DATA SCIENCE COURSE CURRICULUM

INTRODUCTION TO DATA SCIENCE

The Data Science Overview, Data Science – Why all the excitement? Demand for Data Science Professionals, Brief Introduction to Big data and Data Analytics, Life cycle of data science, what do Data scientist Do. Tools and Technologies used in data Science.

STATISTICS

Mean, Median, Mode, Variance, Standard deviation, Probability, Permutations, Combinations, Bayes theorem, Null Hypothesis, Quartile, Interquartile, Measure of central tendency, correlation, causality, Sample, Population, Covariance, Pearson correlation, Random variables, Hypothesis, Types of Hypothesis, Significance value, Types of tests based on features of random variables, Chi square tests, and ANOVA.

PYTHON FOR DATA SCIENCE AND MACHINE LEARNING

PYTHON PROGRAMMING BASICS – Installing Jupyter Notebooks, Python Overview, Python 3 Overview, Python Identifiers, Various Operators and Operators Precedence, Getting input from User, Comments and Multiline Comments.

MAKING DECISIONS AND LOOP CONTROL – Simple if Statement, if-else Statement, if-else-if Statement, Introduction to while Loops, Introduction to For Loops, Using continue and break.

DATA TYPES: LIST, TUPLES, AND DICTIONARIES – Python Lists, Tuples, Dictionaries, Accessing Values, Basic Operations, Indexing, Slicing, and Matrices, Built-in Functions & Methods, Exercises on List, Tuples and Dictionary.

FUNCTIONS AND MODULES – Functions, Why Defining Functions? Calling Functions with Multiple Arguments, Anonymous Functions – Lambda Using Built-In Modules, User-Defined Modules, Decorators Iterators, and Generators.

FILE I/O AND EXCEPTIONAL HANDLING – Opening and Closing Files, Open Function, File Object Attributes, Close Method, Read, Write. Exception Handling, the try-finally Clause, Raising an Exceptions, User-Defined Exceptions Regular Expression- Search and Replace, Regular Expression Modifiers, Regular Expression Patterns, and Re module.

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NUMPY – Array Creation, Printing Arrays, Basic Operations- Indexing, Slicing, and Iterating Shape Manipulation – Changing shape, stacking, and splitting of array Vector stacking.

PANDAS – Importing data into Python, Pandas Data Frames, Indexing Data Frames, Basic Operations with Data frame, Renaming Columns, Subletting and Filtering a data frame.

MATPLOTLIB – Plot, Controlling Line Properties, Working with Multiple Figures and Histograms.

MySQL FOR DATA SCIENCE

Introduction to SQL, Retrieving Data, Updating Data, Inserting Data, Deleting Data, Sorting and Filtering Data, Create connection to the database using python, Creating a database, Check if database exists, Creating a table, Check if table exists and Select records from the table with python.

MS EXCEL FOR DATA SCIENCE

Advanced Formulae (Eg: INDEX-MATCH, SUMPRODUCT), Pivot Tables and Pivot Charts, Power Query for Data Transformation, Power Pivot and Data Models, Advanced Data Visualization (Eg: Sparklines, Conditional Formatting), Dynamic Named Ranges, Advanced Data Validation, VBA and Macros for Automation, Solver and What-if Analysis, Statistical Analysis Tools (Eg: Regression Analysis, ANOVA).

POWER BI FOR DATA SCIENCE

Data Modeling and Relationships, DAX (Data Analysis Expressions) for Advanced Calculations, Custom Visuals and Visualizations, Power Query for Data Transformation and Shaping, Data Aggregation and Summarization, Time Intelligence Functions, Advanced Filters and Slicers, Row-Level Security, Performance Optimization Techniques, Integration with other Data Sources (Eg: SQL and Azure).

TABLEAU FOR DATA SCIENCE

Install Tableau, Tableau to Analyze Data, Connect Tableau to a variety of datasets, Analyze, Blend, Join and Calculate Data, Tableau to Visualize Data, Visualize Data In the form of Various Charts, Plots, and Maps, Data Hierarchies, Work with Data Blending in Tableau, Work with Parameters, Create Calculated Fields, Adding Filters and Quick Filters, Create Interactive Dashboards, and Adding Actions to Dashboards

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EXPLORATORY DATA ANALYSIS

Collecting data from different sources, Analyzing data, Data preprocessing, Data munging, Data mining, Data manipulation, Data visualization, Feature Selection, Feature Scaling, and Dimensionality reduction.

TIME SERIES

Forecasting – Predicting the future, Classification – Categorize a series, Segmentation – Breaking a series into periods of distinct characteristics, Anomaly Detection – Identifying unexpected observations, Signal Processing – Extracting signal from noise, Geospatial-Temporal Analysis – Analyzing time series with a location component

MACHINE LEARNING

INTRODUCTION TO MACHINE LEARNING – Machine Learning? What is the Challenge? Supervised Learning and Unsupervised Learning

SUPERVISED LEARNING

LINEAR REGRESSION – Linear Regression with Multiple Variables, Disadvantage of Linear Models, Interpretation of Model Outputs, Understanding Covariance and Co linearity, Case study on Application of Linear Regression for housing price prediction.

LOGISTIC REGRESSION – Why Logistic Regression, Classification Cost function for logistic regression, Application of logistic regression to multi-class classification, Confusion Matrix, Odd's Ratio, and ROC Curve, Advantages and Disadvantages of Logistic Regression, Case study on to classify an email as spam or not spam using logistic Regression.

DECISION TREES – Decision Tree, data set, how to build decision tree? Understanding Kart Model, Classification Rules- Overfitting Problem, Stopping Criteria and Pruning, How to find the final size of Trees? Model a decision Tree.

RANDOM FOREST– Random Forest, data set, how to build Random Forest? Ensemble Techniques – Boosting, Bagging, Gradient Boost, XG Boost, Classification Rules, Regression Rules.

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SUPPORT VECTOR MACHINE – Support Vector Machine, data set, how to build Support Vector Machine? Support Vectors, Marginal Planes, and Distance, Parameter Tuning, Classification Rules, Regression Rules.

K NEAREST NEIGHBOURS – K Nearest Neighbors, data set, how to build K Nearest Neighbors? Data Set, Nearest Neighbors, Distance Between Two Points, Euclidian Distance and Manhattan Distance Methods, Choosing the Best K Value Classification Rules, Regression Rules.

NAÏVE BAYES – Naïve Bayes, data set, how to build Naïve Bayes? Data Set, Types of Events, Conditional Probability, Bayes Theorem Classification Rules. Practical Example of Bayes Theorem.

UNSUPERVISED LEARNING

Hierarchical Clustering, k-Means algorithm, Principal Component Analysis (PCA), Apriori Algorith and DBSCAN Clustering.

DEEP LEARNING

Neural Network, Understanding Neural Network Model, ANN, CNN, RNN, Understanding Tuning of Neural Network, Case study using Neural Network.

NATURAL LANGUAGE PROCESSING (NLP)

Intro to Natural Language Processing (NLP), Speech to Text and Text to Speech Conversion using NLP

2 INDUSTRY PROJECTS

Define Problem Statement, Gather requirements from various sources, Data Pre-Processing, Choosing the right ML algorithm by considering it's accuracy and Note the best-performed algorithms.

NOTE:

1. ONLY 10 CANDIDATES PER BATCH ARE ALLOWED.
2. SEATS ARE ALLOCATED ON A FIRST-COME FIRST SERVE BASIS.
3. VIDEO RECORDINGS WILL BE SHARED WITH THE STUDENTS FOR FREE OF COST.
4. CANDIDATES SHOULD COMPLETE WEEKLY ASSIGNMENTS AND ATTEND MONTHLY MOCK INTERVIEWS TO RECEIVE CERTIFICATES.

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