Linear Regression

- Multiple Linear Regression
- Running LR
- Evaluating LR model performance
 - Lab
- Use case: House price estimates

Section 6: Logistic Regression

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

Section 7: Classification : SVM (Supervised Vector Machines)

- SVM concepts and theory
- SVM with kernel
 - Lab
- Use case: Customer churn data

Section 8: Classification : Decision Trees & Random Forests

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

Section 9: Classification : Naive Bayes

- Theory behind Naive Bayes
- Running NB algorithm
- Evaluating NB model
 - Lab
- Use case: spam filtering

Section 10: Clustering (K-Means)

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

Section 11: Principal Component Analysis (PCA)

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

Section 12: Recommendation (Collaborative filtering)

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

Section 13: Final workshop (time permitting)