**🏷️ CAPSTONE PROJECT TITLE: GENDER-BASED BODY MEASUREMENTS ANALYSIS USING STATISTICAL METHODS AND VISUALIZATION TECHNIQUES"**

**📝 PROJECT DESCRIPTION:**

This project explores statistical analysis and visualization techniques to compare body measurements between males and females. The dataset comprises numerical attributes such as weight, height, and body circumferences. The workflow includes data cleaning using NumPy, exploratory analysis with histograms and box plots via Matplotlib, and the computation of statistical metrics such as mean, median, standard deviation, skewness, and kurtosis. Additionally, BMI (Body Mass Index) is calculated for the female dataset, followed by standardization (Z-score) and correlation analysis using Seaborn pair plots and Pearson/Spearman correlation coefficients. The project aims to identify patterns and differences in physical attributes across genders, leveraging Python libraries like NumPy, Matplotlib, SciPy, and Seaborn for both descriptive and inferential statistical insights.

**📄 CAPSTONE REPORT SUMMARY:**

1. Data Collection & Import: The datasets (male and female) were imported from Google Drive. Both datasets were converted into NumPy arrays for efficient computation.
2. Data Cleaning & Preparation: Missing values (NaNs) were identified and removed using axis-based NumPy operations. The first column, which contains weight values, was sliced for separate analysis.
3. Visualization: Histogram: Used to analyze and compare the weight distributions of males and females. Box Plot: Visual comparison showed that males generally have higher and more varied weight distributions.
4. Statistical Analysis: Aggregates like mean, median, standard deviation, skewness, and kurtosis were computed. Males generally exhibited higher mean and more variation in the data.
5. Feature Engineering: BMI was calculated and added as a new feature in the female dataset using the standard BMI formula (weight/height²).
6. Z-Score Normalization: Standardized Z-scores were computed for all variables in the female dataset to enable scale-independent comparison.

7. Correlation Analysis: Pair plots were generated to visualize relationships between variables. Pearson and Spearman correlation coefficients were computed to assess linear and monotonic relationships."