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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
Certification Details and **Criteria:**

- 85 percent completion of online self-paced learning or attendance of one live virtual classroom
- A score of at least 75 percent in the course-end assessment
- Successful evaluation in at least one project

**Course Curriculum:**

**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
- 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
- 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.
Customer Reviews:

**Ashok Kumar Kothandapani**  
Senior Test Manager at Infosys  
Simplilearn’s trainers are patient, clearing any confusion and answering all questions without impacting the course timeline. Simplilearn is the most convenient platform for those who want to grow in the fields of Data Analytics and Data Science.

**Asmita Wankhade**  
Student at NIT  
The course content is excellent. You can learn and understand, even if you are only a beginner. I am delighted to have joined and successfully finished the ‘Certified Machine Learning’ course. All thanks to Simplilearn.

**Mahesh Gaonkar**  
Senior Analyst Programmer at Emirates  
Simplilearn is a great start for the beginner as well for the experienced person who wants to get into a data science job. Trainers are well experienced and we get more detailed ideas on the concepts and exercises. I could finish my Machine Learning advance course very easily with good project exercise.

**Sharanya Nair**  
Business Analyst at Genpact  
I had completed Tableau, R, and Python training courses from Simplilearn. These courses helped a lot in moving ahead in my career path. Now, I am pursuing an MS in Data Science. Thank you, Simplilearn!
About **Us:**

Simplilearn is a leader in digital skills training, focused on the emerging technologies that are transforming our world. Our blended learning approach drives learner engagement and is backed by the industry’s highest completion rates. Partnering with professionals and companies, we identify their unique needs and provide outcome-centric solutions to help them achieve their professional goals.