Marketing Campaign Analysis

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Context

The analysis focuses on evaluating the effectiveness of two campaign types:

- **Ads** (Control Group)
- **PSAs** (Test Group)

The study aims to:

- **Evaluate Trade-Offs**: Analyze conversion rates versus ad engagement metrics for both campaign types.
- **Identify Key Factors**: Explore variables impacting ad views to uncover actionable insights.

Objectives

- ❑ Assess the differences in conversion rates and ad view rates between the control and test groups.
- ❑ Identify the key factors driving the total number of ads viewed by users.
- ❑ Build predictive models to estimate ad views based on user behavior and other influencing variables.
- ❑ Provide actionable recommendations aligned with business goals.

Research Questions

- What are the differences in conversion rates and ad view rates between the two groups?
- What factors influence the total number of ads seen by users?
- How do user behavior patterns (day, hour, conversion status) affect ad views?
- Can we predict the total number of ads viewed based on user characteristics and engagement patterns?

Overview of Data

Preprocessing Steps: Loaded and cleaned the dataset by selecting relevant columns, removing nulls/duplicates, filtering outliers (beyond 99.5th percentile), and resetting the index for seamless analysis.

Features:

- test group
- converted
- total ads
- most ads day
- most ads hour

test group	converted	total ads	most ads day	most ads hour
ad	False	130	Monday	20
ad	False	93	Tuesday	22
ad	False	21	Tuesday	18
ad	False	355	Tuesday	10
ad	False	276	Friday	14

Workflow

1. Exploratory Data Analysis (EDA)

- ❑ Visualized the distribution of ads viewed across test and control groups.
- ❑ Identified the most active hours for ad engagement.

2. Hypothesis Testing

- ❑ Z-Test: Compared conversion rates between control (Ads) and test (PSAs) groups.
- ❑ Mann-Whitney U Test: Assessed differences in ads view rates.

3. Regression Analysis

- ❑ Built multiple linear regression models.
- ❑ Identified significant predictors of ad views and evaluated their impact.

Insights

- The distribution is right-skewed for both groups, indicating most users view fewer ads, with a few users viewing many ads
- The Ad group appears to have more users viewing a large number of ads compared to the PSA group.
- The distribution shows multiple peaks, suggesting users view most ads during specific times.
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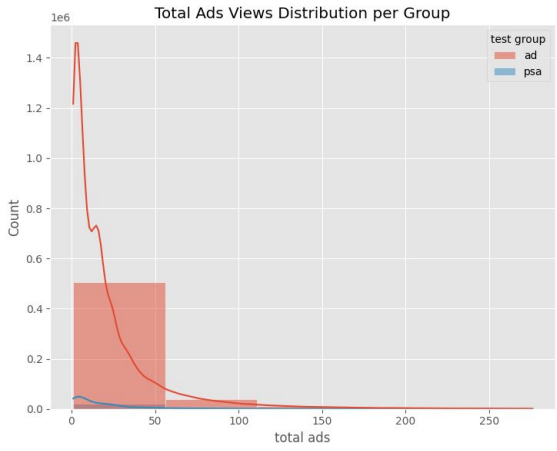
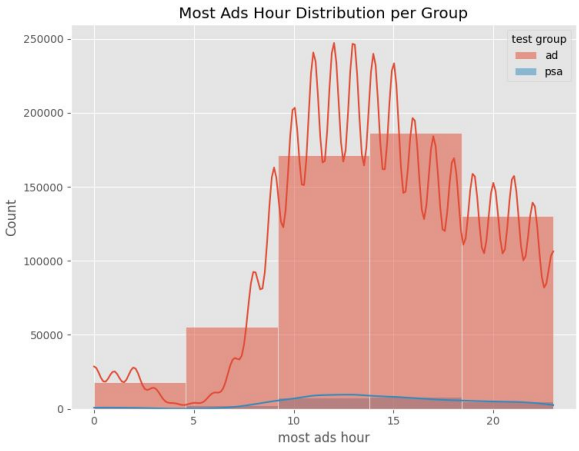
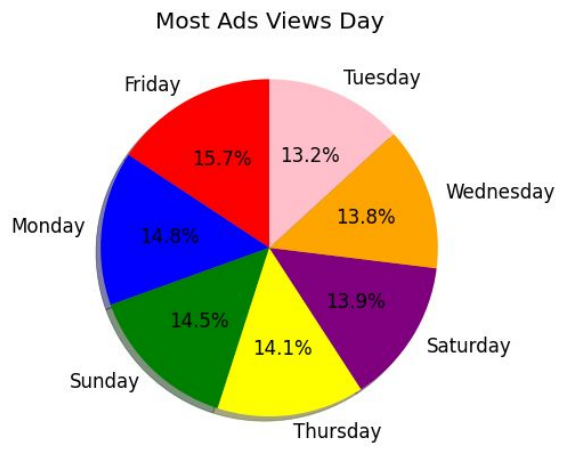
- The Ad group's peak viewing time occurs slightly later than the PSA group.





Insights (Cont.)

- 15.7% of users view the most ads on Fridays, making it the highest proportion day for ad engagement.
- The remaining days have a relatively even distribution, with percentages ranging between 13.2% (Tuesday) and 14.8% (Monday).
- No day stands out as significantly lower or higher in terms of ad views, apart from Friday's slight lead.



Statistical Tests

- **Conversion Rate Analysis (Z-Test):**
  - **Outcome:** Significant difference in conversion rates
  - **Finding:** Control group (Ads viewers) achieves a 0.758% higher conversion rate than the test group (PSA viewers).
  - **Implication:** Ads are more effective for driving immediate conversions, though the observed difference is relatively small.

- **Ads View Rate Analysis (Mann-Whitney U Test):**
  - **Outcome:** Significant difference in ads view rates
  - **Finding:** Test group (PSA viewers) has a 0.087 higher ads view rate than the control group (Ads viewers).
  - **Implication:** PSAs drive slightly higher engagement with ads.

Regression Analysis

Model Fit

- **Improvement with Additional Predictors:**
  - **Model 1 (Single Predictor):** R^2 = 0.0001 (minimal explanatory power).
  - **Model 2 (Two Predictors):** R^2 = 0.001R^2 = 0.001 (slight improvement).
  - **Model 3 (Three Predictors):** R2 = 0.0642 (meaningful increase).
  - **Model 4 (Four Predictors):** R2 = 0.0643 (marginal improvement with the test group added).

Key Predictors

- **Most Ads Hour:**
  - Statistically significant but small negative relationship. Later hours slightly reduce total ads viewed.
- **Most Ads Day:**
  - Statistically significant differences across days. Friday is the reference, with fewer ads viewed on other days.
- **Converted:**
  - Strong positive predictor in Models 3 and 4. Converting users view +51.2 more ads than non-converters.
- **Test Group:**
  - Significant in Model 4. Test group users view +0.49 more ads, though the effect is small.

Business Implications

Recommendations

For Conversion-Focused Campaigns:

- Focus on ad-based campaigns to achieve higher conversion rates.
- Optimize ad delivery timing based on user behavior patterns.

For Engagement-Focused Campaigns:

- Use PSA campaigns to boost ad view rates and promote broader awareness.
- Investigate factors driving PSA engagement to improve campaign design.

Strategic Decisions:

- Conduct a cost-benefit analysis to balance financial returns from conversions against engagement objectives.
- Explore hybrid campaigns to combine the strengths of both approaches.

Future Research and Conclusion

Future Research

- Refine regression models with additional predictors, such as demographics and user activity.
- Assess the impact of external factors, like campaign duration and content type.
- Evaluate the long-term effects of PSA-driven engagement on brand loyalty.

Conclusion

The findings highlight a trade-off between conversions and engagement:

- Ad-based campaigns excel in driving immediate conversions.
- PSA campaigns deliver slightly higher engagement.

THANK YOU