

MACHINE LEARNING

3. MACHINE LEARNING – SUPERVISED LEARNING

4. MACHINE LEARNING – UNSUPERVISED LEARNING

5. MACHINE LEARNING – ADVANCED TOPICS

MACHINE LEARNING – SUPERVISED LEARNING

Learning Outcome Statements

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised learning.
- Be able to design and implement machine learning solutions to classification, and regression problems; and be able to evaluate and interpret the results of the algorithms

Key Contents

Introduction to Machine Learning

- What is ML
- What is Data mining
- Some practical examples
- Steps in KDD

Supervised Learning - I (Regression)

- Basic concepts
- Linear Regression
- Multiple Linear Regression
- Logistic Regression

Supervised Learning- II (Classification)

- Basic Concepts
- Decision Tree, Random Forest
- Bayes Classification
- Rule-Based Classification
- Classification with ANN
- SVM classification
- Model Evaluation and Selection
- Techniques to Improve Classification Accuracy:
Ensemble Methods
- Bagging, Boosting

MACHINE LEARNING – UNSUPERVISED LEARNING

Learning Outcome Statements

- Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised learning.
- Be able to design and implement machine learning solutions to cluster analysis, and associations and correlations; and be able to evaluate and interpret the results of the algorithms

Key Contents

Unsupervised Learning – I (Cluster Analysis)

- Basic Concepts
- Partitioning Methods
- K-means
- K-medoids
- Hierarchical Methods
- Diana
- Density based Methods
- DBSCAN
- Evaluation of Clustering

Unsupervised Learning – II (Associations & Correlations)

- Basic Concepts
- Frequent Item set Mining Methods
- Apriori
- Improving the Efficiency of Apriori
- FPGrowth
- ECLAT: Frequent Pattern Mining with Vertical Data Format
- Pattern evaluation methods

MACHINE LEARNING – ADVANCED TOPICS

Learning Outcome Statements

- Be able to formulate machine learning problems corresponding to different applications.
- Understand a range of machine learning algorithms along with their strengths and weaknesses.
- Understand the basic theory underlying advanced machine learning topics.
- Be able to apply machine learning algorithms to solve problems of moderate complexity using Python.

Key Contents

Introduction to Machine Learning Workflow

- Introduction to Machine Learning with Python
- Setting up a Machine Learning Pipeline with Python

Advanced topics in machine learning

- Hyperparameter tuning (grid and random search)
- cross-validation

Hands-on Projects

- Predicting mortality in Titanic dataset
- Benchmarking ML algorithms on the MNIST dataset
- Exploring Hyper parameter tuning
- Cross-validation