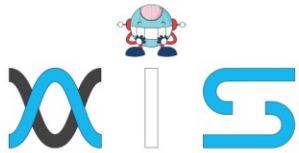


MACHINE LEARNING

Course Outline





Program Overview

This online course offers an in-depth overview of machine learning topics, including working with real-time data, developing algorithms using supervised and unsupervised learning, regression, classification, and time series modeling. You will also learn how to use Python to draw predictions from data.

Program Features

- 58 hours of blended learning
- 14 hours of Online self-paced learning
- 44 hours of instructor-led training
- Four industry-based course-end projects
- Interactive learning with Jupyter notebooks integrated labs
- Dedicated mentoring session from faculty of industry experts

Delivery Mode

Blended - Online self-paced learning and live virtual classroom

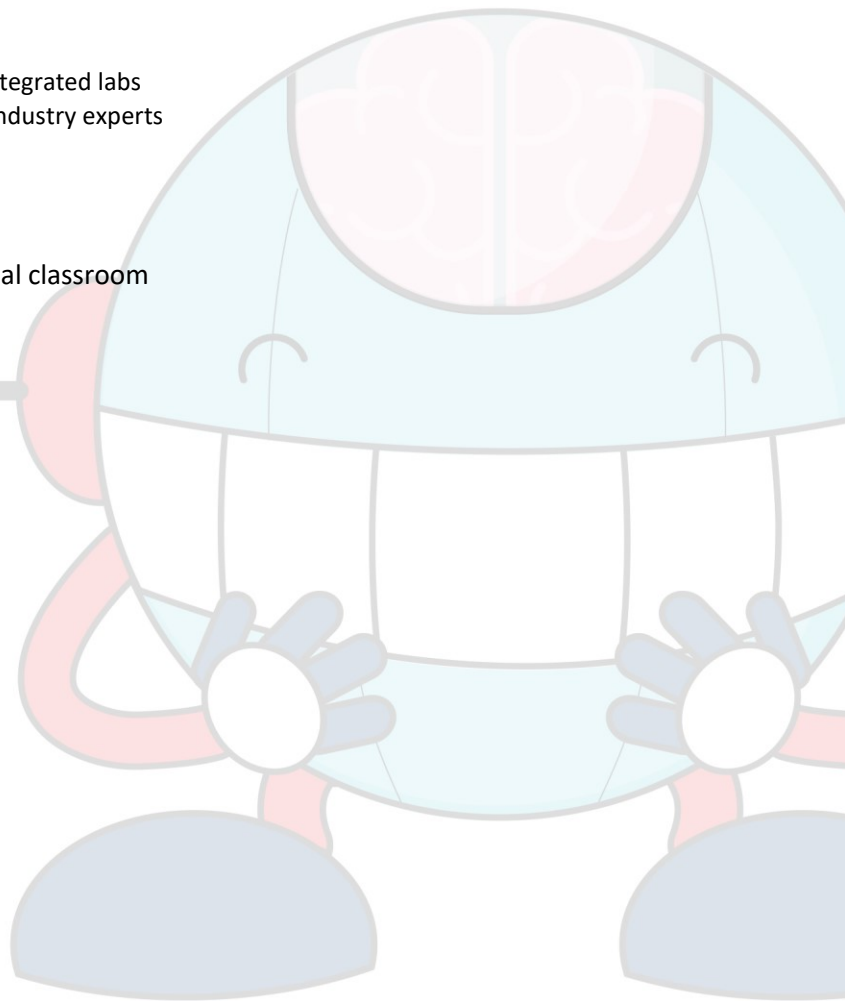
Prerequisites

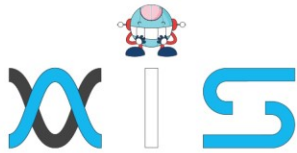
This course requires an understanding of:

- Statistics
- Mathematics
- Python programming

Knowledge of these fundamental courses:

- Python for Data Science
- Math Refresher
- Statistics for Data Science





Target Audience

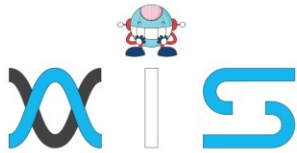
- Data analysts looking to upskill
- Data scientists engaged in prediction modeling
- Any professional with Python knowledge and interest in statistics and math
- Business intelligence developers

Key Learning Outcomes

- Master the concepts of supervised and unsupervised learning, recommendation engine, and time series modeling
- Gain practical mastery over principles, algorithms, and applications of machine learning through a hands-on approach that includes working on four major end-to-end projects and 25+ hands-on exercises
- Acquire thorough knowledge of the statistical and heuristic aspects of machine learning
- Implement models such as support vector machines, kernel SVM, naive Bayes, decision tree classifier, random forest classifier, logistic regression, K-means clustering and more in Python
- Validate machine learning models and decode various accuracy metrics. Improve the final models using another set of optimization algorithms, which include boosting & bagging techniques
- Comprehend the theoretical concepts and how they relate to the practical aspects of machine learning

Course Introduction

- **Lesson 01** – Course Introduction
 - Course Introduction
- **Lesson 02** - Introduction to AI and Machine Learning
 - Learning Objectives
 - The emergence of Artificial Intelligence
 - Artificial Intelligence in Practice
 - Sci-Fi Movies with the concept of AI
 - Recommender Systems
 - Relationship Between Artificial Intelligence, Machine Learning, and Data Science - Part A
 - Relationship Between Artificial Intelligence, Machine Learning, and Data Science - Part B
 - Definition and Features of Machine Learning
 - Approaches Machine Learning
 - Techniques Applications of Machine Learning - Part A
 - Applications of Machine Learning - Part B
 - Key Takeaways

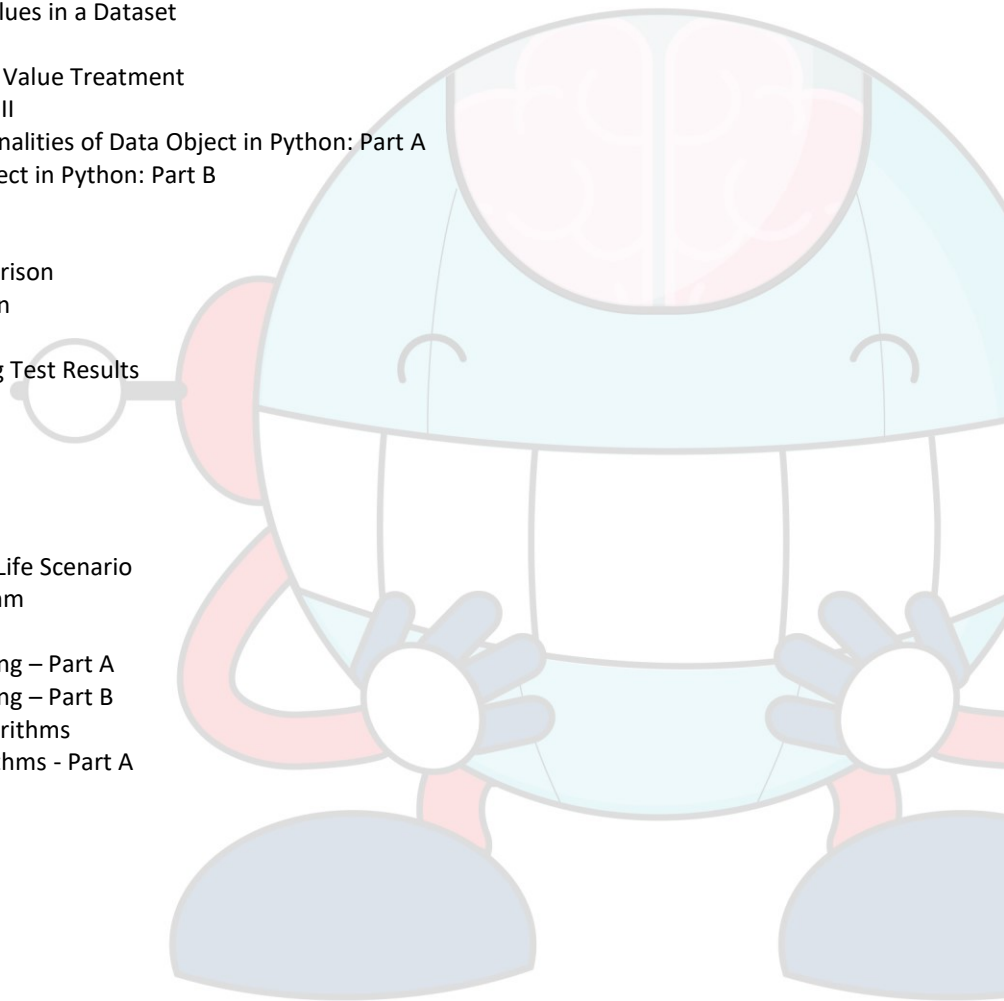


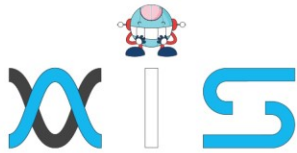
- **Lesson 03** – Data Preprocessing

- Learning Objectives
- Data Exploration: Loading Files
- Demo: Importing and Storing
- Data Practice: Automobile Data Exploration I
- Data Exploration Techniques: Part 1
- Data Exploration Techniques: Part 2
- Seaborn
- Demo: Correlation Analysis
- Practice: Automobile Data Exploration II
- Data Wrangling Missing Values in a Dataset
- Outlier Values in a Dataset
- Demo: Outlier and Missing Value Treatment
- Practice: Data Exploration III
- Data Manipulation Functionalities of Data Object in Python: Part A
- Functionalities of Data Object in Python: Part B
- Different Types of Joins
- Typecasting
- Demo: Labor Hours Comparison
- Practice: Data Manipulation
- Key Takeaways
- Lesson-end project: Storing Test Results

- **Lesson 04** – Supervised Learning

- Learning Objectives
- Supervised Learning
- Supervised Learning- Real-Life Scenario
- Understanding the Algorithm
- Supervised Learning Flow
- Types of Supervised Learning – Part A
- Types of Supervised Learning – Part B
- Types of Classification Algorithms
- Types of Regression Algorithms - Part A
- Regression Use Case
- Accuracy Metrics
- Cost Function
- Evaluating Coefficients
- Demo: Linear Regression
- Practice: Boston Homes I
- Challenges in Prediction
- Types of Regression Algorithms - Part B





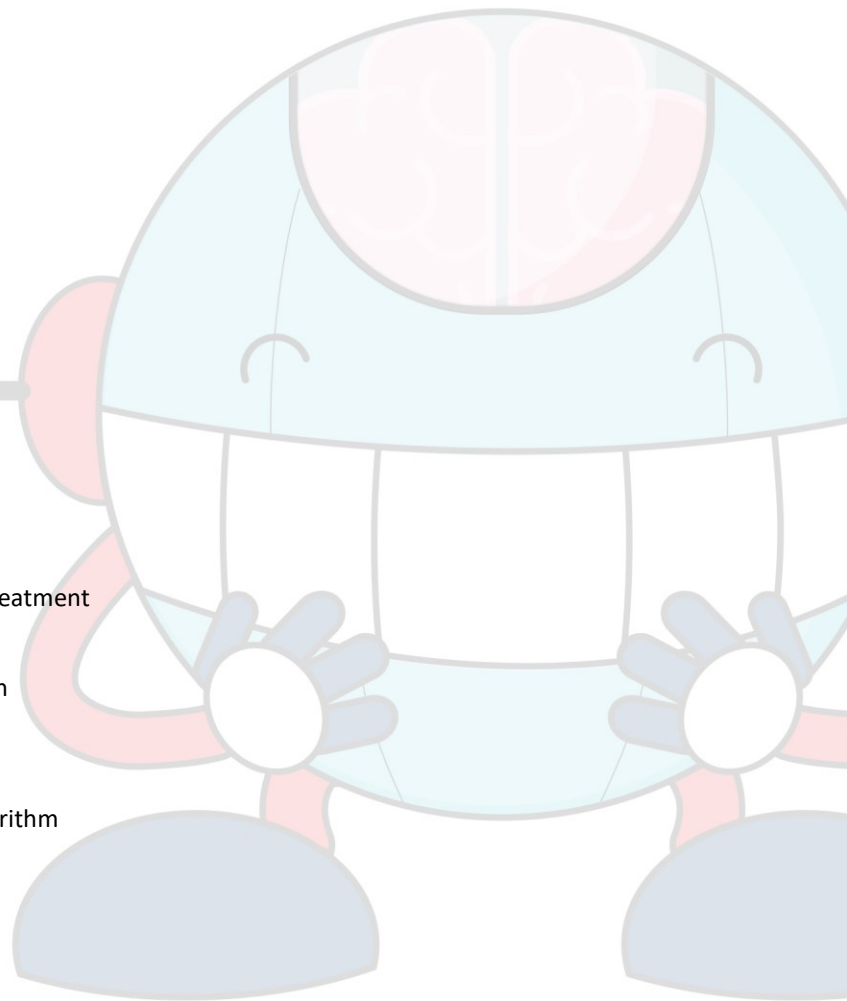
- Demo: Bigmart
- Practice: Boston Homes II
- Logistic Regression - Part A
- Logistic Regression - Part B
- Sigmoid Probability
- Accuracy Matrix
- Demo: Survival of Titanic Passengers
- Practice: Iris Species
- Key Takeaways
- Lesson-end Project: Health Insurance Cost

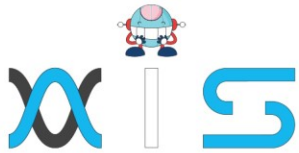
- **Lesson 05 – Feature Engineering**

- Learning Objectives
- Feature Selection
- Regression
- Factor Analysis
- Factor Analysis Process
- Principal Component Analysis (PCA)
- First Principal Component
- Eigenvalues and PCA
- Demo: Feature Reduction
- Practice: PCA Transformation
- Linear Discriminant Analysis
- Maximum Separable Line
- Find Maximum Separable Line
- Demo: Labeled Feature Reduction
- Practice: LDA Transformation
- Key Takeaways
- Lesson-end Project: Simplifying Cancer Treatment

- **Lesson 06 – Supervised Learning: Classification**

- Learning Objectives
- Overview of Classification
- Classification: A Supervised Learning Algorithm
- Use Cases
- Classification Algorithms
- Decision Tree Classifier
- Decision Tree: Examples
- Decision Tree Formation
- Choosing the Classifier





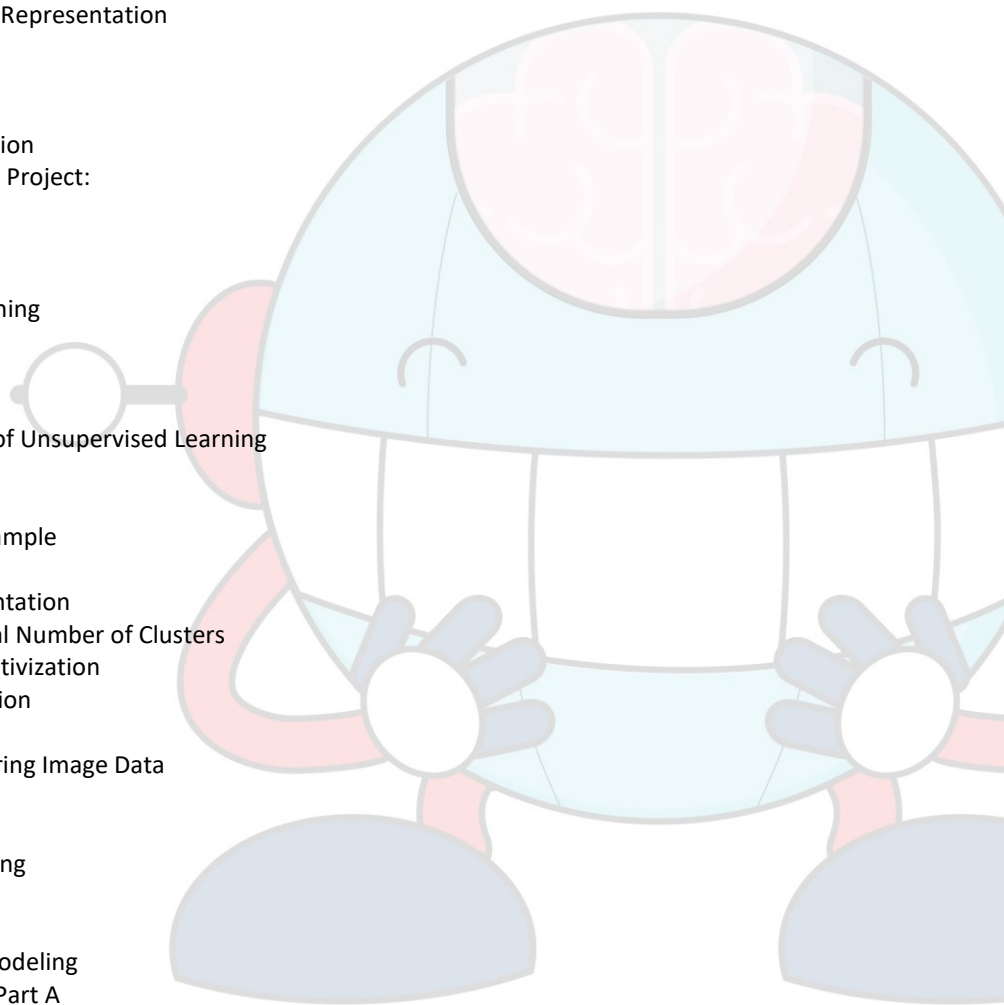
- Overfitting of Decision Trees
- Random Forest Classifier- Bagging and Bootstrapping
- Decision Tree and Random Forest Classifier
- Performance Measures: Confusion Matrix
- Performance Measures: Cost Matrix
- Demo: Horse Survival
- Practice: Loan Risk Analysis
- Naive Bayes Classifier
- Steps to Calculate Posterior Probability: Part A
- Steps to Calculate Posterior Probability: Part B
- Support Vector Machines: Linear Separability
- Support Vector Machines: Classification Margin
- Linear SVM: Mathematical Representation
- Non-linear SVMs
- The Kernel Trick
- Demo: Voice Classification
- Practice: College Classification
- Key Takeaways Lesson-end Project:
- Classify Kinematic Data

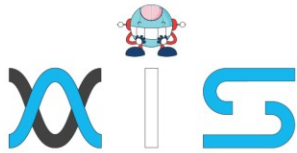
- **Lesson 07 – Unsupervised Learning**

- Learning Objectives
- Overview
- Example and Applications of Unsupervised Learning
- Clustering
- Hierarchical Clustering
- Hierarchical Clustering: Example
- Demo: Clustering Animals
- Practice: Customer Segmentation
- K-means Clustering Optimal Number of Clusters
- Demo: Cluster-Based Incentivization
- Practice: Image Segmentation
- Key Takeaways
- Lesson-end Project: Clustering Image Data

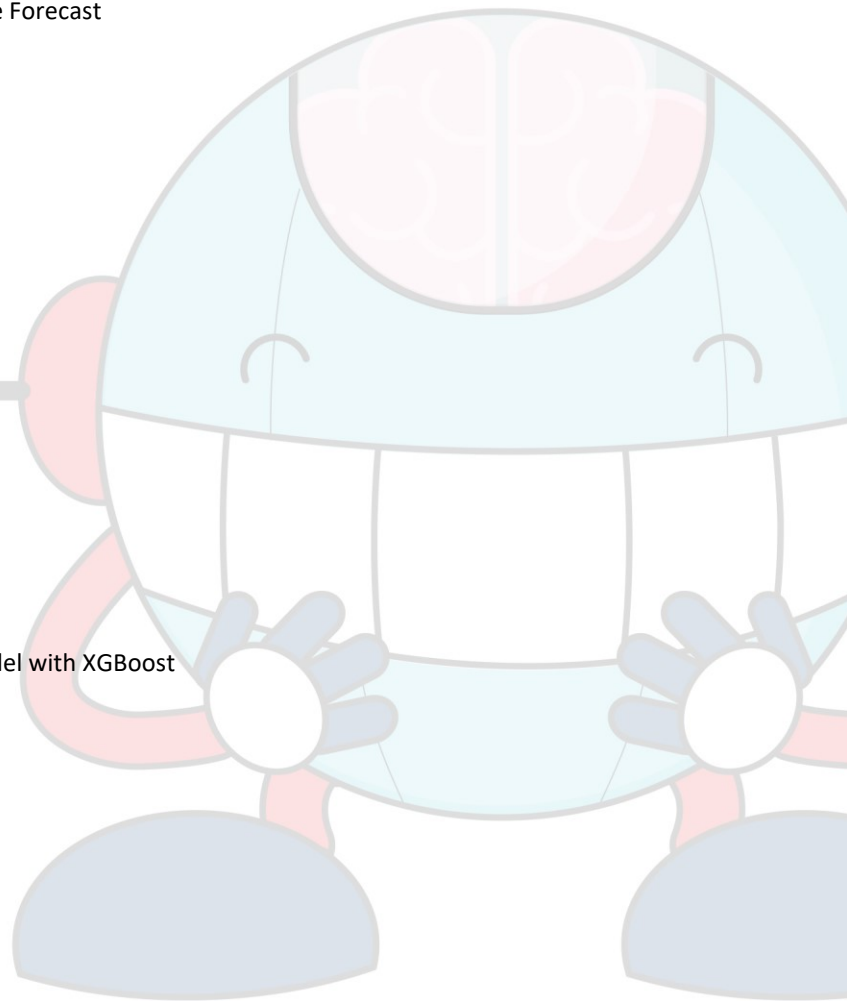
- **Lesson 08 – Time Series Modeling**

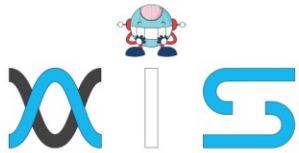
- Learning Objectives
- Overview of Time Series Modeling
- Time Series Pattern Types Part A
- Time Series Pattern Types Part B



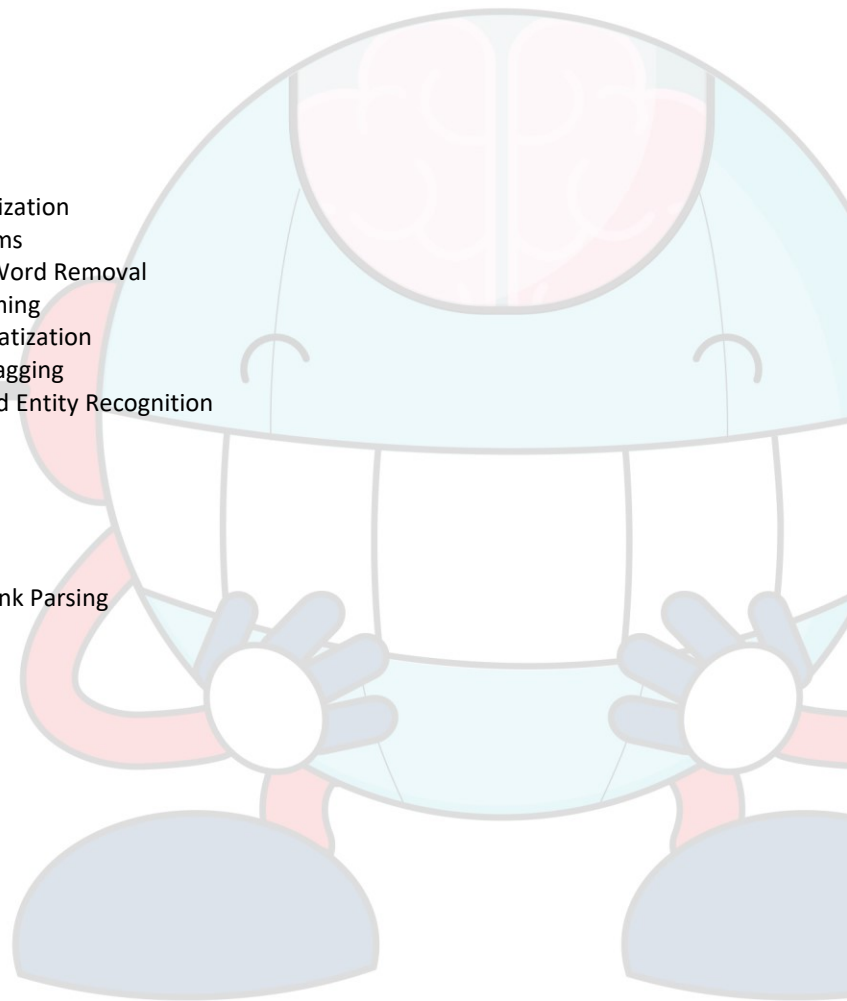


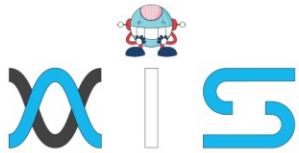
- White Noise
 - Stationarity
 - Removal of Non-Stationarity
 - Demo: Air Passengers I
 - Practice: Beer Production I
 - Time Series Models Part A
 - Time Series Models Part B
 - Time Series Models Part C
 - Steps in Time Series Forecasting
 - Demo: Air Passengers II
 - Practice: Beer Production II
 - Key Takeaways
 - Lesson-end Project: IMF Commodity Price Forecast
- **Lesson 09 – Ensemble Learning**
 - Learning Objectives
 - Overview
 - Ensemble Learning Methods Part A
 - Ensemble Learning Methods Part B
 - Working of AdaBoost
 - AdaBoost Algorithm and Flowchart
 - Gradient Boosting
 - XGBoost XGBoost Parameters Part A
 - XGBoost Parameters Part B
 - Demo: Pima Indians Diabetes
 - Practice: Linearly Separable Species
 - Model Selection
 - Common Splitting Strategies
 - Demo: Cross-Validation
 - Practice: Model Selection
 - Key Takeaways
 - Lesson-end Project: Tuning Classifier Model with XGBoost
- **Lesson 10 – Recommender Systems**
 - Learning Objectives
 - Introduction
 - Purposes of Recommender Systems
 - Paradigms of Recommender Systems
 - Collaborative Filtering Part A
 - Collaborative Filtering Part B
 - Association Rule Mining





- Association Rule Mining: Market Basket Analysis
 - Association Rule Generation: Apriori Algorithm
 - Apriori Algorithm Example: Part A
 - Apriori Algorithm Example: Part B
 - Apriori Algorithm: Rule Selection
 - Demo: User-Movie Recommendation Model
 - Practice: Movie-Movie recommendation
 - Key Takeaways
 - Lesson-end Project: Book Rental Recommendation
-
- **Lesson 11 – Text Mining**
 - Learning Objectives
 - Learning Objectives
 - Overview of Text Mining
 - Significance of Text Mining
 - Applications of Text Mining
 - Natural Language Toolkit Library
 - Text Extraction and Preprocessing: Tokenization
 - Text Extraction and Preprocessing: N-grams
 - Text Extraction and Preprocessing: Stop Word Removal
 - Text Extraction and Preprocessing: Stemming
 - Text Extraction and Preprocessing: Lemmatization
 - Text Extraction and Preprocessing: POS Tagging
 - Text Extraction and Preprocessing: Named Entity Recognition
 - NLP Process Workflow
 - Demo: Processing Brown Corpus
 - Practice: Wiki Corpus
 - Structuring Sentences: Syntax
 - Rendering Syntax Trees
 - Structuring Sentences: Chunking and Chunk Parsing
 - NP and VP Chunk and Parser
 - Structuring Sentences: Chinking
 - Context-Free Grammar (CFG)
 - Demo: Twitter Sentiments
 - Practice: Airline Sentiment
 - Key Takeaways
 - Lesson-end Project: FIFA World Cup





Projects Covered

- **Project 1: Uber Fare Prediction**

Design an algorithm that will tell the fare to be charged for a passenger.

Uber wants to improve the accuracy of its fare prediction model. Help Uber by choosing the best data and AI technologies for building its next-generation model.

- **Project 2: Mercedes-Benz Greener Manufacturing**

Reduce the time a Mercedes-Benz spends on the test bench.

Mercedes-Benz wants to shorten the time models spend on its test-bench, thus moving it to the marketing phase sooner. Build and optimize a machine learning algorithm to solve this problem

- **Project 3: Amazon.com - Employee Access**

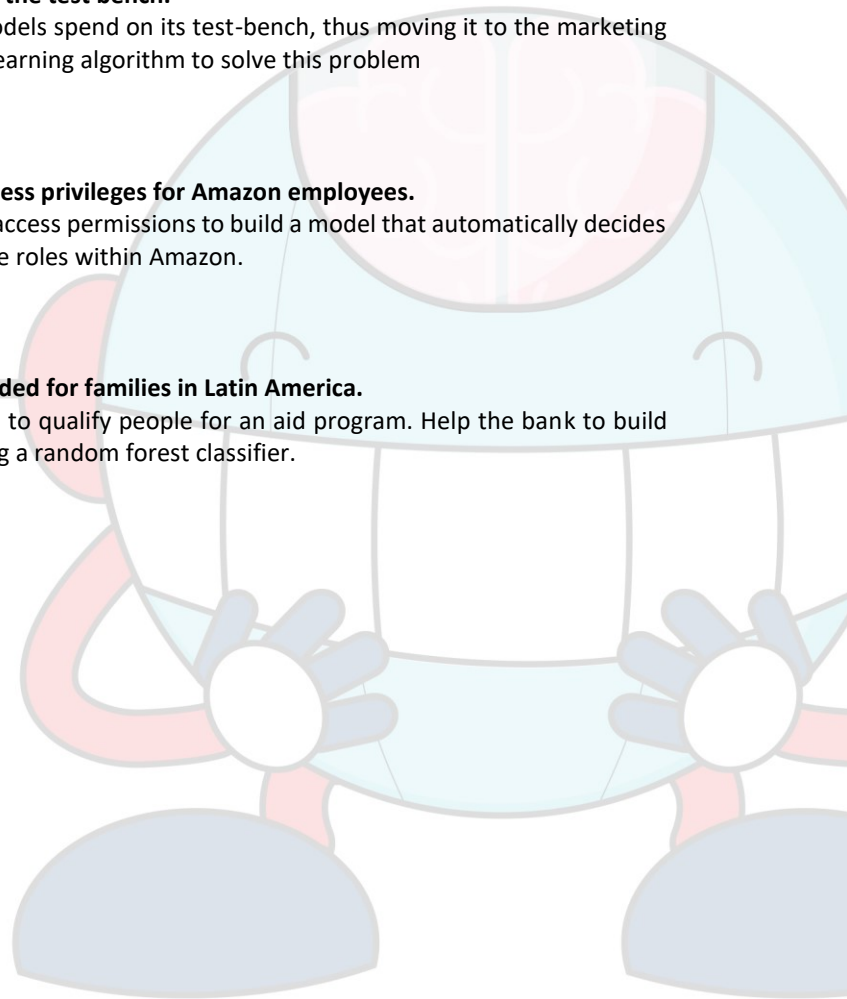
Design an algorithm to accurately predict access privileges for Amazon employees.

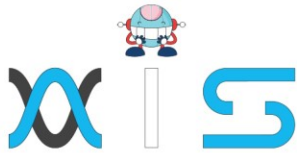
Use the data of Amazon employees and their access permissions to build a model that automatically decides access privileges as employees enter and leave roles within Amazon.

- **Project 4: Income Qualification**

Identify the level of income qualification needed for families in Latin America.

The Inter-American Development bank wants to qualify people for an aid program. Help the bank to build and improve the accuracy of the data set using a random forest classifier.





AIS

With the rising demand in scalable technology, AIS provides tailored goal-setting based on your organization's needs and expectations. With products geared towards the growing needs of your organization's customers and employees, AIS has innovative and value-driven solutions.

Learning Partners

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Premiere training and consulting services company, SAS Management, Inc. has been in the industry for a decade. SAS Management, inc. focuses on creating value in every learning and consulting experience by providing the best possible output – whether in a virtual classroom setup, e-learning, or face-to-face. SAS Management, Inc. is the leading training and certification provider for ITIL, Project Management Professional, ISO certifications, PRINCE2, SDI Service Desk Analyst and Manager, Agile, and a host of many programs and courses.

Simplilearn

Tagged as the “World’s #1 Online Bootcamp”, Simplilearn provides online education and in-house training for professional certification courses. Founded in 2010, Simplilearn offers more than 100 programs, helping professionals reach their learning potentials needed to work in the digital economy.

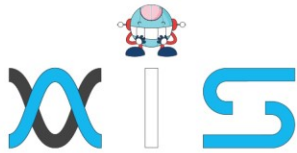
Freshworks

With over 40,000 customers, Freshworks is a business solutions software provider with products ranging from IT helpdesk and service desk, customer relationship management, live chat, marketing automation, phone system, and HR.

Partners & Affiliates



PECB **SDI** **Service Desk Institute** **EC-COUNCIL**



The program presented, as well as a wide range of programs are products of the partnership of AIS, SAS Management, Inc., and Simplilearn. With a common goal of providing the best practice of facilitating learning with an array of choices available in the online platform in this time of digitization.

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