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Internal Assessment Test 3 – July 2024

Sub:	Data Science and Visualization					Sub Code:	21CS644	Branch:	ISE
Date:	31/7/2024	Duration:	90 min's	Max Marks:	50	Sem/Sec:	VI / A, B		OBE

	Answer any FIVE FULL Questions	MARKS	CO	RBT
1 a)	List the Basic image operations. How can we insert an image in a plot?	6	CO5	L2
1 b)	Write short notes on overview of Plots in Matplotlib.	4	CO5	L2
2	You are given a dataset of exam scores (out of 100) for a class of 50 students. Use matplotlib to create a histogram of the exam scores. Customize the plot by adding appropriate labels to the axes and a title. Adjust the bin, size and color for better visualization.	10	CO5	L3
3	Create a histogram plot for the following scenario. You manage a restaurant and want to gain insights into the age groups of your customers. To do this, you have collected data on the ages of restaurant visitors.	10	CO5	L3
4	Learn how to create a Pie Chart using Matplotlib. After running the program, analyze the pie chart and answer the followingquestions: i. What does each slice of the pie chart represent? ii. Where and when pie chart can be used	10	CO5	L3

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1 a)	List the Basic image operations. How can we insert an image in a plot?	6	CO5	L2
1 b)	Write short notes on overview of Plots in Matplotlib.	4	CO5	L2
2	You are given a dataset of exam scores (out of 100) for a class of 50 students. Use Seaborn to create a histogram of the exam scores. Customize the plot by adding appropriate labels to the axes and a title. Adjust the bin, size and color for better visualization.	10	CO5	L3
3	Create a histogram plot for the following scenario. You manage a restaurant and want to gain insights into the age groups of your customers. To do this, you have collected data on the ages of restaurant visitors	10	CO5	L3

4	Learn how to create a Pie Chart using Matplotlib. After running the program, analyze the pie chart and answer the followingquestions: i. What does each slice of the pie chart represent? ii. Which expense category has the highest proportion in your budget?	10	CO5	L3
5	Plot a Radar chart and visualize multiple variables, with each variable plotted on its own axis, resulting in a polygon	10	CO5	L3
6	How to write mathematical expressions using Matplotlib? Make a sine wave curve and write mathematical expressions in it.	10	CO5	L3

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5	Plot a Radar chart and visualize multiple variables, with each variable plotted on its own axis, resulting in a polygon.	10	CO5	L3
6	How to write mathematical expressions using Matplotlib? Make a sine wave curve and write mathematical expressions in it.	10	CO5	L3

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Solution

Ans-1 Basic Image Operations

Ans 1(a)

1. Reading and Writing Images:
    - Load an image from a file: cv2.imread, plt.imread.
    - Save an image to a file: cv2.imwrite, plt.imsave.
2. Displaying Images:
    - Display an image: cv2.imshow, plt.imshow.
3. Resizing Images:
    - Change the size of an image: cv2.resize, PIL.Image.resize.
4. Cropping Images:
    - Extract a portion of an image using slicing or functions.
5. Rotating and Flipping Images:
    - Rotate an image: cv2.getRotationMatrix2D + cv2.warpAffine.
    - Flip an image: cv2.flip.
6. Color Space Conversion:
    - Convert color spaces: cv2.cvtColor.
7. Image Filtering:
    - Apply filters: cv2.GaussianBlur, cv2.medianBlur.
8. Edge Detection:
    - Detect edges: cv2.Canny.
9. Image Thresholding:
    - Thresholding: cv2.threshold.
10. Image Blending:
    - Blend images: cv2.addWeighted.
11. Morphological Operations:
    - Morphological transformations: cv2.morphologyEx.

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Inserting an Image in a Plot using Python

To insert an image in a plot using Matplotlib, follow these steps:

1. Import necessary libraries.
2. Read the image.
3. Display the image.
4. Customize the plot (optional).
5. Show the plot.

Ans 1(b)

Matplotlib is a comprehensive library for creating static, animated, and interactive visualizations in Python. It is widely used in data analysis and scientific research for its versatility and ease of use. Here are some key aspects of plots in Matplotlib:

Basic Plot Types:

- Line Plot: Used to represent data points connected by straight lines. Ideal for showing trends over time.
- Scatter Plot: Displays individual data points. Useful for showing relationships between two variables.
- Bar Plot: Represents data with rectangular bars. Good for comparing quantities among categories.
- Histogram: Shows the distribution of a dataset. Useful for understanding the frequency of data ranges.
- Pie Chart: Represents data as slices of a pie. Useful for showing proportions.

Customization

Titles and Labels: Add titles and axis labels to improve clarity.
Legends: Add a legend to differentiate multiple data series.
Colors and Styles: Customize colors, line styles, markers, etc.

3. Subplots

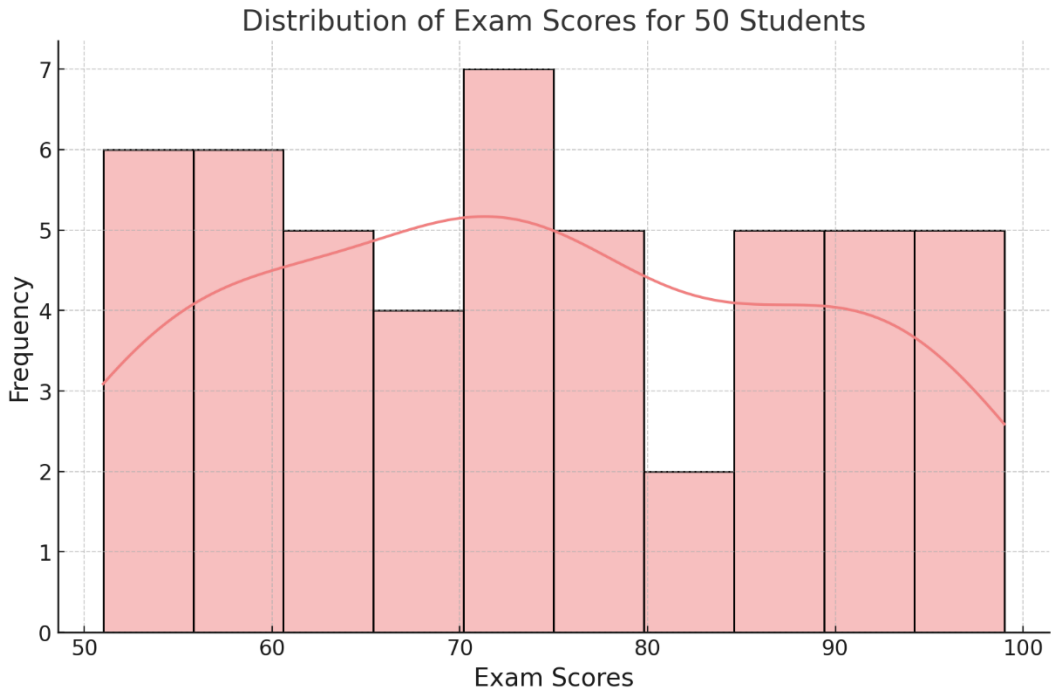
Creating Multiple Plots: Use plt.subplot to create multiple plots in a single figure.

4**. Advanced Features**

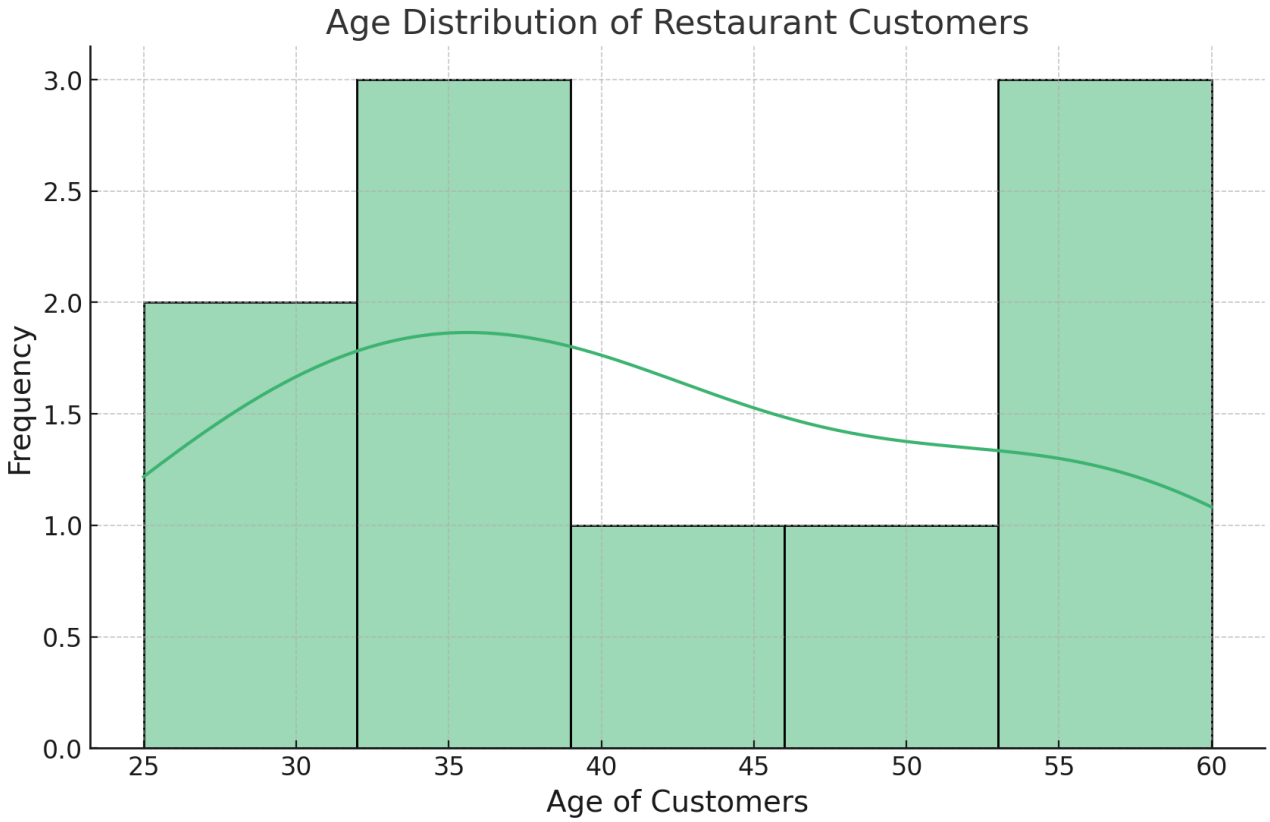
Annotations: Add text annotations to specific points.

Interactive Plots: Use libraries like mpl_toolkits.mplot3d for 3D plots or matplotlib.widgets for interactive controls.

Ans- 2



Ans- 3


Age Distribution of Restaurant Customers
Frequency
Age of Customers
0.0
0.5
1.0
1.5
2.0
2.5
3.0
25
30
35
40
45
50
55
60