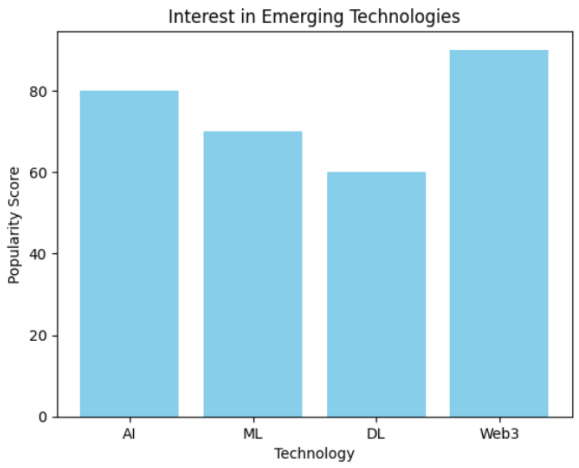
LAB WORK

matplotlib in Python as per Global Curriculum

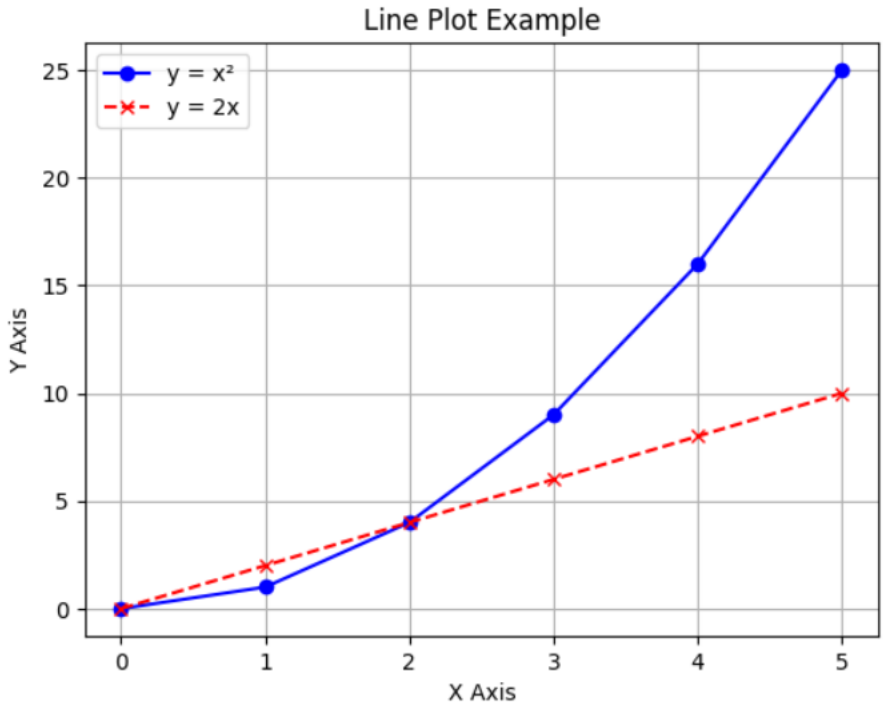
1. Plotting Bar Chart

```
import matplotlib.pyplot as plt
# Sample data
categories = ['AI', 'ML', 'DL', 'Web3']
values = [80, 70, 60, 90]
# Create the bar chart
plt.bar(categories, values, color='skyblue')
# Add title and labels
plt.title('Interest in Emerging Technologies')
plt.xlabel('Technology')
plt.ylabel('Popularity Score')
# Show the plot
plt.show()
```



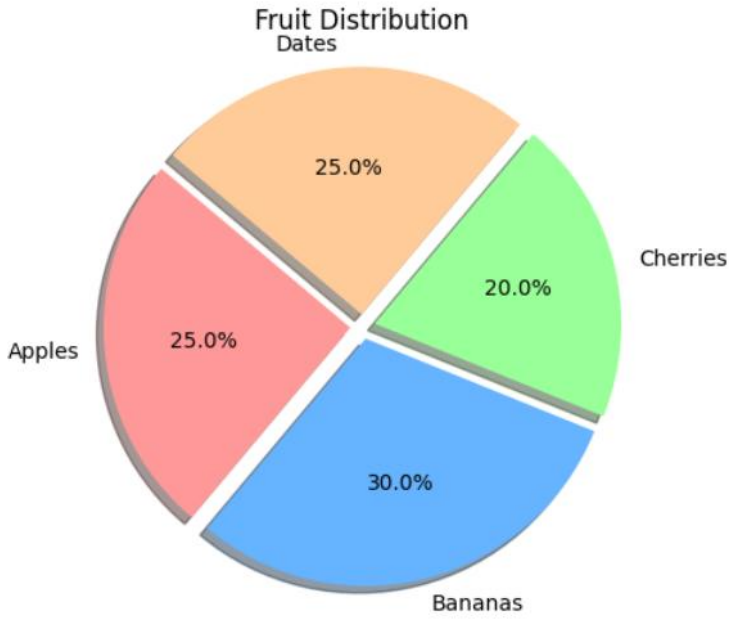
2. Plotting line

```
import matplotlib.pyplot as plt

# Sample data for two lines
x = [0, 1, 2, 3, 4, 5]
y1 = [0, 1, 4, 9, 16, 25]      # y = x^2
y2 = [0, 2, 4, 6, 8, 10]       # y = 2x

# Plotting the lines
plt.plot(x, y1, label='y = x²', color='blue', linestyle='-', marker='o')
plt.plot(x, y2, label='y = 2x', color='red', linestyle='--', marker='x')

# Adding title and labels
plt.title("Line Plot Example")
plt.xlabel("X Axis")
plt.ylabel("Y Axis")

# Show legend
plt.legend()

# Display the plot
plt.grid(True)
plt.show()
```



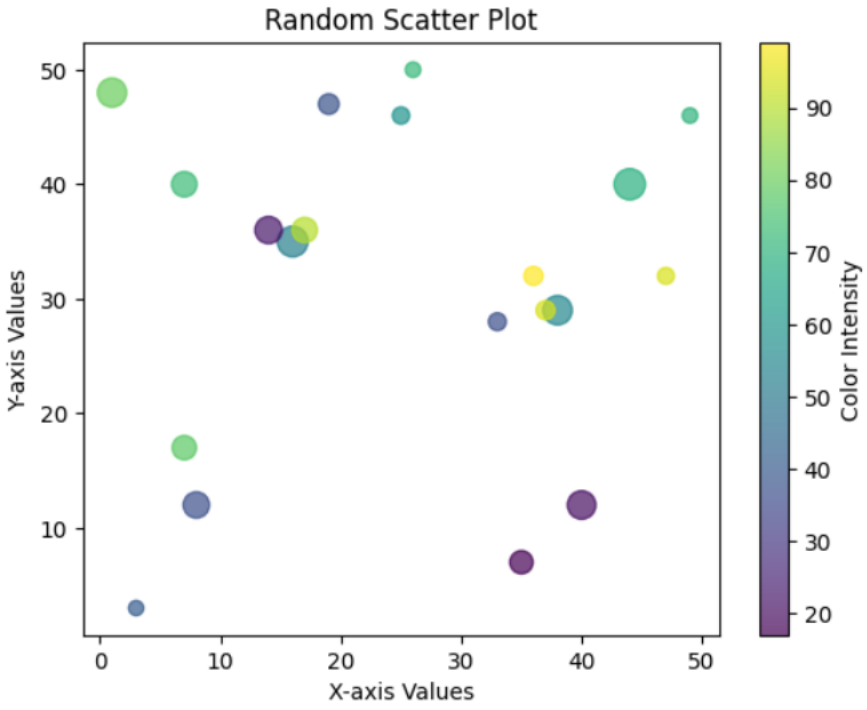
3. PIE CHART

```
import matplotlib.pyplot as plt

# Sample data
labels = ['Apples', 'Bananas', 'Cherries', 'Dates']
sizes = [25, 30, 20, 25]  # Percentages
colors = ['#ff9999','#66b3ff','#99ff99','#ffcc99']
explode = (0.05, 0.05, 0.05, 0.05)  # Slightly "explode" all slices

# Create pie chart
plt.pie(sizes, labels=labels, colors=colors, autopct='%1.1f%%',
        startangle=140, explode=explode, shadow=True)

# Add title
plt.title("Fruit Distribution")

# Equal aspect ratio ensures pie is drawn as a circle.
plt.axis('equal')

# Show the plot
plt.show()
```



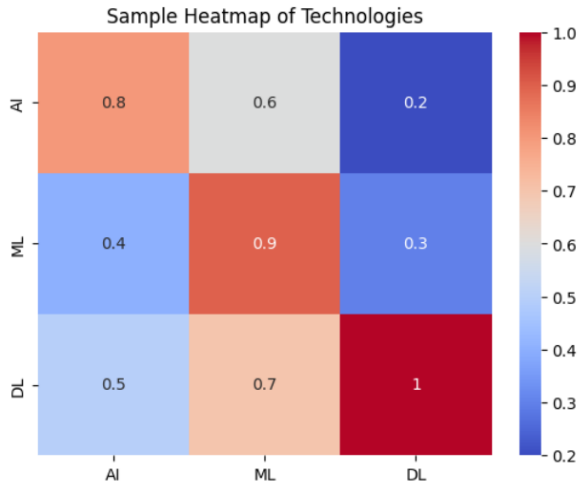
4. RANDOM SCATTER PLOT

```
import matplotlib.pyplot as plt
import random

# Generate some sample data
x = [random.randint(1, 50) for _ in range(20)]
y = [random.randint(1, 50) for _ in range(20)]
colors = [random.randint(10, 100) for _ in range(20)]
sizes = [random.randint(20, 200) for _ in range(20)]

# Create scatter plot
plt.scatter(x, y, c=colors, s=sizes, alpha=0.7, cmap='viridis')

# Add title and labels
plt.title('Random Scatter Plot')
plt.xlabel('X-axis Values')
plt.ylabel('Y-axis Values')
plt.colorbar(label='Color Intensity')

# Show plot
plt.show()
```



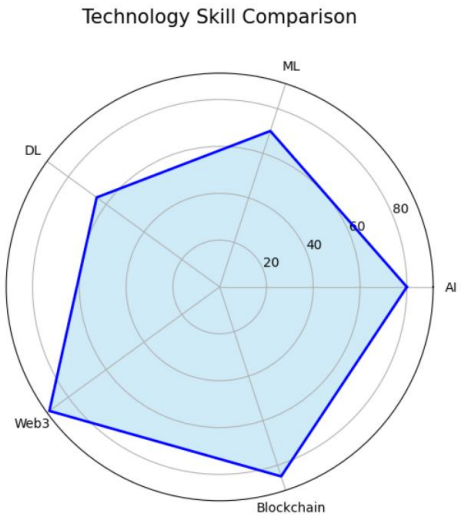
5. HEATMAP

```
import seaborn as sns
import matplotlib.pyplot as plt
import numpy as np

# Sample 2D data (e.g., correlation-like matrix)
data = np.array([
    [0.8, 0.6, 0.2],
    [0.4, 0.9, 0.3],
    [0.5, 0.7, 1.0]
])

# Labels for axes
labels = ['AI', 'ML', 'DL']

# Create the heatmap
sns.heatmap(data, annot=True, xticklabels=labels, yticklabels=labels,
cmap='coolwarm')

# Add title
plt.title('Sample Heatmap of Technologies')

# Show the plot
plt.show()
```



6. Radar Chart

```
import matplotlib.pyplot as plt
import numpy as np

# Categories and values
categories = ['AI', 'ML', 'DL', 'Web3', 'Blockchain']
values = [80, 70, 65, 90, 85]

# Radar chart requires the data to be circular
values += values[:1]
angles = np.linspace(0, 2 * np.pi, len(categories),
endpoint=False).tolist()
angles += angles[:1]
# Set up the radar chart
fig, ax = plt.subplots(figsize=(6, 6), subplot_kw=dict(polar=True))
# Draw the outline and fill
ax.plot(angles, values, color='blue', linewidth=2, linestyle='solid')
ax.fill(angles, values, color='skyblue', alpha=0.4)
# Set the labels
ax.set_xticks(angles[:-1])
ax.set_xticklabels(categories)
# Add title
plt.title('Technology Skill Comparison', size=15, y=1.1)
# Show plot
plt.show()
```



7. 3d Scatter chart

```
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D
import numpy as np
# Generate random data
np.random.seed(7)
x = np.random.randint(1, 100, 50)
y = np.random.randint(1, 100, 50)
z = np.random.randint(1, 100, 50)
# Create 3D figure
fig = plt.figure(figsize=(8, 6))
ax = fig.add_subplot(111, projection='3d')
# Plot the 3D scatter
sc = ax.scatter(x, y, z, c=z, cmap='viridis', s=60)
# Set labels
ax.set_xlabel('X Axis (e.g., AI)')
ax.set_ylabel('Y Axis (e.g., ML)')
ax.set_zlabel('Z Axis (e.g., Performance Score)')
ax.set_title('3D Scatter Plot of Tech Data')
# Add color bar
plt.colorbar(sc)
# Show plot
plt.show()
```