

Numerical Analysis of Health Indicators with Pandas

1. Data Loading and Inspection

Task: Load the CSV data into a pandas DataFrame and inspect the structure.

Explanation: Use `pd.read_csv()` to load data. Utilize `.info()` and `.describe()` to understand column types and summarize statistics.

Key Functions: `pd.read_csv()`, `.info()`, `.head()`, `.describe()`

2. Handling Missing Values

Task: Identify missing values and fill them appropriately.

Explanation: Use `.isnull()` and `.sum()` to detect missing values. Fill missing numeric values with the mean using `.fillna()`.

Key Functions: `.isnull()`, `.sum()`, `.fillna()`

3. Descriptive Statistics for Life Expectancy by Country

Task: Calculate the mean, standard deviation, minimum, and maximum for life expectancy values by country.

Explanation: Use `groupby()` to group data by country, and apply aggregate functions like `mean()`, `std()`, `min()`, and `max()`.

Key Functions: `.groupby()`, `.agg()`

4. Life Expectancy Comparison by Gender

Task: Calculate the average life expectancy for each gender across all countries.

Explanation: Filter data by gender column and apply `.mean()` to the life expectancy column.

Key Functions: `.loc[]`, `.mean()`

5. Correlation Analysis of Life Expectancy Range

Task: Calculate the correlation between low and high life expectancy ranges.

Explanation: Use `.corr()` to compute Pearson correlation between two columns.

Key Functions: `.corr()`

6. Regional Analysis of Life Expectancy

Task: Group countries by region and calculate the average life expectancy for each region.

Explanation: Use `.groupby()` to group data by region and calculate mean life expectancy.

Key Functions: `.groupby()`, `.mean()`

7. Identifying Highest and Lowest Life Expectancy

Task: Identify countries with the highest and lowest life expectancy for 'Male' and 'Both sexes.'

Explanation: Use `.idxmax()` and `.idxmin()` to locate the rows with maximum and minimum values.

Key Functions: `.idxmax()`, `.idxmin()`

8. Outlier Detection in Life Expectancy

Task: Identify outliers in life expectancy using the Interquartile Range (IQR) method.

Explanation: Compute Q1 and Q3 with `.quantile()`, calculate IQR, and filter outliers.

Key Functions: `.quantile()`, boolean indexing

9. Comparing Life Expectancy Against a Threshold

Task: Calculate the proportion of countries with life expectancy above a threshold (e.g., 50 years).

Explanation: Use boolean indexing to filter rows and `.count()` to determine proportions.

Key Functions: Boolean indexing, `.count()`

10. Trend Over Time (If Period Data Exists)

Task: Calculate life expectancy changes over time for each country.

Explanation: Use `.diff()` to compute changes across time periods, highlighting trends.

Key Functions: `.diff()`