Data Visualization Course Syllabus

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1. Excel

Lecture 1: Data Management, Table Formatting, and Basic Excel Functions

- Entering Data into Worksheets
- Freezing Panes, Rows, and Columns
- Handling Data, Rows, and Columns
- Using the Find and Replace Feature
- Sorting Data: Simple and Custom Options
- Table Setup and Filtering Data
- Hiding and Organizing Columns and Rows
- Adjusting and Formatting Text and Cells
- Introduction to Number Formatting

Lecture 2: Basic Excel Calculations

- Working with Percentages and Absolute References
- Some Basic Functions Pre-Defined in Excel
- Using the AutoSum Tool
- Calculating Dates and Times

Lecture 3: Introduction to Data Visualization and Excel Charting

Basic Charts:

- Bar and Column Charts
- Line Charts and Trendlines
- Histograms and Pareto Charts

Advanced and Specialized Charts:

- Bubble Charts

- Box-and-Whisker Charts
- Waterfall Charts
- Funnel Charts
- Stock Charts

Hierarchical and Multi-Dimensional Charts:

- Tree Maps and Sunburst Charts
- Radar Charts
- Surface and Contour Charts

Heat and Geographic Visualizations

- Heat Maps
- Geospatial and Choropleth Maps

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2. Python

Lecture 1: Introduction to Python Concepts I

- Understanding Data Types: Numbers, Strings, and Booleans
- Using Lists, Dictionaries, Tuples, and Sets
- Comparison Operators and Conditional Statements (if, elif, else)
- Mastering Loops: for and while loops

Lecture 2: Introduction to Python Concepts II

- Using the range() Function
- List Comprehension Techniques
- Defining and Using Functions

- Lambda Expressions
- Using map and filter Functions
- Understanding Python Methods

Lecture 3: Numpy Basics

- Introduction to the Numpy Library
- Working with Numpy Arrays
- Indexing in Numpy Arrays
- Performing Operations with Numpy Arrays

Lecture 4: Introduction to Pandas

- Overview of the Pandas Library
- Understanding Pandas Series
- Working with DataFrames
- Handling Missing Data
- Using GroupBy for Aggregation
- Merging, Joining, and Concatenating DataFrames
- Performing Operations on DataFrames
- Data Input and Output Techniques

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3. Data Visualization with Python

Lecture 1: Introduction to Matplotlib

- Overview of the Matplotlib Library
- Basic Plotting Techniques with Matplotlib

Lecture 2: Matplotlib (Part 1)

- Creating Basic Plots: Line and Scatter Plots
- Customizing Charts in Matplotlib
- Adding Titles, Labels, and Legends
- Customizing Chart Elements (Colors, Styles, Markers)

Lecture 4: Matplotlib (Part 2)

- Advanced Plotting Techniques with Matplotlib

- Working with Subplots and Layouts

Lecture 5: Introduction to Seaborn

- Introduction to Seaborn for Statistical Plots
- Creating Basic Visualizations with Seaborn

Lecture 6: Distribution Plots

- Visualizing Data Distributions Using Seaborn
- Creating Histograms and Kernel Density Estimates

Lecture 7: Categorical Plots

- Creating Box Plots, Violin Plots, and Bar Plots with Seaborn

Lecture 8: Matrix Plots and Grids

- Generating Heatmaps and Correlation Plots
- Visualizing Data in Matrix Form
- Utilizing Seaborn’s Grids for Complex Plotting

Lecture 9: Regression Plots

- Creating and Customizing Regression Visualizations
- Customizing Visual Styles and Color Schemes in Seaborn

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4. Advanced Data Visualization with Pandas and Plotly

Lecture 1: Built-in Pandas Data Visualization

- Visualizing Data Directly from Pandas DataFrames
- Exploring Pandas' Built-in Plotting Capabilities
- Practical Exercise: Data Visualization using Pandas
- Walkthrough of the Pandas Visualization Exercise Solutions

Lecture 2: Introduction to Plotly and Cufflinks

- Getting Started with Plotly and Cufflinks for Interactive Visualizations
- Creating Interactive Plots and Charts with Plotly and Cufflinks

Lecture 3: Introduction to Geospatial Plotting

- Introduction to Geospatial Data and Mapping
- Building Choropleth Maps for the United States with Plotly
- Creating Global Choropleth Maps with Plotly

An optional lecture covering the basics of Tabular will also be provided in this course.