Data Visualization using Python (Matplotlib, Pandas, NumPy)

Data visualization is the graphical representation of information and data using visual elements such as charts, graphs, and plots. It enables analysts and decision-makers to understand complex datasets more easily by identifying patterns, trends, and outliers.

In this assignment, we utilize Python-based tools such as Matplotlib, Pandas, and NumPy to perform various visualizations. These tools allow for efficient data handling, numerical operations, and high-quality plotting.

Objective: To visualize different aspects of data through various chart types like line plots, bar charts, histograms, pie charts, and box plots for better understanding and interpretation.

Environment Setup:

Language: Python

Libraries: matplotlib, pandas, numpy

IDE Used: VS Code

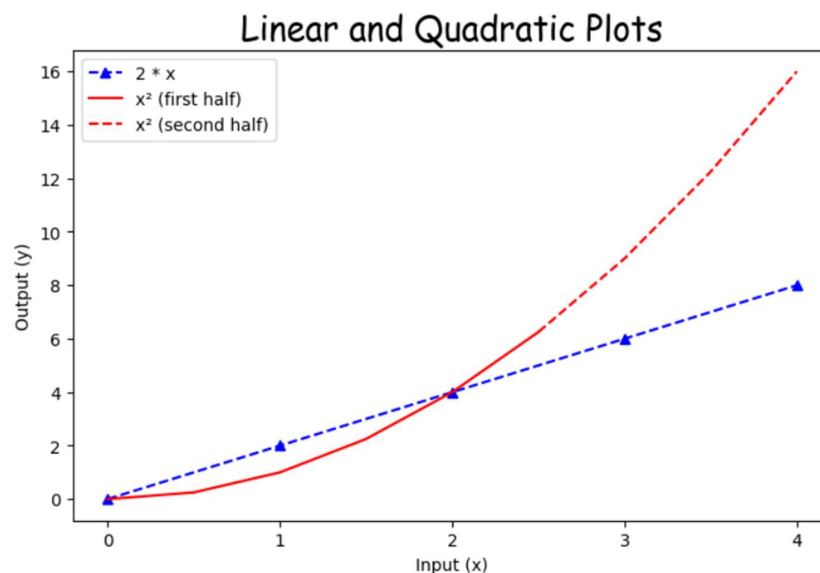Dataset: fifa_data.csv, gas_prices.csv

Import Required Libraries

```
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
```
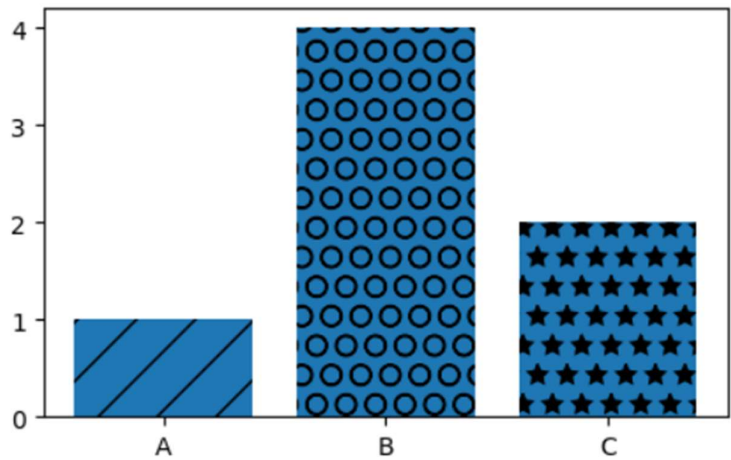
1. Line Plot - Mathematical Functions

Compare a linear and a quadratic function.

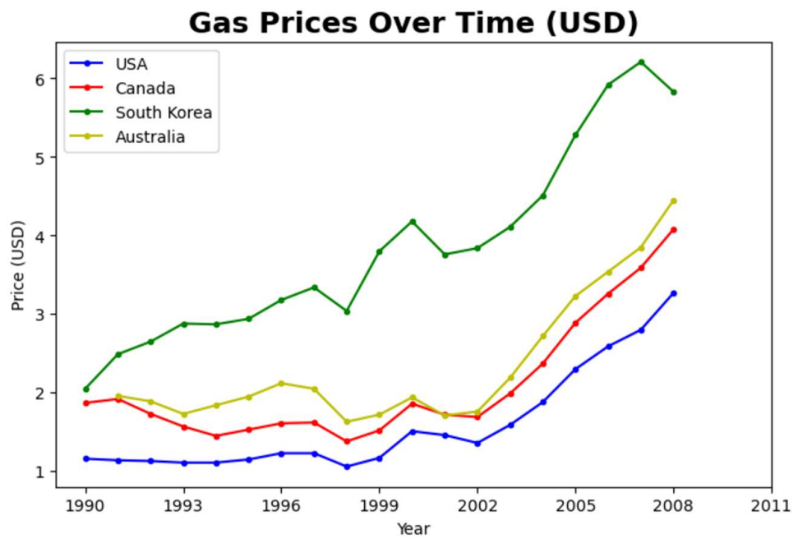## 2. Bar Chart with Hatch Patterns

Compare categories visually.

3. Load Gas Prices Data

	Year	Australia	Canada	France	Germany	Italy	Japan	Mexico	South Korea	UK	USA
0	1990	NaN	1.87	3.63	2.65	4.59	3.16	1.00	2.05	2.82	1.16
1	1991	1.96	1.92	3.45	2.90	4.50	3.46	1.30	2.49	3.01	1.14
2	1992	1.89	1.73	3.56	3.27	4.53	3.58	1.50	2.65	3.06	1.13
3	1993	1.73	1.57	3.41	3.07	3.68	4.16	1.56	2.88	2.84	1.11
4	1994	1.84	1.45	3.59	3.52	3.70	4.36	1.48	2.87	2.99	1.11

4. Time Series Plot - Gas Prices

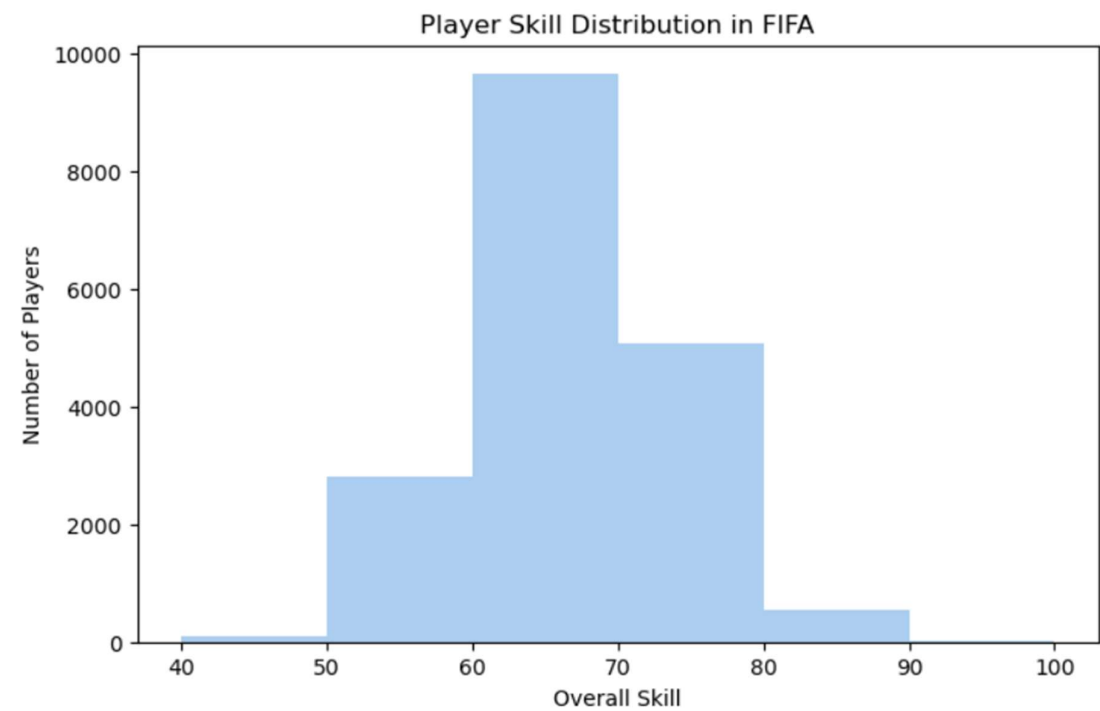Track gas price trends in multiple countries over time.

5. LOAD FIFA DATA

	Unnamed: 0	ID	Name	Age	Photo	Nationality	
0	0	158023	L. Messi	31	https://cdn.sofifa.org/players/4/19/158023.png	Argentina	https://cdn.sofifa.org/flags/
1	1	20801	Cristiano Ronaldo	33	https://cdn.sofifa.org/players/4/19/20801.png	Portugal	https://cdn.sofifa.org/flags/
2	2	190871	Neymar Jr	26	https://cdn.sofifa.org/players/4/19/190871.png	Brazil	https://cdn.sofifa.org/flags/
3	3	193080	De Gea	27	https://cdn.sofifa.org/players/4/19/193080.png	Spain	https://cdn.sofifa.org/flags/
4	4	192985	K. De Bruyne	27	https://cdn.sofifa.org/players/4/19/192985.png	Belgium	https://cdn.sofifa.org/flags

5 rows × 89 columns
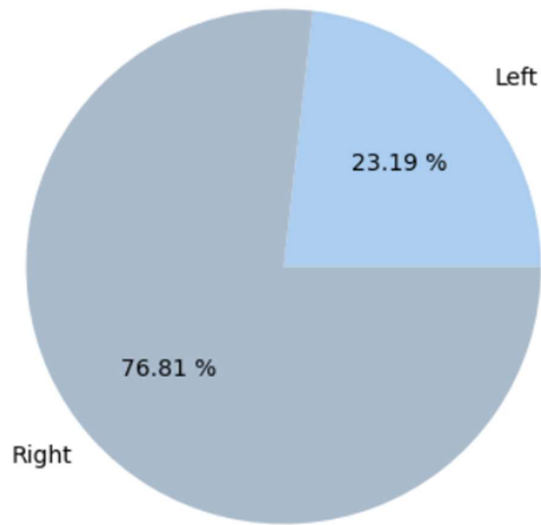
6. Histogram - FIFA Skill Distribution

Visualize frequency distribution of skill levels.

7. Pie Chart - Foot Preference
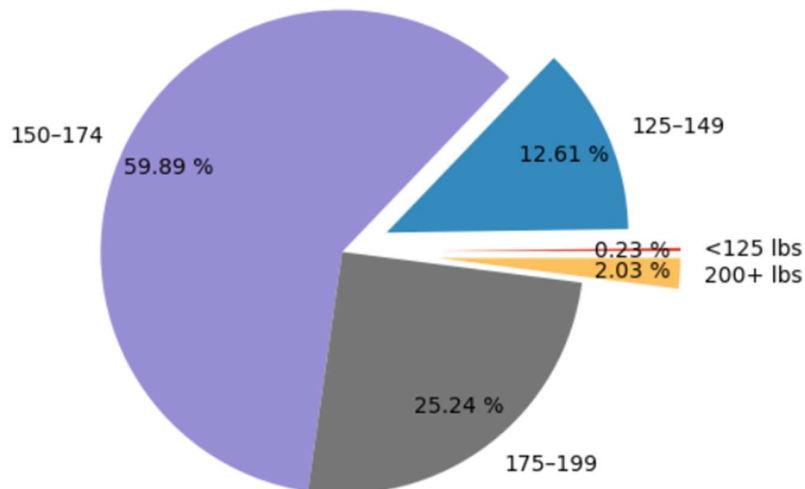
Compare left vs right footed players.

Player Foot Preference

8. Pie Chart - Player Weight Distribution

Analyze physical characteristics of players

Weight Categories of FIFA Players

9. Box Plot - Club-wise Comparison

Compare player ratings between top football clubs

Club-wise Player Skill Comparison