E-News Express Case Study

E-news Express Data Analysis

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E-news Express

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Executive Summary

E-news Express is an online news portal that aims to expand its business by acquiring new subscribers.

The company plans to analyze the actions with every visitor to the website taking certain actions based on their interest to understand user interests and determine how to drive better engagement.

The research and design team of the company has created a new landing page that has a new outline & more relevant content shown compared to the old page. Below are some insights after doing the exploratory data analysis:

- 50% of users spend 5.415 minutes and more on the website. Both new and old landing page have same number visits
- 54% of users were converted and both Spanish and French are the most preferred languages with 34% then English follow with 32%
- We do have enough statistical evidence that users spend more time in the new landing page

Business Problem Overview and Solution Approach

Potential Problems

- There has been a decline in new monthly subscribers compared to the past year because the current webpage is not designed well enough in terms of the outline & recommended content to keep customers engaged long enough to decide to subscribe.

Solution Approach / Methodology

- Univariate analysis
- Multivariate analysis

Exploratory Data Analysis

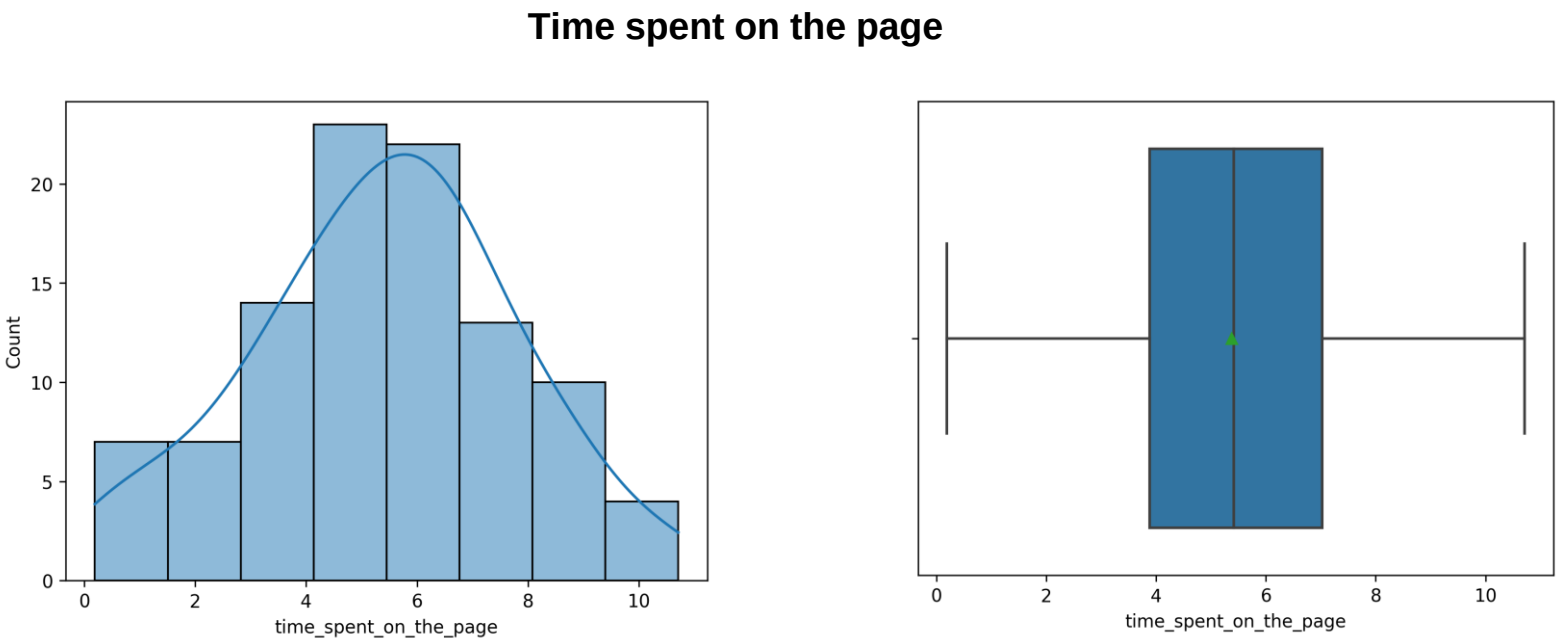
	user_id	group	landing_page	time_spent_on_the_page	converted	language_preferred
0	546592	control	old	3.48	no	Spanish
1	546468	treatment	new	7.13	yes	English
2	546462	treatment	new	4.40	no	Spanish
3	546567	control	old	3.02	no	French
4	546459	treatment	new	4.75	yes	Spanish

- We have 100 rows and 6 columns in the DataFrame
- Both control and treatment have same frequency
- Both new and old page have same frequency
- On average user spend 5.38 minutes on the website

Exploratory Data Analysis

- The minimum time spent on the website is 0.19 minutes and maximum is 10.71 minutes
- 75% of visitors spend 7.02 minutes or less on the website
- Among the 100 people that visited the website 54 were converted
- Spanish is the preferred language
- There are no missing values in the DataFrame
- There are not duplicated values in the DataFrame

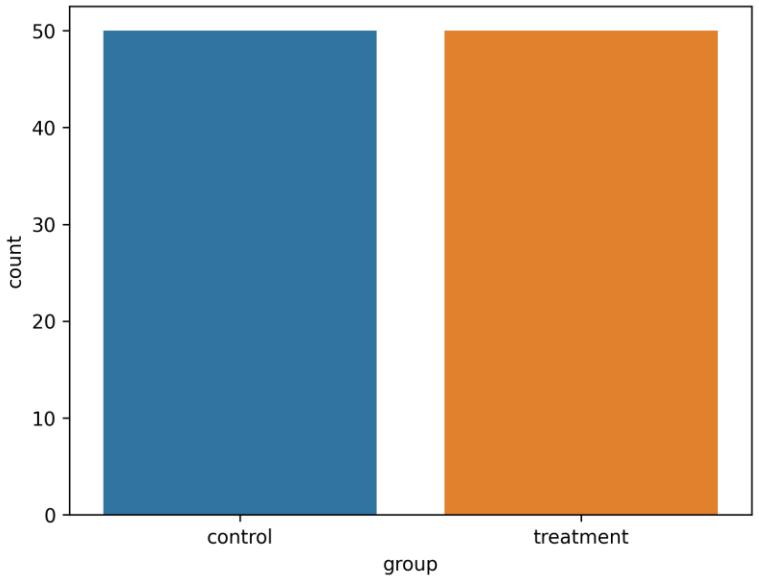
Exploratory Data Analysis



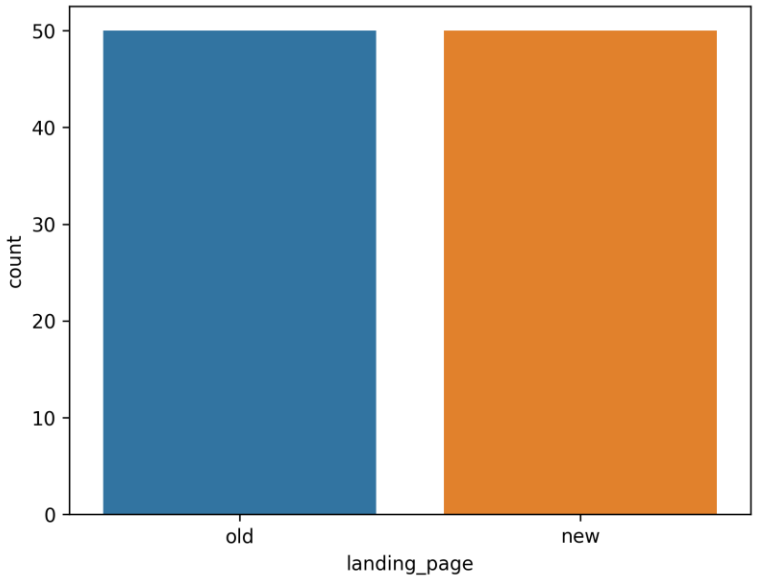
- 50% of users spend 5.415 minutes and more on the website

Exploratory Data Analysis

Group



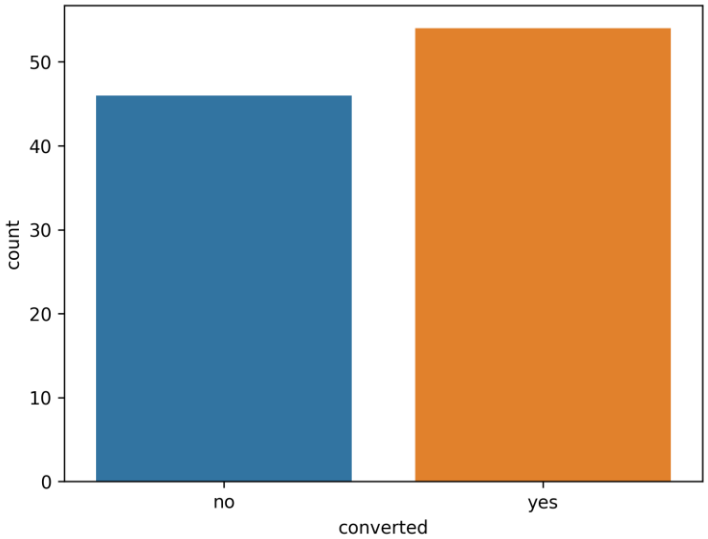
Landing page



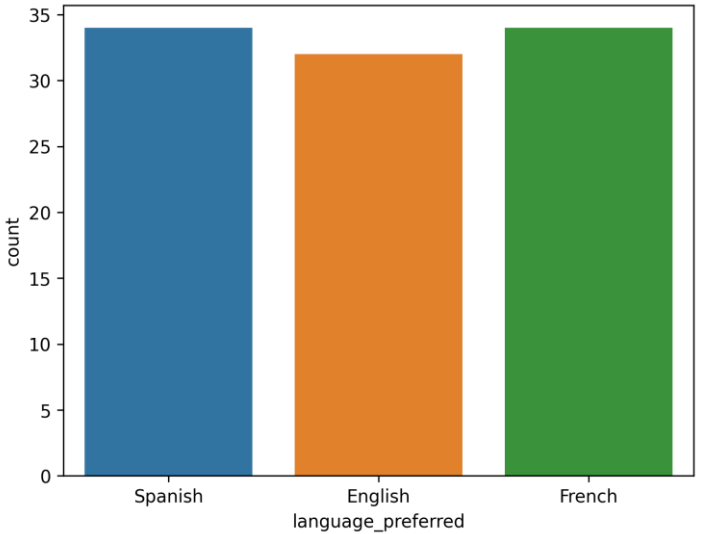
- Both control and treatment group have same number users
- Both new and old landing page have same number of visits

Exploratory Data Analysis

Converted



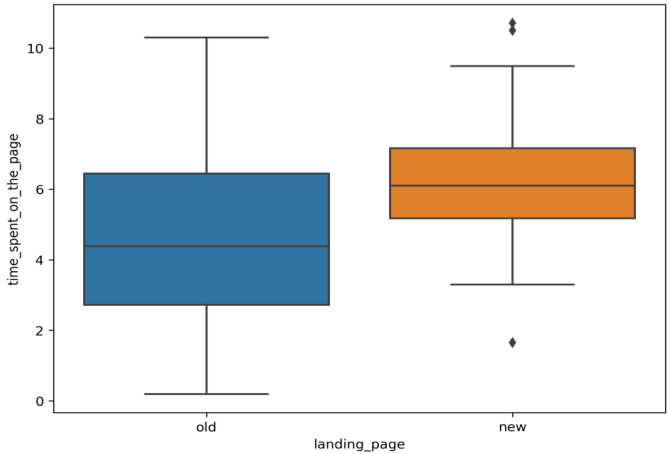
Language preferred



- 54% of users were converted
- Both Spanish and French are the most preferred languages with 34% then English follow with 32%

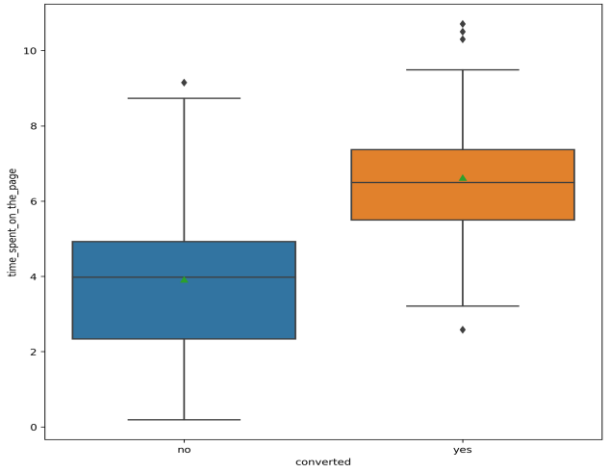
Exploratory Data Analysis

Landing page vs Time spent on the page



- On average users spend more time on the website with new landing page vis a vis the old landing page
- There are outliers in the time spent on website with new landing page

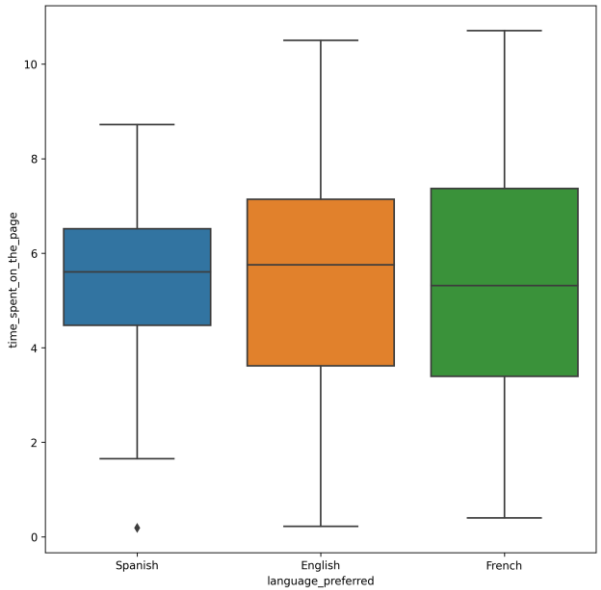
Conversion status vs Time spent on the page



- On average users who spend more time on the website got converted
- There are outliers in users who got converted
- There are outliers in the upper side on users who were not converted

Exploratory Data Analysis

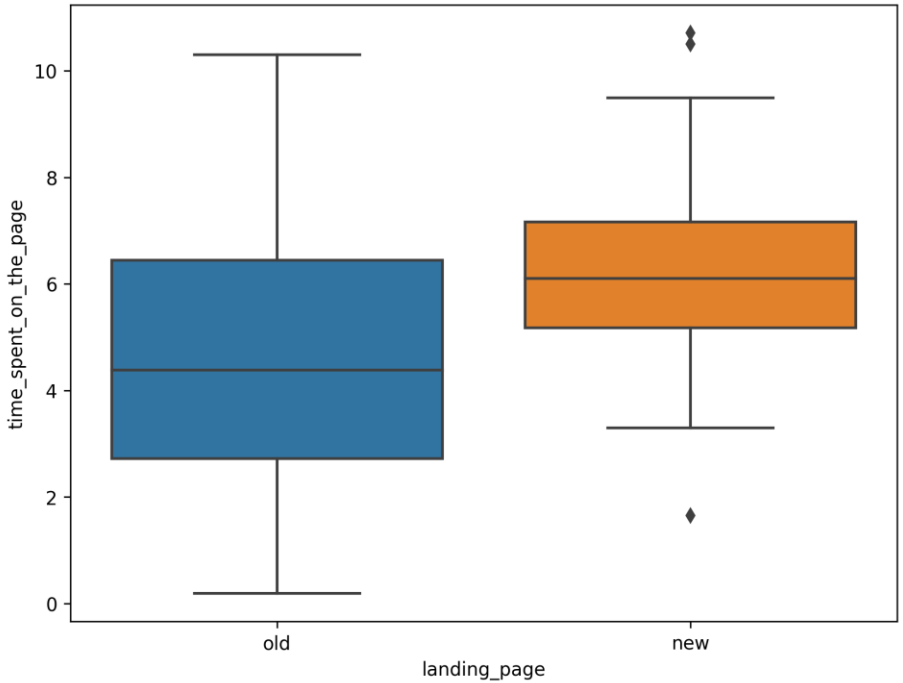
Language preferred vs Time spent on the page



- Users who speak English spend more time on the website, followed by French speaking users then Spanish speaking users
- There are outliers on the lower side for Spanish speaking users

Hypothesis Testing

1. Testing the hypothesis that users spend more time on the new landing page or on the existing landing page



- Users spend more time on the website with the new landing page

Hypothesis Testing

Let $\mu 1$ and $\mu 2$ be the mean time spent on the old landing page vs the mean time spent on the new landing page

Thus,

- Null hypothesis

$H0$: $\mu 1 = \mu 2$

- Alternate hypothesis

Ha: $\mu 1 > \mu 2$

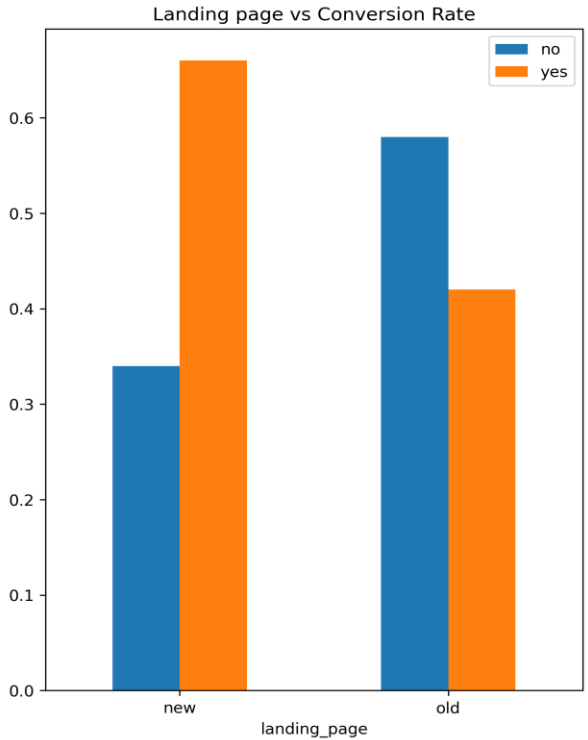
Hypotheses Testing Results and Inference

We did two independent sample T-test for equality of means where standard deviation is unknown, considering α as 0.05, following are the results we received:

- The sample standard deviation of the time spent on the new page is 1.82 and on the old page it is 2.58
- As the p-value 0.00013 is less than the level of significance which is 0.05. Hence, we reject the null hypothesis
- This means that the new landing page encourages users to spend more time significantly.

Hypothesis Testing

2. Testing the hypothesis if the conversion rate for the new page is greater than the conversion rate for the old page



- It can be observed that users engaging with the new landing page are more likely to convert than those using the old landing page.

Hypothesis Testing

Let $p1$ and $p2$ be the proportions of converters in old landing page and new landing page respectively

Thus,

- Null hypothesis

$H0: p1 = p2$

- Alternate hypothesis

$Ha: p1 \neq p2$

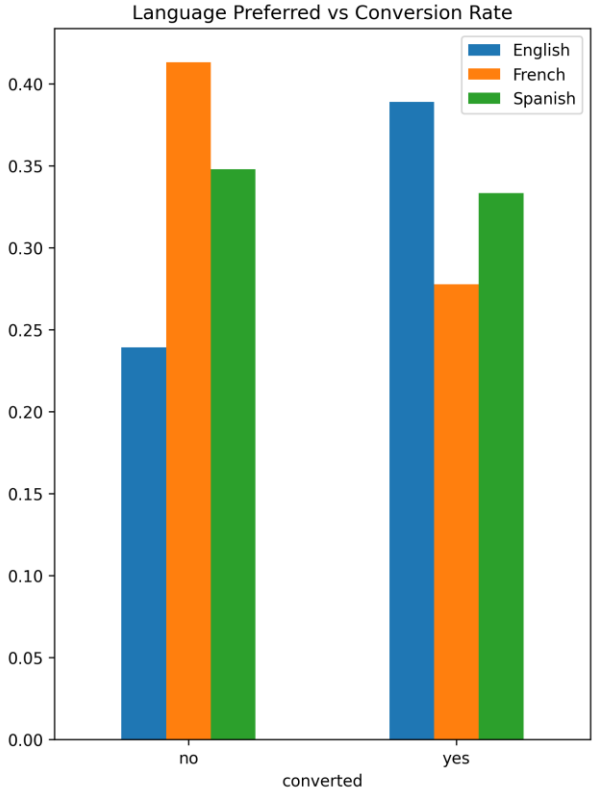
Hypotheses Testing Results and Inference

We did two independent sample Z-test for proportions, and we selected α as 0.05, following are the results we received:

- The number of users served the new and the old pages are 50 and 50 respectively
- As the p-value 0.0080 is less than the level of significance which is 0.05, we reject the null hypothesis
- We do have enough statistical evidence that the conversion rate for the new landing page is greater than the conversion rate in the old landing page

Hypotheses Testing

3. Testing the hypothesis if the converted status depend on the preferred language



- We can observe that English speaking users were converted more than other languages speaking users.
- The converted status doesn't seem to have much of an effect on French and Spanish users but does play more of a role with English speaking users.

Hypothesis Testing

- Null hypothesis

$H0$: Conversion is independent of language

- Alternate hypothesis

Ha: Conversion is NOT independent of language

Contingency Table

language_preferred converted	English	French	Spanish
no	11	19	16
yes	21	15	18

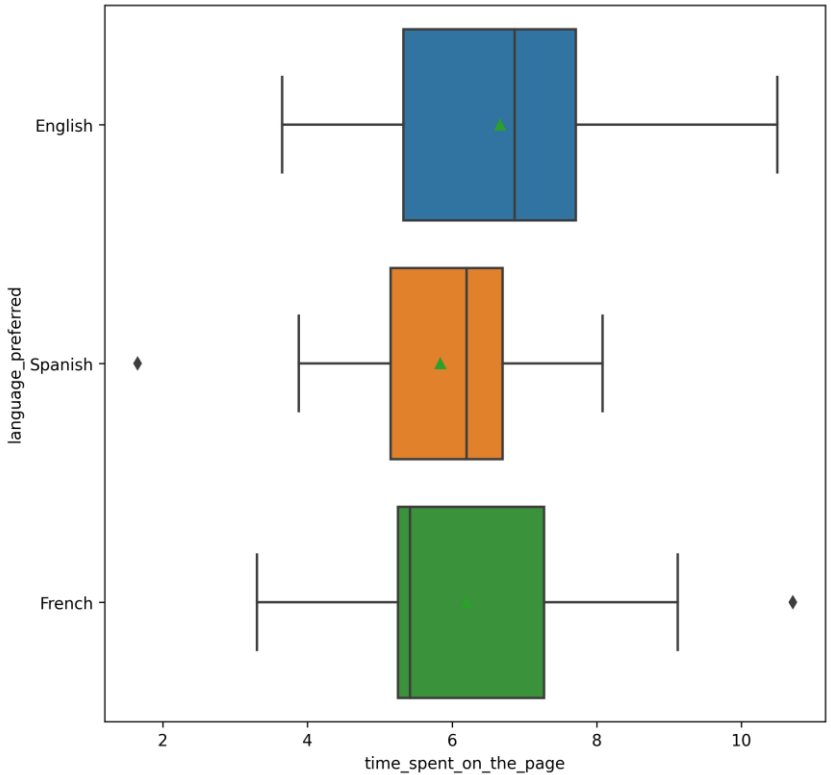
Results and Inference

We did Chi-Square test of independent, and we selected α as 0.05, following are the results we received:

- As the p-value 0.213 is greater than the level of significance which is 0.05, we fail to reject the null hypothesis
- We do have enough statistical evidence that the conversion is independent of the languages

Hypothesis Testing

4. Testing the hypothesis that the time spent on the new page same for the different language users



- There is a difference on time spent on the new landing page for the different languages
- On average English-speaking users spend more time on the new landing page
- There are outliers in the lower side for Spanish speaking users and in the upper side for French speaking users

Hypothesis Testing

Let $\mu 1$ and $\mu 2$ be the means of time spent on the new landing page for language preferences English, Spanish and French, respectively.

Thus,

- Null hypothesis

$H0$: $\mu 1 = \mu 2 = \mu 3$

- Alternate hypothesis

Ha: At least one average time spent on the new landing page is different from the rest.

Hypotheses Testing Results and Inference

We did ANOVA test , and we selected α as 0.05, following are the results we received:

- The number of users served the new and the old pages are 50 and 50 respectively
- As the p-value 0.432 is greater than the level of significance which is 0.05, we fail to reject the null hypothesis
- This means that the time averages on the new landing page for the different languages are relatively the same.

Conclusions:

- On average user spend 5.38 minutes on the website, the minimum time spent on the website is 0.19 minutes and maximum is 10.71 minutes. 75% of visits spend 7.02 minutes or less on the website
- Both Spanish and French are the most preferred languages with 34% then English follow with 32%
- We observed that are no missing values and duplicated values in the DataFrame
- 50% of users spend 5.7 minutes and more on the website, the distribution of time spent on the website is slightly left skewed
- 54% of users were converted after visiting the website
- On average users in the treatment group spend more time on the website compared to users in the control group

Conclusions:

- On average users spend more time on the website with new landing page vis a vis the old landing page and the users who spend more time on the website got converted. There are outliers in the time spent on website with new landing page

- Users who speak English spend more time on the website, followed by French speaking users then Spanish speaking users. There are outliers on the lower side for Spanish speaking users in the control group visited only the website with old landing page whereas Visitors in the treatment group visited only the website with new landing page. There are more converted users in the new landing page

- Most users speak French and Spanish in both control and treatment group. English speaking users are the most converted and French speaking users are the least converted

- We do have enough statistical evidence that users spend more time in the new landing page and the conversion rate for the new landing page is greater than the conversion rate in the old landing page, and the conversion is independent of the languages

- Even if the time spent on the new page for the 3 languages seems to be different, We do not have enough statistical evidence to prove that.

Recommendations:

- E-news Express should go with the website with the new landing page because:
  - Users spend more time on the website with the new landing page.
  - Conversion rate is high on the website with the new landing page.

- E-news Express should find a way of reaching more users who speak English as they spend more time on the website with new landing page; they are also the most converted after visiting the website with new landing page.

- E-news Express should also increase their visibility or advertise their portal to users who speak Spanish and French as most users who visited the website with the new landing page speak those 2 languages.

Great Learning

Happy Learning !