

# A/B Testing Case Study

IMPACT OF LANDING PAGE REDESIGN ON CONVERSION

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# Business Problem

- The objective of this analysis is to evaluate whether a redesigned landing page leads to higher user conversion compared to the existing version.
- Conversion is a critical business metric as it directly impacts revenue and user engagement.
- Before deploying the new design to all users, an A/B test was conducted to validate whether the observed improvement is statistically reliable and practically meaningful.

# Experiment Design

- Users were randomly assigned to one of two groups:
  1. **Control Group:** Users exposed to the existing landing page
  2. **Treatment Group:** Users exposed to the redesigned landing page
- Each user was exposed to only one version of the page to maintain independence of observations.
- The experiment dataset contains approximately **294,000** users, ensuring sufficient sample size for statistical testing.
- The primary metric selected for evaluation was **conversion rate**.

# Hypothesis Definition

- **Null Hypothesis ( $H_0$ ):**  
There is no difference in conversion rates between the control and treatment groups.
- **Alternative Hypothesis ( $H_1$ ):**  
There is a difference in conversion rates between the control and treatment groups.
- A two-sided hypothesis test was chosen to detect both potential improvements and degradations in performance.

# Data Validation & Preparation

Several validation checks were performed before analysis:

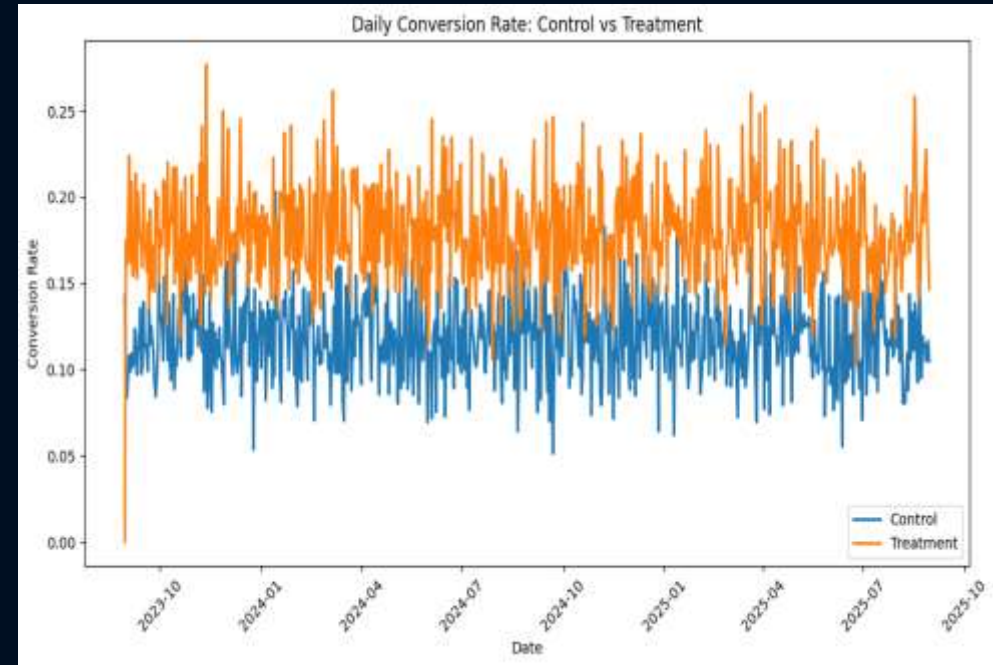
- Verified there were no duplicate user records
- Confirmed each experiment group was mapped to the correct landing page
- Checked for missing values and corrected data types
- Ensured consistent metric definitions across groups

These steps ensured the dataset was clean and suitable for causal inference.



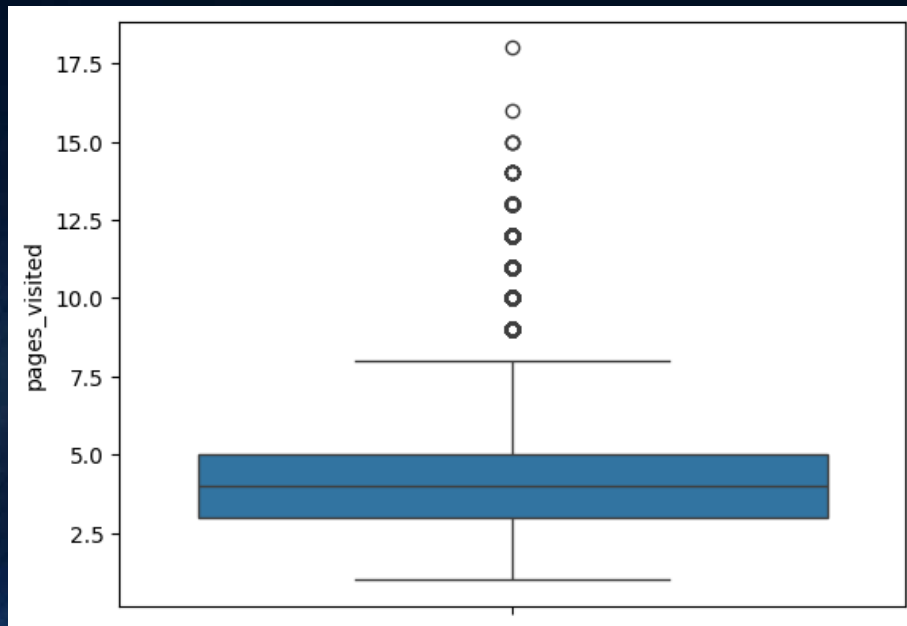
# Exploratory Data Analysis (EDA)

- Demographic attributes (age, gender, device type, geography) were well balanced across control and treatment groups, indicating successful randomization.
- Time-based analysis of conversion rates showed stable behavior throughout the experiment.

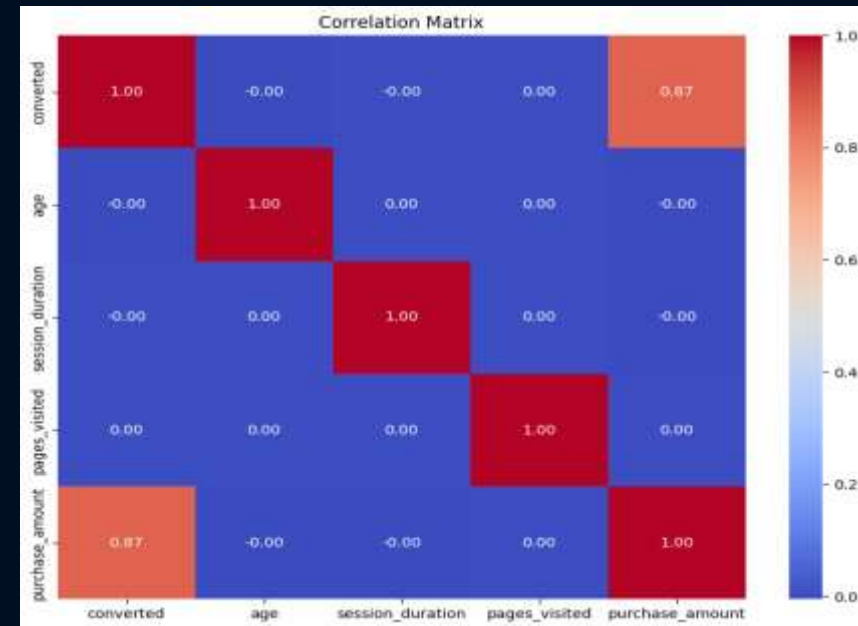


# EDA CNTN

PAGES VISITED SHOWED VARIABILITY BUT NO STRONG CORRELATION WITH PURCHASE AMOUNT.



CONVERSION STATUS STRONGLY CORRELATED WITH PURCHASE AMOUNT, CONFIRMING CONVERSION RATE AS THE APPROPRIATE PRIMARY METRIC.



# Metric Results

- **Control Conversion Rate:** 11.87%
- **Treatment Conversion Rate:** 17.95%
- **Absolute Lift:** +6.08 percentage points

This indicates a substantial increase in conversions for users exposed to the redesigned landing page.



# Statistical Analysis

- A two-sample proportion z-test was applied to compare conversion rates between the control and treatment groups.
  1. **Z-statistic:** -46.28
  2. **P-value:**  $< 0.001$
- The extremely small p-value indicates that the observed difference is highly unlikely to be due to random chance. The null hypothesis was rejected.
- A 95% confidence interval for the absolute lift was calculated as [5.8%, 6.3%]

# Interpretation

- The confidence interval lies entirely above zero, providing strong statistical evidence that the redesigned landing page improves conversion rate.
- Furthermore, even the lower bound of the interval represents a large and practically meaningful improvement from a business perspective.

# Conclusion & Recommendation

- Based on both statistical significance and practical significance, the redesigned landing page demonstrably outperforms the existing version.
- It is recommended to roll out the new landing page to all users.
- Continued monitoring of guardrail metrics post-deployment is advised to ensure sustained performance.