DSP505: Programming Lab for Data Science and Artificial Intelligence

TPL616: Advanced Programming for DSAI

Lab-5: Practice Problems (Matplotlib)

Date: 12-Sept-2025

Instructions:

1. Try to complete lab problems during the lab hour and submit it through canvas. If you can't complete it within the lab time, you can submit it by the end of tomorrow.
2. Prepare all your solution files in a zip file and name it as <Name.zip> and submit on canvas.
3. You can use a jupyter notebook to solve the problems.

Problem Set-0:

Practice the codes given in the slides, execute them and make sure you get the correct output. No need to submit this.

Problem Set-1:

Explore the different types of charts available in the matplotlib to visualize the health data as follows.

1. Load and Inspect Data
- Read health_data.csv using pandas.

2. Line Chart – Fitness Progress
- Plot monthly Steps and Calories Burned.
- Highlight months with the highest activity.

3. Bar Chart – Sleep Analysis
- Plot average Sleep Hours per Month using a bar chart.
- Add a horizontal line at 7 hours as a reference for healthy sleep.

4. Scatter Plot – Heart Rate vs Sleep
- Plot Avg_Heart_Rate against Sleep_Hours.
- Use color coding for Steps that month.

5. Pie Chart – Activity Contribution
- Compare total yearly Steps vs total Calories Burned (scaled).
- Show percentage contribution.

6. Subplots (2x2 Layout)
- Combine line, bar, scatter, and pie charts in one figure.
- Add the main title: 'Health & Fitness Analysis (2024)'.

7. Save Report
- Export the figure as health_report.png.

Problem Set-2:

Load iris dataset as follows.

```
import seaborn as sns

iris_df = sns.load_dataset('iris')

iris_df.head()
```

Perform the following tasks:

1. Plot the relationship between PetalLengthCm and PetalWidthCm using a 2D scatter plot.
2. Now, plot a 3D scatter plot by adding SepalLengthCm as the third dimension.

Which plot (2D or 3D) is more effective in helping you distinguish?