import matplotlib.pyplot as plt

# Sample data

x = [1, 2, 3, 4, 5]

y = [5, 7, 4, 6, 8]

# Create scatter plot

plt.scatter(x, y, color='blue', marker='v', label='Data Points')

# Connect points with a line

plt.plot(x, y, color='red', linestyle='-', linewidth=1, label='Connecting Line')

# Add value labels for each point

for i in range(len(x)):

    plt.text(x[i], y[i], f'({x[i]},{y[i]})', fontsize=9, ha='left', va='top')

# Add labels, title, and legend

plt.xlabel('X Axis')

plt.ylabel('Y Axis')

plt.title('Scatter Plot with Connecting Line')

plt.legend()

# Show plot

plt.show()

#####two scatter line in a plot

import matplotlib.pyplot as plt

# Data

x = [1, 2, 3, 4, 5]

y = [5, 7, 4, 6, 8]

z = [2, 4, 6, 7, 8]

# Plot x vs y

plt.scatter(x, y, color='blue', marker='o', label='x vs y')

plt.plot(x, y, color='blue', linestyle='-', linewidth=1)

# Plot x vs z

plt.scatter(x, z, color='red', marker='^', label='x vs z')

plt.plot(x, z, color='red', linestyle='--', linewidth=1)

# Labels and title

plt.xlabel('x')

plt.ylabel('Values')

plt.title('Scatter Plot with Two Lines')

plt.legend()

plt.show()

###Histogram

import matplotlib.pyplot as plt

import numpy as np

import math

# Sample data

data = [12, 15, 13, 17, 19, 22, 22, 23, 25, 26, 26, 29, 30, 33, 35]

# Calculate bins using Sturges' formula

n = len(data)

bins = math.ceil(np.log2(n) + 1)

# Plot histogram and get counts and bin edges

counts, bin\_edges, patches = plt.hist(data, bins=bins, color='skyblue', edgecolor='black')

# Calculate bin midpoints for labeling

bin\_mids = (bin\_edges[:-1] + bin\_edges[1:]) / 2

# Add axis labels and title

plt.xlabel('Value')

plt.ylabel('Frequency')

plt.title(f'Histogram with bin midpoints labeled (bins={bins})')

# Set new x-axis labels

plt.xticks(bin\_mids, [f'{mid:.1f}' for mid in bin\_mids])

plt.show()

#### Bar Diagram

import matplotlib.pyplot as plt

from collections import Counter

# Your categorical data

data = ['A', 'A', 'B', 'A', 'C', 'A', 'B', 'C', 'D', 'E', 'D', 'F', 'E', 'F', 'C', 'D', 'A', 'F', 'A']

# Count frequency of each category

freq = Counter(data)

# Separate the categories and their counts

categories = list(freq.keys())

values = list(freq.values())

# Create bar plot

plt.bar(categories, values, color='skyblue', edgecolor='red')

# Add labels and title

plt.xlabel('Category')

plt.ylabel('Frequency')

plt.title('Bar Diagram of Categorical Data')

# Show plot

plt.show()

#### Pie chart

import matplotlib.pyplot as plt

from collections import Counter

# Your categorical data

data = ['A', 'A', 'B', 'A', 'C', 'A', 'B', 'C', 'D', 'E', 'D', 'F', 'E', 'F', 'C', 'D', 'A', 'F', 'A']

# Count frequency of each category

freq = Counter(data)

# Separate the categories and their counts

labels = list(freq.keys())

sizes = list(freq.values())

# Create pie chart

plt.pie(sizes, labels=labels, autopct='%1.1f%%', startangle=140, colors=plt.cm.Pastel1.colors)

# Equal aspect ratio ensures pie is a circle

plt.axis('equal')

plt.title('Pie Chart of Categorical Data')

# Show plot

plt.show()

import matplotlib.pyplot as plt

# Data

x = [1, 2, 3, 4, 5]

y = [5, 7, 4, 6, 8]

z = [2, 4, 6, 7, 8]

# Plot x vs y

plt.scatter(x, y, color='blue', marker='o', label='x vs y')

plt.plot(x, y, color='blue', linestyle='-', linewidth=1)

# Plot x vs z

plt.scatter(x, z, color='red', marker='^', label='x vs z')

plt.plot(x, z, color='red', linestyle='--', linewidth=1)

# Labels and title

plt.xlabel('x')

plt.ylabel('Values')

plt.title('Scatter Plot with Two Lines')

plt.legend()

plt.show()