

## Seaborn Assignment 1

### (Case Study)

#### Note: Dataset

```
# Load the penguins dataset penguins =  
sns.load_dataset("penguins")
```

#### 1. Relationship Between Body Mass and Flipper Length Across Species

- Plot the relationship between `body_mass_g` and `flipper_length_mm` for different species.
- Use **axis-level** and **figure-level** versions of `sns.scatterplot` and `sns.relplot`.
- Highlight differences between the species using color.

#### 2. Trend of Body Mass by Island

- Show how the average `body_mass_g` varies across island.
- Use **line plots** (both `sns.lineplot` and `sns.relplot`).
- Add error bars to the plot to represent variability.

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#### 3. Comparison of Body Mass Across Species

- Create a bar plot to compare the mean `body_mass_g` for each species.
- Use both `sns.barplot` (axis-level) and `sns.catplot` (figure-level).

## 4. Distribution of Flipper Length by Species and Gender

- Create a **box plot** and a **violin plot** to compare flipper\_length\_mm across species and sex.
- Use sns.boxplot/sns.violinplot and sns.catplot.

## 5. Count of Penguins by Species and Island

- Show the count of penguins for each species on different islands.
- Use a **count plot** with sns.countplot and sns.catplot.

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## 6. Correlation Heatmap for Numerical Features

- Compute the correlation matrix for numerical features (body\_mass\_g, flipper\_length\_mm, bill\_length\_mm, bill\_depth\_mm) and visualize it using a **heatmap**.
- Use sns.heatmap (axis-level) and show how to integrate it with a Matplotlib figure using plt.subplots.

## 7. Pairwise Relationship Between Features

- Use sns.pairplot to visualize pairwise relationships between numerical features.
- Add hue based on species and include histograms on the diagonal.

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## 8. Predicting Body Mass from Flipper Length

- Use a **regression plot** to study the linear relationship between flipper\_length\_mm and body\_mass\_g.

- Use `sns.regplot` (axis-level) and `sns.lmplot` (figure-level).
- Add a confidence interval and hue based on species.

## 9. Impact of Bill Length and Depth on Body Mass

- Create a **residual plot** to analyze how well `bill_length_mm` predicts `body_mass_g`.
- Use `sns.residplot` and explain how residuals help evaluate model quality.

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## 10. Body Mass Distribution Across Species

- Plot the distribution of `body_mass_g` for each species using **histograms** and **KDE plots**.
- Use `sns.histplot` and `sns.displot`.

## 11. Joint Distribution of Flipper Length and Bill Length

- Create a **joint plot** to show the relationship between `flipper_length_mm` and `bill_length_mm`.
- Use `sns.jointplot` with different kinds (scatter, kde, hex) to analyze the data.