A/B Testing Analysis:

Impact of Background Colour on Conversion and User Engagement

The Dataset Overview

Data Overview:

- Synthetic dataset simulating user sessions on a UK **retail website**.
- Metrics include **Page Views**, **Time Spent**, **Conversion**, **Device**, and **Location**.

⭐**Assumption:** Since it's a **retail** website, the most likely primary conversion goals(or events) would be:

1. **Purchase**
2. **Add to cart**
3. **Registration/account creation**
4. **Newsletter signup**

Through it is not clearly stated by the data source, for this analysis, **conversion** is assumed to represent a **purchase action** (e.g., completing a transaction), as it is a common goal in e-commerce.

Framing the Analysis

Objective:

Primary Goal

- Evaluate whether changing the website background colour (white → black) improved **conversion rates(purchase action)** between Group A and Group B.

User Engagement Impact:

- Assess whether the background change led to significant differences in **Page Views** and **Time Spent** between the groups (*using statistical tests*).

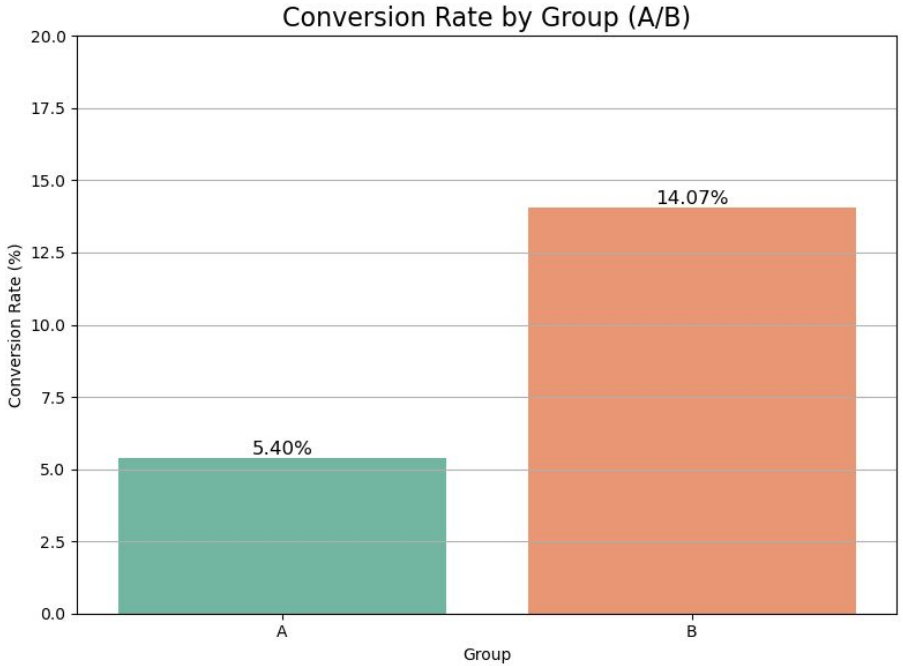
Segment Analysis:

- Compare **conversion rates by Device** and **Location** between the groups.

Behavioural Correlation Analysis:

- Assess whether engagement metrics (Page Views and Time Spent) are predictive of conversion outcomes across all users.

Primary Outcome: Conversion Rate Analysis



Primary Goal

Is it Statistically Significant?

Null Hypothesis: Changing the website background color from white (Group A) to black (Group B) will **NOT** increase the conversion rate.

$$\text{P Value} = 3.99 \times 10^{-25} \text{ (Z-test)}$$

Key Finding:

The extremely low p-value(<0.05) indicate a **highly significant difference** between the conversion rates of Group A and Group B, so, we can confidently **reject the Null Hypothesis**, and say that the change in Group B had a real impact on conversion rate, namely, **changing the website background colour (white → black) improved conversion rates**.

User Engagement Impact Analysis: Page Views & Time Spent

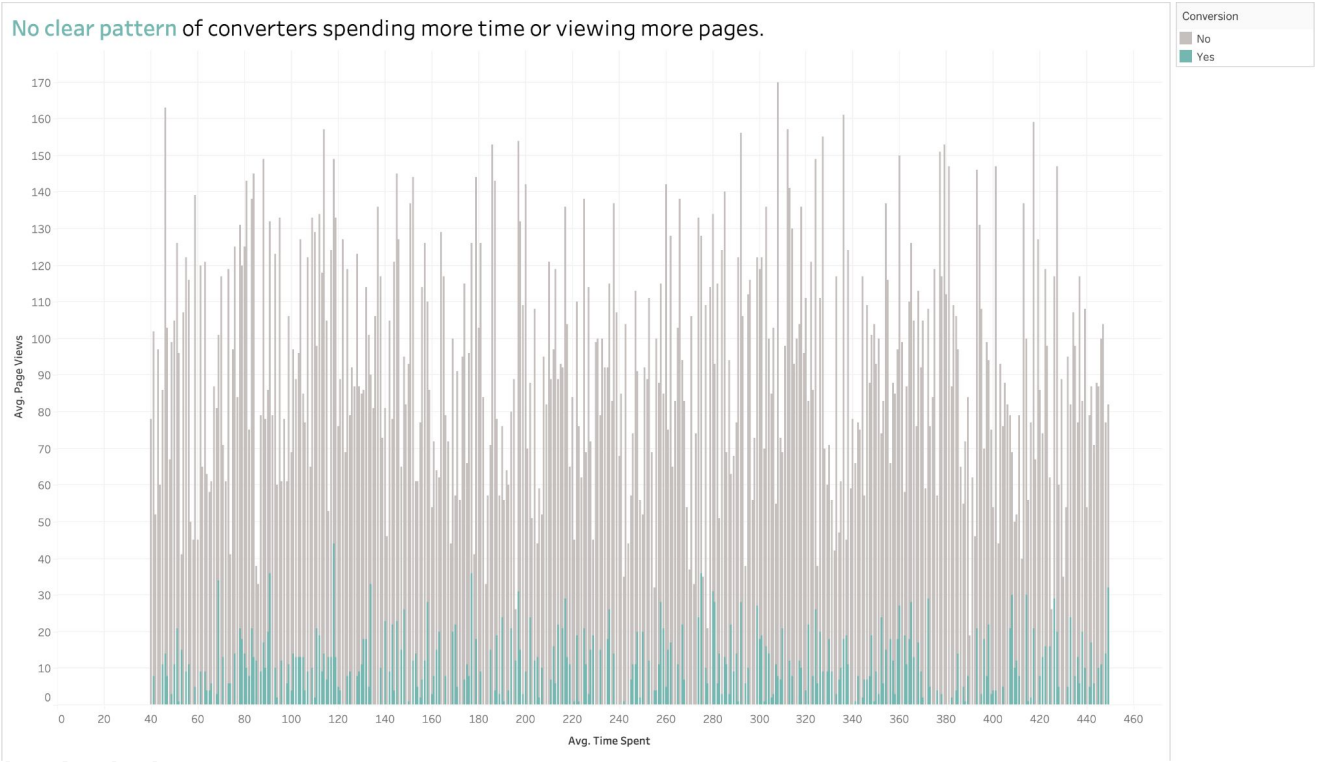
User Engagement Impact Analysis: Statistical test results

Conversion Rates by Device

Conversion by Location

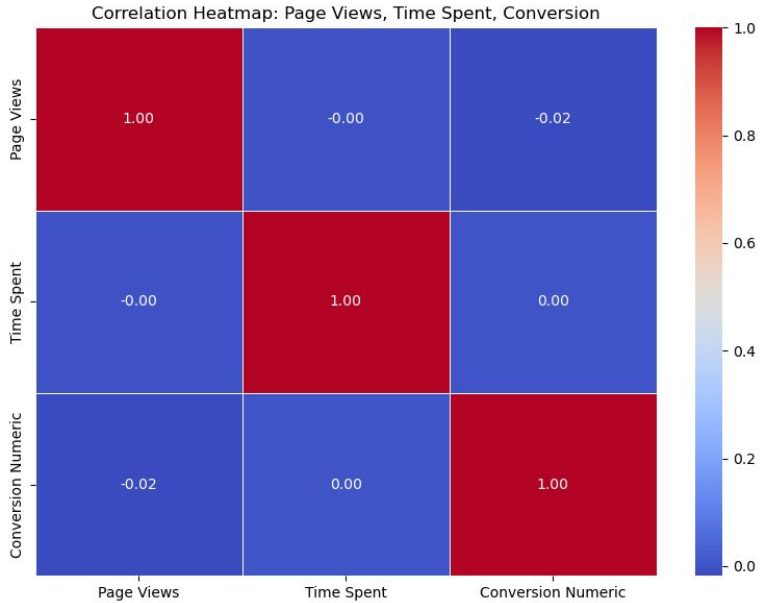
Behavioural Correlation Analysis

Are Page Views & Time Spent predictive of conversion outcomes?



Behavioural Correlation Analysis

We use correlation analysis to further test if are Page Views & Time Spent predictive of conversion outcomes



Key Finding: **Neither** Page Views **nor** Time Spent are strong predictors of conversion in this dataset.

Key Insights and Business Implications

1. The colour change did caused higher conversion rate(purchase action)
2. Device
3. Location
4. The colour change did **NOT** lead to more Page View, nor Time Spent
5. Conversion rate in this dataset is not positively correlated with Page view or Time Spent
6. When conversion goal is purchase efficiency, then low engagement metrics(Page view and Time Spent) with high conversion might actually be a **positive sign**, it might means more streamlined process (although unlikely just because of simple colour change)

Conclusions and Next Steps

- Changing the background colour is a low-cost intervention from a web development perspective and **is therefore worth pursuing**.
- However, due to the lack of customer value data, it is **difficult to directly assess the commercial impact of the conversion increase.**
- If conversion represents an engagement action (e.g., registration or newsletter signup), we would expect converters to exhibit higher Page Views and Time Spent. However, the data showed no increase — or even slightly lower engagement — among converters. This suggests that while the design change increased conversions, it did not enhance broader user engagement. This may be acceptable if the goal is streamlined conversion but could indicate a need for further design adjustments to promote deeper user interaction.
- **If the business aims to achieve both higher registrations and greater engagement, this result highlights an opportunity for future improvement**.