Python Programming and Logic Building Roadmap

Basics:

1) **Variables**
2) **Print function**
3) **Input from the user**
4) **Data Types**
    - Numbers
    - Strings
    - Lists
    - Dictionaries
    - Tuples
    - Sets
    - Other Types

Operators

- Arithmetic Operators
- Relational Operators
- Bitwise Operators
- Logical Operators

- Type Conversion

Control Statements

If Else

- If
- Else
- Else If
- If Else Ternary Expression

While Loop

- Nested While Loops
- Break
- Continue
- Pass
- Loop Else

LIST:

- List Basics
- List Operations
- List Comprehensions
- List Methods

Strings:

String Basics

- String Literals
- String Operations
- String Comprehensions
- String Methods
- For Loops

Functions:

- Nested For Loops
- Break
- Continue

- Pass
- Loop else
- Function Definitions
- Function Call
- Function Arguments
- Default Arguments
- Docstrings
- Scope
- Special Functions: Lambda, Map, and Filter
- Recursion
- Functional Programming and Reference Functions

Dictionaries:

- Dictionaries Basics
- Operations
- Comprehensions
- Dictionaries Methods

Tuples:

- Tuples Basics
- Tuples Comprehensions
- Tuple Methods

Sets:

- Sets Basics
- Set Operation
- Union
- Intersection
- Difference and Symmetric Difference

File Handling:

- File Basics
- Opening Files
- Reading Files
- Writing Files

- Editing Files
- Working with different extensions of files
- With Statements

Exception Handling:

- Common Exceptions
- Exception Handling
- Try
- Except
- Try except else
- Finally
- Raising exceptions
- Assertion

Object-Oriented Programming:

- Classes
- Objects
- Method Calls
- Inheritance and Its Types
- Overloading
- Overriding
- Data Hiding
- Operator Overloading

Regular Expression:

- Basic RE functions
- Patterns
- Meta Characters
- Character Classes

Modules & Packages:

- Different types of modules
- Create your module
- Building Packages
- Build your own Python module and deploy it on pip

- Magic Methods
- Dunders
- Operator Methods

Pandas NumPy Matplotlib

NumPy

- Understanding NumPy
- Basic working
- Working with dimensions and matrix
- Basic Operations with Arrays
- NumPy and Data Manipulation

Pandas

Introduction to Pandas

- What is Pandas?
- Key features and advantages of Pandas
- Installing Pandas
- Pandas Series
- Creating Pandas Series
- Accessing elements and slicing
- Working with labels and indexes
- Operations on Series
- Pandas DataFrames
- Creating DataFrames from different data sources

- Basic DataFrame attributes: shape, size, info
- Accessing rows and columns
- Selecting subsets of data with indexing and filtering
- Loading and Saving Data
- Reading data from CSV, Excel, and other formats
- Writing data to files
- Handling different file formats

1. Data Cleaning and Preprocessing

- Handling missing data with NaN
- Removing duplicates
- Data normalization and scaling
- Handling outliers

2. Data Transformation with Pandas

- Applying functions to columns and rows
- Creating new columns based on existing data
- Combining and merging DataFrames
- Pivot tables and reshape data
- Grouping and Aggregation
- Split-Apply-Combine strategy
- Grouping data with group by()
- Applying aggregation functions
- Multi-level grouping and hierarchical indexing

3. Data Visualization with Pandas

- Plotting with Pandas
- Line plots, bar plots, scatter plots, and more
- Customizing plots
- Creating subplots
- Time Series Data Analysis
- Working with date and time data
- Resampling time series data
- Time-based indexing and slicing
- Plotting time series data
- Handling Categorical Data

- Introduction to categorical data
- Converting data to categorical type
- Working with categorical data
- One-hot encoding
- Handling Text Data with Pandas
- String methods in Pandas
- Text data manipulation and cleaning
- Extracting information from text data
- Regular expressions in Pandas

4. Merging and Joining DataFrames

- Concatenating DataFrames
- Merging DataFrames on columns and indexes
- Handling different types of joins

Matplotlib

- Introduction to Matplotlib
- What is Matplotlib?
- Key features and advantages of Matplotlib
- Installing Matplotlib
- Getting started with basic plots
- Line Plots
- Creating simple line plots
- Customizing line styles, colors, and markers
- Adding labels, titles, and legends

- Working with multiple lines in one plot
- Bar Plots
- Creating bar charts and barh (horizontal) charts
- Grouped and stacked bar plots
- Customizing bar properties
- Adding error bars to bar plots
- Histograms
- Understanding histograms and their use cases
- Plotting histograms with different bin sizes
- Customizing histogram appearance
- Plotting multiple histograms in one figure
- Scatter Plots
- Creating scatter plots for visualizing relationships between variables
- Adding colors and sizes to scatter points
- Incorporating labels and annotations
- Creating bubble plots
- Pie Charts and Donut Charts
- Creating pie charts and donut charts
- Exploding sections for emphasis
- Customizing pie chart appearance
- Combining pie charts with other plot types
- Area Plots and Stacked Area Plots
- Plotting area plots for visualizing data over time
- Creating stacked area plots to show cumulative data
- Handling missing data in area plots
- Adding transparency for overlapping areas
- Box Plots and Violin Plots
- Creating box plots for visualizing data distributions
- Customizing box plot appearance
- Creating violin plots for a more informative view
- Combining box and violin plots in one figure
- Heatmaps
- Creating heatmaps to display 2D data with colors
- Customizing heatmap appearance
- Using annotations to show additional information
- Correlation matrices with heatmaps

Power BI

Introduction to Power BI

- What is Power BI?
- Key features and benefits of Power BI
- Installing and setting up Power BI

Connecting to Data Sources

- Importing data from various sources (Excel, CSV, databases, etc.)
- Data transformation and cleaning in Power Query Editor
- Creating a data model

Creating Visualizations

- Understanding different visualization types in Power BI
- Creating bar charts, line charts, pie charts, and more
- Customizing visual appearance, labels, and colors

Interactive Features in Power BI

- Using slicers to filter data
- Creating drill-down and drill-up experiences
- Adding bookmarks for interactive storytelling

Maps and Geographic Visualizations

- Plotting data on maps in Power BI
- Using geospatial data and custom map visualizations
- Implementing heat maps and choropleth maps
- Combining Multiple Visualizations
- Building dashboards with multiple visualizations
- Arranging visuals and creating a user-friendly layout
- Adding text boxes, images, and shapes to dashboards

Creating Advanced Visualizations

- Using custom visuals from the Power BI marketplace
- Building waterfall charts, tree maps, and funnel charts

- Implementing gauges and KPI visualizations

Time Series Data Analysis

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Tableau

1.Introduction to Tableau

- What is Tableau?
- Key features and benefits of Tableau
- Installing and setting up Tableau

2.Connecting to Data Sources

- Importing data from various sources (Excel, CSV, databases, etc.)
- Data preparation and cleaning in Tableau Prep
- Creating data connections and joins

3. Basic Visualizations in Tableau

- Understanding different visualization types in Tableau
- Creating bar charts, line charts, pie charts, and more
- Customizing visual appearance and formatting

4. Interactive Features in Tableau

- Using filters and quick filters to interact with data
- Creating hierarchies and drill-downs for exploration
- Implementing actions for interactive dashboards

5. Maps and Geographic Visualizations

- Plotting data on maps in Tableau
- Using geospatial data and custom map visualizations
- Implementing heat maps and symbol maps

6. Combining Multiple Visualizations

- Building dashboards with multiple visualizations
- Arranging visuals and creating a user-friendly layout
- Adding text boxes, images, and web pages to dashboards

7. Creating Advanced Visualizations

- Using calculated fields and table calculations
- Building tree maps, bubble charts, and packed bubbles
- Implementing box plots and reference lines

8. Dashboard Design and Storytelling

- Design principles for effective data visualizations
- Building interactive dashboards with actions and filters
- Creating a compelling data story with annotations and narratives

9. Tableau Prep for Data Cleaning and Transformation

- Introduction to Tableau Prep Builder
- Data profiling and cleaning techniques
- Joining and reshaping data in Tableau Prep

MySQL

1.Introduction to MySQL

1. What is MySQL?
2. Key features and benefits of MySQL
3. Installing and setting up MySQL

2. Creating Databases and Tables

- Creating databases in MySQL
- Defining tables with various data types

- Setting primary keys and auto-incrementing fields

3.Basic SQL Queries

- SELECT statement for retrieving data
- INSERT statement for adding data to tables
- UPDATE statement for modifying existing data
- DELETE statement for removing data from tables

4.Filtering Data with WHERE Clause

- Using WHERE clause to filter rows based on conditions
- Combining multiple conditions with logical operators
- NULL and NOT NULL checks in queries

5.Sorting and Limiting Results

- ORDER BY clause for sorting query results
- LIMIT clause for restricting the number of rows returned
- Using OFFSET for pagination

6. Aggregate Functions and Grouping

- Using aggregate functions: SUM, AVG, MIN, MAX, COUNT
- GROUP BY clause for grouping data
- HAVING clause for filtering grouped data

7. Joins and Subqueries

- INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN
- Subqueries for performing nested queries
- Correlated subqueries and their usage

8. Indexes and Performance Optimization

- Understanding indexes and their importance
- Creating and managing indexes
- EXPLAIN command for query analysis

9. Data Modification Statements

- INSERT, UPDATE, and DELETE statements with JOINs

- Transaction management: COMMIT and ROLLBACK

10. Working with Date and Time Data

- Storing and retrieving date and time data
- Date functions for date manipulation
- Handling time zones in MySQL

11. Data Import and Export

- Importing data from CSV and other file formats
- Exporting data to CSV and other formats
- Using mysqldump for database backup

12. Views, Stored Procedures, and Functions

- Creating views for simplified data access
- Writing and executing stored procedures
- User-defined functions for custom data processing

13. Data Analysis with GROUP_CONCAT and GROUP_CONCAT_WS

- Concatenating strings in grouped data
- Using GROUP_CONCAT to merge rows into a single string
- Customizing separator with GROUP_CONCAT_WS

14. Conditional Data Aggregation with CASE

- Conditional aggregation using CASE statements
- Using CASE for customizing results based on conditions

15. Window Functions and Analytic Queries

- Understanding window functions in MySQL
- ROW_NUMBER, RANK, DENSE_RANK, and NTILE functions
- Aggregating data with window functions

16. Working with Multiple Tables

- Joining multiple tables in complex queries

- Handling multiple table relationships
- Using subqueries with multi-table queries

17. Data Analysis with Common Table Expressions (CTEs)

- Creating recursive and non-recursive CTEs
- Using CTEs for hierarchical data and data transformation

18. Data Analysis with Temporary Tables

- Creating temporary tables for data manipulation
- Utilizing temporary tables in complex queries

Web Scraping Roadmap

1.Introduction to Web Scraping

- What is web scraping?
- Understanding the need for web scraping
- Basic tools for web scraping

2. HTML Basics

- Overview of HTML structure
- Understanding HTML tags and elements

3.Introduction to Beautiful Soup

- Introduction to the Beautiful Soup library
- Parsing HTML with Beautiful Soup

4.Scraping Text Data

- Extracting text data from web pages

- Cleaning and processing scraped text

5.Scraping Links and URLs

- Collecting links from web pages
- Extracting URLs for further scraping

6.Handling Dynamic Websites

- Introduction to dynamic websites
- Basic techniques for handling dynamic content

7.Scraping Tables

- Extracting data from HTML tables
- Handling table data in Python

8.Web Scraping with Requests

- Using the Requests library for web scraping
- Fetching HTML content from web pages

9. Web Scraping Practice

- Step-by-step web scraping project
- Scraping data from a real website

10. Data Cleaning and Export

- Cleaning and preprocessing scraped data
- Exporting scraped data to CSV or Excel

This comprehensive roadmap covers a wide range of topics in Python programming, data analysis, web scraping, and data visualization. It's designed to guide you through essential concepts and skills to become proficient in Python and related technologies. Happy learning!