A/B Testing for Marketing Campaign Optimization

Objective: The goal of this analysis was to determine which marketing campaign (A vs. B) leads to higher customer conversions using A/B testing methodologies.

Dataset Overview:

- The dataset contains customer interactions from two different marketing campaigns: **Campaign A (Ad group)** and **Campaign B (PSA group)**.
- Key columns used: test group and converted.

Statistical Analysis:

1. **Conversion Rates:**
    - **Campaign A (Ad group):** 2.55%
    - **Campaign B (Control group):** 1.79%
2. **Hypothesis Testing (Two-Proportion Z-Test):**
    - **Z-Statistic:** 7.37
    - **P-Value:** 1.71e-13 (very small, highly significant)
    - Conclusion: Since p-value < 0.05, we reject the null hypothesis, meaning there is a statistically significant difference in conversion rates.
3. **Confidence Intervals:**
    - **Campaign A (Ad group):** (2.51%, 2.60%)
    - **Campaign B (PSA group):** (1.62%, 1.95%)
    - Conclusion: The confidence intervals do not overlap, reinforcing the significance of the result.
4. **Power Analysis:**
    - **Power:** 1.0 (Indicates a very strong ability to detect an effect)

Visualization: A bar plot comparing conversion rates shows a clear advantage for **Campaign A**, with confidence intervals providing additional statistical support.

Conclusion: Campaign A (Ad group) significantly outperforms Campaign B (PSA group) in terms of conversion rates. The results are statistically significant, and the power analysis confirms the robustness of the findings. Based on this analysis, **Campaign A is the more effective marketing campaign**.

Recommendations:

- Given the strong statistical support, the company should **invest more in Campaign A** for higher conversions.

- Further segment analysis could be performed to see if certain demographics responded better to either campaign.
- Additional A/B tests could be conducted on different elements such as ad creatives, targeting strategies, or landing pages to refine the campaign further.