edureka!
Discover Learning

Machine Learning Engineer
Masters Program

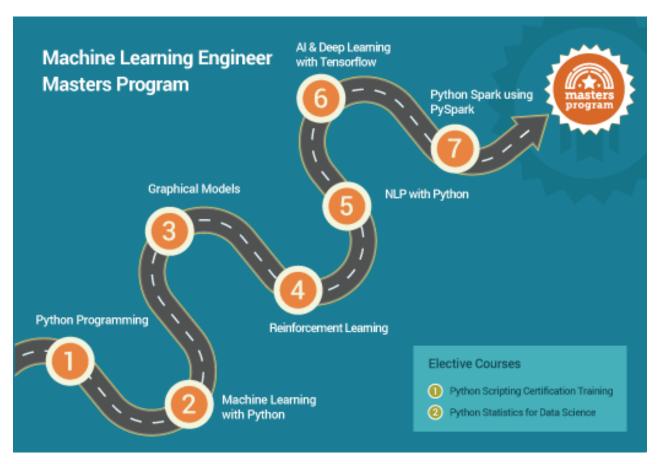**Course Curriculum**

masters programme

About Edureka

Edureka is a leading e-learning platform providing live instructor-led interactive online training. We cater to professionals and students across the globe in categories like Big Data & Hadoop, Business Analytics, NoSQL Databases, Java & Mobile Technologies, System Engineering, Project Management and Programming.

We have an easy and affordable learning solution that is accessible to millions of learners. With our students spread across countries like the US, India, UK, Canada, Singapore, Australia, Middle East, Brazil and many others, we have built a community of over 1 million learners across the globe.

About the Course

Machine Learning Engineer Masters Program covers a broad array of topics which includes: Supervised Learning, Unsupervised Learning and Natural Language Processing. It includes training on the latest advancements and technical approaches in Artificial Intelligence & Machine Learning such as Deep Learning, Graphical Models, Reinforcement Learning and many more.

The program provides access to 200+ hours of interactive online learning, 12 industry-based use cases, skills specific assessments and other resources. There are no prerequisites for enrollment to the Masters Program. It is designed and developed to accommodate diverse professional backgrounds. Our Masters Program recommends the ideal path for becoming a Machine Learning Engineer, however, it is learner's preference to complete the courses in any order they intend to.

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Python Programming

Course Curriculum

About the Course

The Course 'Python Programming' is designed to master important Python programming concepts such as data & file operations in Python, object-oriented concepts in Python & various Python libraries such as Pandas, Numpy, Matplotlib, and so on. This Python certification course is also a gateway towards your Data Science career.

Curriculum

Module I: Introduction to Python

Learning Objectives:

At the end of this Module, you should be able to define Python, understand the need of Programming, know why to choose Python over other languages, setup Python environment, understand Various Python concepts – Variables, Data Types Operators, Conditional Statements and Loops, Illustrate String formatting and understand Command Line Parameters and Flow control

Topics:

- Overview of Python
- The Companies using Python
- Other applications in which Python is used
- Discuss Python Scripts on UNIX/Windows
- Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the screen

Hands On/Demo:

- Creating "Hello World" code
- Variables
- Demonstrating Conditional Statements
- Demonstrating Loops

Module 2: Sequences and File Operations

Learning Objectives:

At the end of this Module, you should be able to understand Operations performed on Files, learn what sequences are, execute Sequence Operations, understand types of Sequences in Python: Lists, Tuples, Strings, Sets, and Dictionaries.

Topics:

- Python files I/O Functions
- Lists and related operations
- Tuples and related operations
- Strings and related operations
- Sets and related operations
- Dictionaries and related operations

Hands On/Demo:

- Tuple - properties, related operations, compared with list
- List - properties, related operation
- Dictionary - properties, related operations
- Set - properties, related operations

Module 3: Deep Dive – Functions and OOPs

Learning Objectives:

At the end of this Module, you should be able to define and call Functions, understand why the return statement is used, and understand and execute Object Oriented Concepts

Topics:

- Functions
- Function Parameters
- Global variables

- Variable scope and Returning Values
- Lambda Functions
- Object Oriented Concepts

Hands On/Demo:

- Functions - syntax, arguments, keyword arguments, return values
- Lambda - features, syntax, options, compared with the functions

Module 4: Working with Modules and Handling Exceptions

Learning Objectives:

At the end of this Module, you should be able to use Standard Libraries, use modules, understand Exception Handling, and Create User Defined Exceptions

Topics:

- Standard Libraries
- Modules Used in Python (OS, Sys, Date and Time etc.)
- The Import statement
- Module search path
- Package installation ways
- Errors and Exception Handling
- Handling multiple exceptions

Hands On/Demo:

- Errors and exceptions - types of issues, remediation
- Packages and module - modules, import options, sys path

Module 5: Introduction to NumPy & Pandas

Learning Objectives:

At the end of this Module, you should be able to create arrays using NumPy, use NumPy to perform mathematical operations on arrays, read and write data from text/csv files into arrays and vice-versa, understand Pandas and employ it for data manipulation, understand and use the data structures available in Pandas, and read and write data between files and programs

Topics:

- NumPy – arrays
- Operations on arrays

- Indexing slicing and iterating
- Reading and writing arrays on files
- Pandas - data structures & index operations
- Reading and Writing data from Excel/CSV formats into Pandas

Hands On/Demo:

- NumPy library- Installation, Creating NumPy array, operations performed on NumPy array
- Pandas library- Installation, creating series and dataframes, Importing and exporting data

Module 6: Data visualisation

Learning Objectives:

At the end of this Module, you should be able to create simple plots like scatter plot, histogram, bar graph, pie chart using Matplotlib**,** add different styles to the plot**,** and use the different forms of plots available in Matplotlib

Topics:

- matplotlib library
- Grids, axes, plots
- Markers, colours, fonts and styling
- Types of plots - bar graphs, pie charts, histograms
- Contour plots

Hands On/Demo:
- Matplotlib - Installation, Using Scatterplot, histogram, bar graph, pie chart to show information, Styling of Plot

Module 7: Data Manipulation

Learning Objectives:

At the end of this module, you will learn how to perform function manipulations on Data objects, perform Concatenation, Merging and Joining on DataFrames, iterate through DataFrames and explore Datasets and extract insights from it.

Topics:

- Basic Functionalities of a data object
- Merging of Data objects
- Concatenation of data objects
- Types of Joins on data objects
- Exploring a Dataset
- Analyzing a dataset

Hands On/Demo:

- Pandas Function- Ndim(), axes(), values(), head(), tail(), sum(), std(), iteritems(), iterrows(), itertuples(), GroupBy operations, Aggregation, Concatenation, Merging and joining

Module 8: GUI Programming

Learning Objectives:

After completing this module, you should be able to learn ipywidgets package, understand different widgets like Numeric Widgets, Boolean Widgets, Selection Widgets, String Widgets, Date Picker, Color Picker and Container Widgets, and create an application using ipywidgets package

Topics:
- Ipywidgets package
- Numeric Widgets
- Boolean Widgets
- Selection Widgets
- String Widgets
- Date Picker
- Color Picker
- Container Widgets
- Creating a GUI Application

Hands-on/Demo

- Create GUI

Self-paced Module: Network Programming and Multithreading

Learning Objectives:

After completing this module, you should be able to understand the concept of Database, access MySQL DB, create socket for sending short messages, and learn Multithreading concepts

Topics:
- MySQL DB access
- Network programming
- Multithreading

Hands-on/Demo

- Database Creation

- CRUD Operations

- Network Creation

- Multithreading

Module 9: Developing Web Maps and Representing information using Plots

Learning Objectives:

At the end of this Module, you should be able to design a Web Map using Folium and Pandas for displaying Volcanoes in USA and Population in different countries in a Single map and represent information from Dataset with the help of Plots

Topics:

- Use of Folium Library
- Use of Pandas Library
- Flow chart of Web Map application
- Developing Web Map using Folium and Pandas
- Reading information from Dataset and represent it using Plots

Module 10: Computer vision using OpenCV and Visualisation using Bokeh

Learning Objectives:

At the end of this Module, you should be able to perform Web Scraping using Python, visualise Data the browser using Bokeh, and use OpenCV to create a motion detection software

Topics:

- Beautiful Soup Library
- Requests Library
- Scrap all hyperlinks from a webpage, using Beautiful Soup & Requests
- Plotting charts using Bokeh
- Plotting scatterplots using Bokeh
- Image Editing using OpenCV
- Face detection using OpenCV
- Motion Detection and Capturing Video

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Machine Learning with Python

Course Curriculum

About the Course

The Course 'Machine Learning with Python' is designed to gain expertise in various machine learning algorithms such as regression, clustering, decision trees, random forest, Naïve Bayes and Q-Learning. This Machine Learning using Python Training exposes you to concepts of Statistics, Time Series and different classes of machine learning algorithms like supervised, unsupervised and reinforcement algorithms. Throughout the Data Science Certification Course, you'll be solving real-life case studies on Media, Healthcare, Social Media, Aviation, HR.

Curriculum

Module 1: Introduction to Data Science

Learning Objectives:

At the end of this Module, you should be able to define Data Science, discuss the era of Data Science, describe the Role of a Data Scientist, illustrate the Life cycle of Data Science, list the Tools used in Data Science, and states what role Big Data and Hadoop, Python, R and Machine Learning play in Data Science.

Topics:

- What is Data Science?
- What does Data Science involve?
- Era of Data Science
- Business Intelligence vs Data Science
- Life cycle of Data Science
- Tools of Data Science
- Introduction to Python

Module 2: Data Extraction, Wrangling, Visualization

Learning Objectives:

At the end of this Module, you should be able to discuss Data Acquisition technique, list the different types of Data, evaluate Input Data, explain the Data Wrangling techniques, and discuss Data Exploration.

Topics:

- Data Analysis Pipeline
- What is Data Extraction
- Types of Data
- Raw and Processed Data
- Data Wrangling
- Exploratory Data Analysis
- Visualization of Data

Hands-On/Demo:
- Loading different types of dataset in Python
- Arranging the data
- Plotting the graphs

Module 3: Introduction to Machine Learning with Python

Learning Objectives:

At the end of this module, you should be able to essential Python Revision, necessary Machine Learning Python libraries, define Machine Learning, discuss Machine Learning Use cases, list the categories of Machine Learning, illustrate Supervised Learning Algorithms, identify and recognize machine learning algorithms around us and understand the various elements of machine learning algorithm like parameters, hyper parameters, loss function and optimization.

Topics:

- Python Revision (numpy, Pandas, scikit learn, matplotlib)
- What is Machine Learning?
- Machine Learning Use-Cases
- Machine Learning Process Flow
- Machine Learning Categories
- Linear regression
- Gradient descent

Skills:

- Machine Learning concepts
- Machine Learning types
- Linear Regression Implementation

Hands On:
- Linear Regression – Boston Dataset

Module 4: Supervised Learning – I

Learning Objectives:

At the end of this module, you should be able to understand What is Supervised Learning, illustrate Logistic Regression, define Classification, and explain different Types of Classifiers such as - Decision Tree and Random Forest.

Topics:

- What is Classification and its use cases?
- What is Decision Tree?
- Algorithm for Decision Tree Induction
- Creating a Perfect Decision Tree
- Confusion Matrix
- What is Random Forest?

Skills:

- Supervised Learning concepts
- Implementing different types of Supervised Learning algorithms
- Evaluating model output

Hands On:

- Implementation of Logistic regression, Decision tree, Random forest

Module 5: Dimensionality Reduction
Learning Objectives:

At the end of this module, you should be able to define the importance of Dimensions, explore PCA and its implementation, and discuss LDA and its implementation
Topics:

- Introduction to Dimensionality
- Why Dimensionality Reduction
- PCA
- Factor Analysis

- Scaling dimensional model
- LDA

Skills:

- Implementing Dimensionality Reduction Technique

Hands On:

- PCA
- Scaling

Module 6: Supervised Learning – II

Learning Objectives:

At the end of this module, you should be able to understand What is Naïve Bayes Classifier, how Naïve Bayes Classifier works, understand Support Vector Machine, illustrate How Support Vector Machine works, and understand Hyperparameter Optimization

Topics:

- What is Naïve Bayes?
- How Naïve Bayes works?
- Implementing Naïve Bayes Classifier
- What is Support Vector Machine?
- Illustrate how Support Vector Machine works?
- Hyperparameter Optimization
- Grid Search vs Random Search
- Implementation of Support Vector Machine for Classification

Skills:

- Supervised Learning concepts
- Implementing different types of Supervised Learning algorithms
- Evaluating model output

Hands On:

- Implementation of Naïve Bayes, SVM

Module 7: Unsupervised Learning

Learning Objectives:

At the end of this module, you should be able to define Unsupervised Learning, discuss the following Cluster Analysis: K - means Clustering, C - means Clustering, andHierarchical Clustering

Topics:

- What is Clustering & its Use Cases?
- What is K-means Clustering?
- How K-means algorithm works?
- How to do optimal clustering

- What is C-means Clustering?
- What is Hierarchical Clustering?
- How Hierarchical Clustering works?

Skills:
- Unsupervised Learning
- Implementation of Clustering – various type

Hands On:

- Implementing K-means Clustering
- Implementing Hierarchical Clustering

Module 8: Association Rules Mining and Recommendation Systems
Learning Objectives:

At the end of this module, you should be able to define Association Rules and learn the backend of recommendation engines and develop your own using python

Topics:

- What are Association Rules?

- Association Rule Parameters

- Calculating Association Rule Parameters

- Recommendation Engines

- How Recommendation Engines work?

- Collaborative Filtering

- Content Based Filtering

Skills:

- Data Mining using python
- Recommender Systems using python

Hands On:

- Apriori Algorithm

- Market Basket Analysis

Module 9: Reinforcement Learning

Learning Objectives:

At the end of this module, you should be able to explain the concept of Reinforcement Learning, generalize a problem using Reinforcement Learning, explain Markov's Decision Process, and demonstrate Q Learning

Topics:

- What is Reinforcement Learning
- Why Reinforcement Learning
- Elements of Reinforcement Learning
- Exploration vs Exploitation dilemma
- Epsilon Greedy Algorithm
- Markov Decision Process (MDP)
- Q values and V values
- Q – Learning
- α values

Skills:

- Implement Reinforcement Learning using python
- Developing Q Learning model in python

Hands On:

- Calculating Reward
- Discounted Reward
- Calculating Optimal quantities
- Implementing Q Learning
- Setting up an Optimal Action

Module 10: Time Series Analysis

Learning Objectives:

At the end of this module, you should be able to explain Time Series Analysis (TSA), discuss the need of TSA, describe ARIMA modelling, and Forecast the time series model.

Topics:

- What is Time Series Analysis?
- Importance of TSA
- Components of TSA
- White Noise
- AR model
- MA model
- ARMA model
- ARIMA model
- Stationarity
- ACF & PACF

Skills:

- TSA in Python

Hands on:

- Checking Stationarity
- Converting a non-stationary data to stationary
- Implementing Dickey Fuller Test
- Plot ACF and PACF
- Generating the ARIMA plot
- TSA Forecasting

Module 11: Model Selection and Boosting

Learning Objectives:

At the end of this module, you should be able to discuss Model Selection**,** define Boosting**,** express the need of Boosting**,** and explain the working of Boosting algorithm

Topics:

- What is Model Selection?
- Need of Model Selection
- Cross – Validation
- What is Boosting?
- How Boosting Algorithms work?
- Types of Boosting Algorithms
- Adaptive Boosting

Skills:
- Model Selection
- Boosting algorithm using python

Hands on:
- Cross Validation
- AdaBoost

Module 12: Hands-On Project

Learning Objectives:

At the end of this module, you should be able to know how to approach a project, hands-On project implementation, what Industry expects, Industry insights for the Machine Learning domain, and QA & doubt clearing session.

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Graphical Models

Course Curriculum

About the Course

'Graphical Modelling Certification Training' is designed to teach Graphical Models, fundamentals of graphical modelling, Probabilistic theories, types of graphical models –Bayesian (Directed) and Markov's (Undirected) networks, representation of Bayesian and Markov's Networks, concepts related to Bayesian and Markov's networks, and decision making– theories and Inference.

Curriculum

Module 1: Introduction to Graphical Model

Goal:

To give a brief idea about Graphical models, graph theory, probability theory, components of graphical models, types of graphical models, representation of graphical models, Introduction to inference, learning and decision making in Graphical Models.

Topics:

- Add examples where Graphical Models are used (Netflix or Amazon or Facebook)
- Why do we need Graphical Models?
- Introduction to Graphical Model
    - Probability theory
    - Graph theory
- How does Graphical Model help you deal with uncertainty and complexity?
- Types of Graphical Models
    - Factor graph
    - Undirected graph
    - Directed graph
- Graphical Modes
    - Bayesian Networks
    - Markov Networks

- Components of Graphical Model
    - Qualitative specification
    - Quantitative specification
- Representation of Graphical Models
- Inference in Graphical Models
- Learning Graphical Models
- Decision theory
- Applications

Module 2: Bayesian Network

Goal:

To give a brief idea of Bayesian networks, independencies in Bayesian Networks and building a Bayesian network.

Topics:

- What is Bayesian Network?
- Advantages of Bayesian Network for data analysis
- Bayesian Network in Python Examples
- Independencies in Bayesian Networks
- Criteria for Model Selection
    - Relative Posterior Probability
    - Local Criteria
- Building a Bayesian Network

Module 3: Markov's Networks

Goal:

To give a brief understanding of Markov's networks, independencies in Markov's networks, Factor graph and Markov's decision process.

Topics:

- Example of a Markov Network or Undirected Graphical Model
- Markov Model
    - Markov Chain
    - Continuous-time Markov Chain
    - Reversible Markov Chain
- Markov Property
- Markov and Hidden Markov Models
- The Factor Graph
- Independencies in Markov Networks
- Markov Decision Process

- Decision Making under Uncertainty
- Decision Making Scenarios

Module 4: Inference

Goal: To understand the need for inference and interpret inference in Bayesian and Markov's Networks.

Topics:

- Inference
    - o Marginal Inference
    - o Posterior Inference
    - o MAP Inference
- Complexity in Inference
- Exact Inference
- Approximate Inference
- Monte Carlo Algorithm
- Gibb's Sampling
- Inference in Bayesian Networks
- Inference in Bayesian Networks

Module 5: Model learning

Goal:

To understand the Structures and Parametrization in graphical Models

Topics:

- General Ideas in Learning
    - o Goals of Learning
    - o Density Estimation
    - o Predicting the Specific Probability Values
    - o Knowledge Discovery
- Parameter Learning
    - o Maximum Likelihood Estimation
    - o Maximum Likelihood Principle
    - o The Maximum Likelihood Estimate for Bayesian Networks
- Learning with Approximate Inference
- Structure learning
    - o Constraint-based Structure Learning
    - o Score-based Structure Learning
    - o The likelihood Score
    - o Bayesian Score
- Model Learning: Parameter Estimation in Bayesian Networks
- Model Learning: Parameter Estimation in Markov Networks

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Reinforcement Learning

Course Curriculum

About the Course

'Reinforcement Learning' is designed as an area of Machine Learning. You will learn the Bandit Algorithms, Dynamic Programming, and Temporal Difference (TD) methods. You will be introduced to Value function, Bellman equation, and Value iteration. You will also learn Policy Gradient methods and learn to make decisions in uncertain environment.

Curriculum

Module 1: Introduction to Reinforcement Learning
Goal:

The aim of this module is to introduce you to the fundamentals of Reinforcement Learning and its elements. To learn Decision Making, Monte Carlo Approach and Temporal Difference Learning.

Topics

- Branches of Machine Learning

  o Supervised Learning
  o Unsupervised Learning
  o Reinforcement Learning
- What is Reinforcement Learning?
- Reinforcement Learning - How does it differ from other machine learning paradigms
- Comparing RL with other ML techniques
- Elements of Reinforcement Learning
- The Reinforcement Learning Process
- Rewards
  o The central idea of the Reward Hypothesis
  o Reward Examples
- Agent and Environment
  o Fully Observable Environments
  o Partially Observable Environments

- o   RL Agent Components (Value-based, Policy-based, Model-based)
  - o   RL Agent Taxonomy
- Types of Tasks (Episodic and Continuous Tasks)
- Ways of Learning (Monte Carlo Approach and Temporal Difference Learning)
- Exploration and Exploitation Trade off
- Approaches to Decision Making in RL
- Most used Reinforcement Learning algorithm (Q-learning)
- Practical applications of Reinforcement Learning
- Challenges with implementing RL

Module 2: Markov Decision Processes and Bandit Algorithms

Goal:

The aim of this module is to Markov Decision Processes and Bandit Algorithms.

Topics

- Reinforcement Learning Problems
  - o   Formulating a basic Reinforcement Learning Problem
  - o   Framework for solving RL problem
- Markov Processes
- Markov Reward Processes
- Markov Decision Processes
- Bellman Equation
- Bandit Algorithms (UCB, PAC, Median Elimination, Policy Gradient)
- Contextual Bandits

Module 3: Dynamic Programming & Temporal Difference Methods

Goal:
The aim is to get an overview of the tools and techniques of Dynamic Programming and reset the state of the system to a particular state using temporal difference methods.
Topics
- Introduction to Dynamic Programming
- Policy valuation (Prediction)
- Policy Improvement
- Policy Iteration
- Value Iteration
- Generalized Policy Iteration
- Asynchronous Dynamic Programming
- Efficiency of Dynamic Programming
- Temporal Difference Prediction
- Why TD Prediction Methods
- On-Policy and Off-Policy Learning

- Q-learning
- Reinforcement Learning in Continuous Spaces
- SARSA

Module 4: Value Function, Bellman Equation, Value Iteration, and Policy Gradient Methods

Goal:

The aim of this module is to use function approximation methods to represent value functions. Learn Bellman Equation, Value Iteration, and Policy Gradient methods.

Topics
- Value Function
- Bellman Equations
- Optimal Value Functions
- Bellman Optimality Equation
- Optimality and Approximation
- Value Iteration
- Introduction to Policy-based Reinforcement Learning: Policy Gradient
- Monte Carlo Policy Gradients
- Generalized Advantage Estimation (GAE)
- Monte Carlo Prediction
- Monte Carlo Estimation of Action Values
- Monte Carlo Control
- Monte Carlo Control without Exploring Starts
- Incremental Implementation
- Policy optimization methods (Trust Region Policy Optimization (TRPO) and Proximal Policy Optimization (PPO))

Module 5: In-class Project

Goal:

The aim of this module is to provide you hands-on experience in Reinforcement Learning.

NLP with Python

Course Curriculum

About the Course

Edureka's 'Natural Language Processing with Python' course will take you through the essentials of text processing all the way up to classifying texts using Machine Learning algorithms. You will learn various concepts such as Tokenization, Stemming, Lemmatization, POS tagging, Named Entity Recognition, Syntax Tree Parsing and so on using Python's most famous NLTK package. Once you delve into NLP, you will learn to build your own text classifier using the Naïve Bayes algorithm.

Curriculum

Module 1: Introduction to Text Mining and NLP

Learning Objectives:

At the end of this Module, you should be able to gain an understanding of Text Mining & NLP, manipulate various file types, and use the NLTK library.

Topics:

- Overview of Text Mining
- Need of Text Mining
- Natural Language Processing (NLP) in Text Mining
- Applications of Text Mining
- OS Module
- Reading, Writing to text and word files
- Setting the NLTK Environment
- Accessing the NLTK Corpora

Hands On/Demo:
- Install NLTK Packages using NLTK Downloader
- Accessing your operating system using the OS Module in Python
- Reading & Writing .txt Files from/to your Local
- Reading & Writing .docx Files from/to your Local
- Working with the NLTK Corpora

Module 2: Extracting, Cleaning and Pre-processing Text

Learning Objectives:

At the end of this Module, you should be able to clean and preprocess text data, using sentence tokenization, clean and preprocess text data, using word tokenization**,** demonstrate the use of Bigrams, Trigrams and Ngrams**,** work on text data with Stemming, Lemmatization and Stop-Word removal**,** and describe your text data with POS tags and Named Entities

Topics:

- Tokenization
- Frequency Distribution
- Different Types of Tokenizers
- Bigrams, Trigrams & Ngrams
- Stemming
- Lemmatization
- Stopwords
- POS Tagging
- Named Entity Recognition

Hands On/Demo:

- Tokenization: Regex, Word, Blankline, Sentence Tokenizers
- Bigrams, Trigrams & Ngrams
- Stopword Removal
- POS Tagging
- Named Entity Recognition (NER)

Module 3: Analyzing Sentence Structure

Learning Objectives:

At the end of this Module, you should be able to analyze Syntax Trees**,** analyze sentence structures using Context Free Grammars (CFG's), and demonstrate sentence structures using Chunking and Chinking techniques.

Topics:

- Syntax Trees
- Chunking
- Chinking
- Context Free Grammars (CFG)
- Automating Text Paraphrasing

Hands On/Demo:

- Parsing Syntax Trees
- Chunking
- Chinking
- Automate Text Paraphrasing using CFG's

Module 4: Text Classification-I

Learning Objectives:

At the end of this Module, you should be able to recall the basic mechanism of Machine Learning, demonstrate the concept of Bag of Words, implement Count Vectorization technique, and use the concept of TF-IDF over the csr matrix.

Topics:

- Machine Learning: Brush Up
- Bag of Words
- Count Vectorizer
- Term Frequency (TF)
- Inverse Document Frequency (IDF)

Hands On/Demo:
- Demonstrate Bag of Words Approach
- Working with CountVectorizer()
- Using TF & IDF

Module 5: Text Classification-II

Learning Objectives:

At the end of this Module, you should be able to implement Vectorization technique over text data, derive Bag of Words Model, and use Naiive Bayes classifier to classify labelled text data

Topics:

- Converting text to features and labels
- Multinomial Naiive Bayes Classifier
- Leveraging Confusion Matrix

Hands On/Demo:
- Converting text to features and labels
- Demonstrate text classification using Multinomial NB Classifier
- Leveraging Confusion Matrix

Module 6*: In-Class Project

Learning Objectives:

At the end of this module, you should be able to implement all the text processing techniques starting with tokenization, express your end to end work on Text Mining, and implement Machine Learning along with Text Processing.

Hands On:

- Sentiment Analysis

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AI & Deep Learning with TensorFlow

Course Curriculum

About the Course

Edureka's Deep Learning in TensorFlow with Python Certification Training is curated by industry professionals as per the industry requirements & demands. You will master the concepts such as SoftMax function, Autoencoder Neural Networks, Restricted Boltzmann Machine (RBM) and work with libraries like Keras & TFLearn.

Curriculum

Module 1 – Introduction to Deep Learning

Learning Objectives:

At the end of this Module, you should be able to discuss the revolution of Artificial Intelligence, discuss the limitations of Machine Learning, list the advantages of Deep Learning over Machine Learning, discuss Real-life use cases of Deep Learning, understand the Scenarios Where Deep Learning is applicable, discuss Machine learning algorithms, define Reinforcement Learning, and discuss model parameters and optimization techniques.

Topics:

- Deep Learning: A revolution in Artificial Intelligence
- Limitations of Machine Learning
- What is Deep Learning?
- Advantage of Deep Learning over Machine learning
- 3 Reasons to go for Deep Learning
- Real-Life use cases of Deep Learning
- Review of Machine Learning: Regression, Classification, Clustering, Reinforcement Learning, Underfitting and Overfitting, Optimization

Hands-On:
- Implementing a Linear Regression model for predicting house prices from Boston dataset
- Implementing a Logistic Regression model for classifying Customers based on an Automobile purchase dataset

Module 2: Understanding Fundamentals of Neural Networks with TensorFlow

Learning Objectives:
At the end of this Module, you should be able to illustrate How Deep Learning works, how Neural Networks work, understand Various Components of a Neural Network, define TensorFlow, illustrate how TensorFlow works, discuss the Functionalities of TensorFlow, and implement a Single Layer Perceptron using TensorFlow.

Topics:
- How Deep Learning Works?
- Activation Functions
- Illustrate Perceptron
- Training a Perceptron
- Important Parameters of Perceptron
- What is TensorFlow?
- TensorFlow code-basics
- Graph Visualization
- Constants, Placeholders, Variables
- Creating a Model
- Step by Step - Use-Case Implementation

Hands-On:
Building a single perceptron for classification on SONAR dataset

Module 3: Deep dive into Neural Networks with TensorFlow

Learning Objectives:
At the end of this Module, you should be able to understand limitations of A Single Perceptron, illustrate Working of Multi-Layered Perceptron (MLP), understand MLP Training Phases, and implement a Multi-Layered Perceptron using TensorFlow.

Topics:
- Understand limitations of A Single Perceptron
- Understand Neural Networks in Detail
- Illustrate Multi-Layer Perceptron
- Backpropagation – Learning Algorithm
- Understand Backpropagation – Using Neural Network Example
- MLP Digit-Classifier using TensorFlow
- TensorBoard
- Summary

Hands-On:
- Building a multi-layered perceptron for classification of Hand-written digits

Master Deep Networks
Learning Objectives:
At the end of this Module, you should be able to illustrate Deep Neural Networks, understand How Deep Network works, concept of Backpropagation, variants of Gradient Descent, and categorize type of Deep Networks.

Topics:
- Why Deep Networks
- Why Deep Networks give better accuracy?
- Use-Case Implementation on SONAR dataset
- Understand How Deep Network Works?
- How Backpropagation Works?
- Illustrate Forward pass, Backward pass
- Different variants of Gradient Descent
- Types of Deep Networks

Hands-On:
- Building a multi-layered perceptron for classification on SONAR dataset

Module 5: Convolutional Neural Networks (CNN)
Learning Objectives:
At the end of this Module, you should be able to define CNNs, discuss the Applications of CNN, explain the Architecture of a CNN, list Convolution and Pooling Layers in CNN, illustrate CNN, and discuss Fine-tuning and Transfer Learning of CNNs.

Topics:
- Introduction to CNNs
- CNNs Application
- Architecture of a CNN
- Convolution and Pooling layers in a CNN
- Understanding and Visualizing a CNN
- Transfer Learning and Fine-tuning Convolutional Neural Networks

Hands-On:
- Building a convolutional neural network for image classification. The model should predict the difference between 10 categories of images.

Module 6: Recurrent Neural Networks (RNN)

Learning Objectives:

At the end of this Module, you should be able to define RNN, discuss the Applications of RNN, illustrate how RNN is trained, discuss Long Short-Term memory(LSTM), explain Recursive Neural Tensor Network theory, and Illustrate the working of Neural Network Model.

Topics:
- Intro to RNN Model
- Application use cases of RNN
- Modelling sequences
- Training RNNs with Backpropagation
- Long Short-Term memory (LSTM)
- Recursive Neural Tensor Network Theory
- Recurrent Neural Network Model

Hands-On:
- Building a recurrent neural network for SPAM prediction.

Module 7: Restricted Boltzmann Machine(RBM) and Autoencoders

Learning Objectives:

At the end of this Module, you should be able to define RBM, discuss the Applications of RBM, illustrate Collaborative Filtering using RBM, and define Autoencoders.

Topics:
- Restricted Boltzmann Machine
- Applications of RBM
- Collaborative Filtering with RBM
- Introduction to Autoencoders
- Autoencoders applications
- Understanding Autoencoders

Hands-On:
- Building a Autoencoder model for classification of handwritten images extracted from the MNIST Dataset.

Module 8: Keras

Learning Objectives:
At the end of this Module, you should be able to define Keras, understand Keras Model Building Blocks, illustrate Different Compositional Layers for a Keras Model, implement a Use-Case Step by Step, and understand few features available with Keras.

Topics:
- Define Keras
- How to compose Models in Keras
- Sequential Composition
- Functional Composition
- Predefined Neural Network Layers
- What is Batch Normalization
- Saving and Loading a model with Keras
- Customizing the Training Process
- Using TensorBoard with Keras
- Use-Case Implementation with Keras

Hands-On:
- Build a model using Keras to do sentiment analysis on twitter data reactions on GOP debate in Ohio.

Module 9 – TFLearn

Learning Objectives:
At the end of this Module, you should be able to define TFLearn, understand TFLearn Model Building Blocks, illustrate Different Compositional Layers for a TFLearn Model, implement a Use-Case Step by Step, and understand few features available with TFLearn.

Topics:
- Define TFLearn
- Composing Models in TFLearn
- Sequential Composition
- Functional Composition
- Predefined Neural Network Layers
- What is Batch Normalization
- Saving and Loading a model with TFLearn
- Customizing the Training Process
- Using TensorBoard with TFLearn
- Use-Case Implementation with TFLearn

Hands-On:
- Build a recurrent neural network using TFLearn to do image classification on hand-written digits.

Module 10: Hands-On Project

Learning Objectives:

At the end of this module, you should be able to:

- How to approach a project
- Hands-On project implementation
- What Industry expects
- Industry insights for the Machine Learning domain
- QA and Doubt Clearing Session

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Python Spark using PySpark

Course Curriculum

About the Course

Edureka's 'PySpark Certification Training' is designed to provide you the knowledge and skills that are required to become a successful Spark Developer using Python and prepare you for the Cloudera Hadoop and Spark Developer Certification Exam (CCA175). Throughout the PySpark Training, you will get an in-depth knowledge of Apache Spark and the Spark Ecosystem, which includes Spark RDD, Spark SQL, Spark MLlib and Spark Streaming. You will also get comprehensive knowledge of Python Programming language, HDFS, Sqoop, Flume, Spark GraphX and Messaging System such as Kafka.

Curriculum

Module 1 - Introduction to Big Data Hadoop and Spark

Learning Objectives –

In this module, you will understand Big Data, the limitations of the existing solutions for Big Data problem, how Hadoop solves the Big Data problem, Hadoop ecosystem components, Hadoop Architecture, HDFS, Rack Awareness and Replication. You will learn about the Hadoop Cluster Architecture, important configuration files in a Hadoop Cluster. You will also get an introduction to Spark, why it is used and understanding of the difference between batch processing and real time processing.

Topics:

- What is Big Data
- Big Data Customer Scenarios
- Limitations and Solutions of Existing Data Analytics Architecture with Uber Use Case
- How Hadoop Solves the Big Data Problem
- What is Hadoop
- Hadoop's Key Characteristics
- Hadoop Ecosystem and HDF
- Hadoop Core Component
- Rack Awareness and Block Replication
- YARN and Its Advantage

- Hadoop Cluster and Its Architecture
- Hadoop: Different Cluster Modes
- Big Data Analytics with Batch & Real-Time Processing
- Why Spark is Needed
- What is Spar
- How Spark Differs from Its Competitors
- Spark's Place in Hadoop Ecosystem

Module 2 - Introduction to Python for Apache Spark

Learning Objectives:

At the end of this Module, you should be able to define Python, explain Numbers, explain Strings, Tuples, Lists, Dictionaries, and Sets, understand Operands and Expressions, write your First Python Program, understand Command Line Parameters and Flow Control, and take input from the user and perform operations on it.

Topics:

- Overview of Python
- Different Applications where Python is Used
- Values, Types, Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the Screen
- Python files I/O Functions
- Numbers
- Strings and related operations
- Tuples and related operations
- Lists and related operations
- Dictionaries and related operations
- Sets and related operations

Hands On/Demo:
- Creating "Hello World" code
- Variables
- Demonstrating Conditional Statements
- Demonstrating Loops
- Tuple - properties, related operations, compared with list
- List - properties, related operations
- Dictionary - properties, related operations
- Set - properties, related operations

Module 3 - Functions, OOPs, Modules in Python

Learning Objectives:

At the end of this Module, you should be able to create and Execute Python Functions, learn Object Oriented Concepts in Python, understand Python Standard Libraries, define Modules in Python, and handle Errors and Exceptions

Topics:

- Functions
- Function Parameters
- Global Variables
- Variable Scope and Returning Values
- Lambda Functions
- Object Oriented Concepts
- Standard Libraries
- Modules Used in Python
- The Import Statements
- Module Search Path
- Package Installation Ways
- Errors and Exception Handling
- Handling Multiple Exceptions

Hands On/Demo:

- Functions - Syntax, Arguments, Keyword Arguments, Return Values
- Lambda - Features, Syntax, Options, Compared with the Functions
- Sorting - Sequences, Dictionaries, Limitations of Sorting
- Errors and Exceptions - Types of Issues, Remediation
- Packages and Module - Modules, Import Options, sys Path

Module 4 – Deep Dive into Apache Spark Framework

Learning Objectives –

In this module, you will understand Apache Spark in depth and you will be learning about various Spark components, you will be creating and running various spark applications. At the end you, will learn how to perform data ingestion using Sqoop.

Topics:

- Spark Components & It's Architecture
- Spark Deployment Modes
- Introduction to PySpark Shell
- Submitting PySpark Job

- Spark Web UI
- Writing your first PySpark Job Using Jupyter Notebook
- Data Ingestion using Sqoop

Hands On:

- Building and Running Spark Application
- Spark Application Web UI
- Understanding different Spark Properties

Module 5 - Playing with Spark RDDs

Learning Objectives –
In this module, you will learn about Spark - RDDs and other RDD related manipulations for implementing business logics (Transformations, Actions and Functions performed on RDD).
Topics:
- Challenges in Existing Computing Methods
- Probable Solution & How RDD Solves the Problem
- What is RDD, It's Operations, Transformations & Actions?
- Data Loading and Saving Through RDDs
- Key-Value Pair RDDs
- Other Pair RDDs, Two Pair RDDs
- RDD Lineage
- RDD Persistence
- WordCount Program Using RDD Concepts
- RDD Partitioning & How It Helps Achieve Parallelization
- Passing Functions to Spark

Hands On:
- Loading data in RDDs
- Saving data through RDDs
- RDD Transformations
- RDD Actions and Functions
- RDD Partitions
- WordCount through RDDs

Module 6 – DataFrames and Spark SQL

Learning Objectives:
In this module, you will learn about SparkSQL which is used to process structured data with SQL queries. You will learn about data-frames and datasets in Spark SQL along with different kind of SQL operations performed on the data-frames. You will also learn about the Spark and Hive integration.

Topics:
- Need for Spark SQL
- What is Spark SQL?
- Spark SQL Architecture
- SQL Context in Spark SQL
- Schema RDDs
- User Defined Functions
- Data Frames & Datasets
- Interoperating with RDDs
- JSON and Parquet File Formats
- Loading Data through Different Sources
- Spark – Hive Integration

Hands On:
- Spark SQL – Creating data frames
- Loading and transforming data through different sources
- Stock Market Analysis
- Spark - Hive Integration

Module 7 – Machine Learning using Spark MLlib

Learning Objectives:

In this module you will learn about why machine learning is needed, different Machine Learning techniques/algorithms and their implementation using Spark MLlib.

Topics:

- Why Machine Learning?
- What is Machine Learning?
- Where Machine Learning is Used?
- Face Detection: USE CASE
- Different Types of Machine Learning Techniques
- Introduction to MLlib
- Features of MLlib and MLlib Tools
- Various ML algorithms supported by MLlib

Module 8 – Deep Dive into Spark MLlib

Learning Objectives:

In this module you will be implementing various algorithms supported by MLlib such as Linear Regression, Decision Tree, Random Forest and many more.

Topics:
- Supervised Learning
    - o Linear Regression
    - o Logistic Regression
    - o Decision Tree
    - o Random Forest
- Unsupervised Learning
    - K-Means Clustering & How It Works with MLlib
- Analysis on US Election Data using MLlib (K-Means)

Hands On:
- Machine Learning MLlib
- K- Means Clustering
- Linear Regression
- Logistic Regression
- Decision Tree
- Random Forest

Module 9 - Understanding Apache Kafka and Apache Flume

Learning Objectives –

In this module, you will understand Kafka and Kafka Architecture. Afterwards you will go through the details of Kafka Cluster and you will also learn how to configure different types of Kafka Cluster. At last you will see how messages are produced and consumed using Kafka API's in Java. You will also get an introduction to Apache Flume, its basic architecture and how it is integrated with Apache Kafka for event processing. You will learn how to ingest streaming data using flume.

Topics:
- Need for Kafka
- What is Kafka?
- Core Concepts of Kafka
- Kafka Architecture
- Where is Kafka Used?
- Understanding the Components of Kafka Cluster
- Configuring Kafka Cluster
- Kafka Producer and Consumer Java API
- Need of Apache Flume
- What is Apache Flume?
- Basic Flume Architecture
- Flume Sources
- Flume Sinks

- Flume Channels
- Flume Configuration
- Integrating Apache Flume and Apache Kafka

Hands On:
- Configuring Single Node Single Broker Cluster
- Configuring Single Node Multi Broker Cluster
- Producing and consuming messages through Kafka Java API
- Flume Commands
- Setting up Flume Agent
- Streaming Twitter Data into HDFS

Module 10 - Apache Spark Streaming - Processing Multiple Batches

Learning Objectives:

In this module, you will work on Spark streaming which is used to build scalable fault-tolerant streaming applications. You will learn about DStreams and various Transformations performed on the streaming data. You will get to know about commonly used streaming operators such as Sliding Window Operators and Stateful Operators.

Topics:

- Drawbacks in Existing Computing Methods
- Why Streaming is Necessary?
- What is Spark Streaming?
- Spark Streaming Features
- Spark Streaming Workflow
- How Uber Uses Streaming DataStreaming Context & DStreams
- Transformations on DStreams
- Describe Windowed Operators and Why it is Useful
- Important Windowed Operators
- Slice, Window and ReduceByWindow Operators
- Stateful Operators

Module 11 - Apache Spark Streaming – Data Sources

Learning Objectives:

In this module, you will learn about the different streaming data sources such as Kafka and flume. At the end of the module, you will be able to create a spark streaming application.

Topics:

- Apache Spark Streaming: Data Sources
- Streaming Data Source Overview
- Apache Flume and Apache Kafka Data Sources
- Example: Using a Kafka Direct Data Source
- Perform Twitter Sentimental Analysis Using Spark Streaming

Module 12: Implementing an End-to-End Project

Learning Objectives:

In this module, you will be learning how to use different concepts of Spark to build a project.

Module 13: Spark GraphX (Self-Paced)

Learning Objective:

In this module, you will be learning the key concepts of Spark GraphX programming concepts and operations along with different GraphX algorithms and their implementations.

Topics:

- Introduction to Spark GraphX
- Information about a Graph
- GraphX Basic APIs and Operations
- Spark GraphX Algorithm
  - PageRank
  - Personalized PageRank
  - Triangle Count
  - Shortest Paths
  - Connected Components
  - Strongly Connected Components
  - Label Propagation
- Examples:
  - The Traveling Salesman problem
  - Minimum Spanning Trees