

Funnel Analysis of E-commerce website with real data



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Summary

In this article, I used python to do Funnel analysis to find out potential reasons that stop our sales or conversion rate from growing and give some feasible advises to our CEO.

Our problem

We are looking at data from an e-commerce website. The site is very simple and has just 4 pages:

1. The first page is the **home page**. When you come to the site for the first time, you can only land on the home page as a first page.
2. From the home page, the user can perform a search and land on the **search page**.
3. From the search page, if the user clicks on a product, she will get to the **payment page**, where she is asked to provide payment information in order to buy that product.
4. If she does decide to buy, she ends up on the **confirmation page**

The company CEO isn't very happy with the volume of sales and, especially, of sales coming from **new users**. Therefore, she asked you to investigate whether there is something wrong in the conversion funnel or, in general, if you could suggest how conversion rate can be improved.

[1] <https://www.kaggle.com/aerodinamicc/ecommerce-website-funnel-analysis>

Our data set

Data set overview

We have 5 files, 4 of them contains page_visit information and 1 of them contains user information.

page_visit information files:

Example:

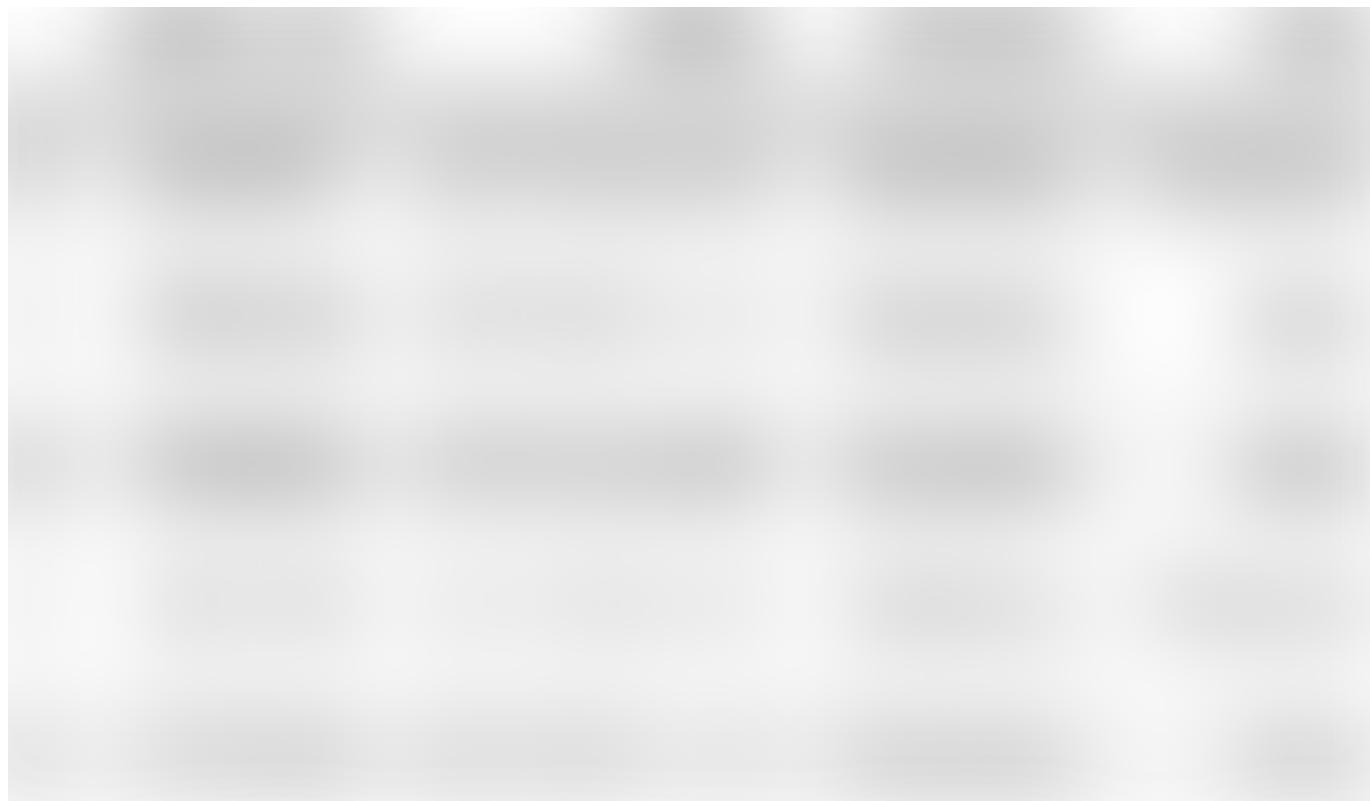
	user_id	page
0	313593	home_page
1	468315	home_page

2	264005	home_page
3	290784	home_page
4	639104	home_page

- home_page_table.csv
- search_page_table.csv
- payment_page_table.csv
- payment_confirmation_table.csv

user_information page

- user_table.csv



Data massaging and feature engineering

First thing I do is to merge these 4 tables together by user_id. And created 4 new columns indicating whether a user is in home_page(of course all 1), search_page, payment_page, confirmation_page, 1 indicating that one person is in this page and 0 other wise.

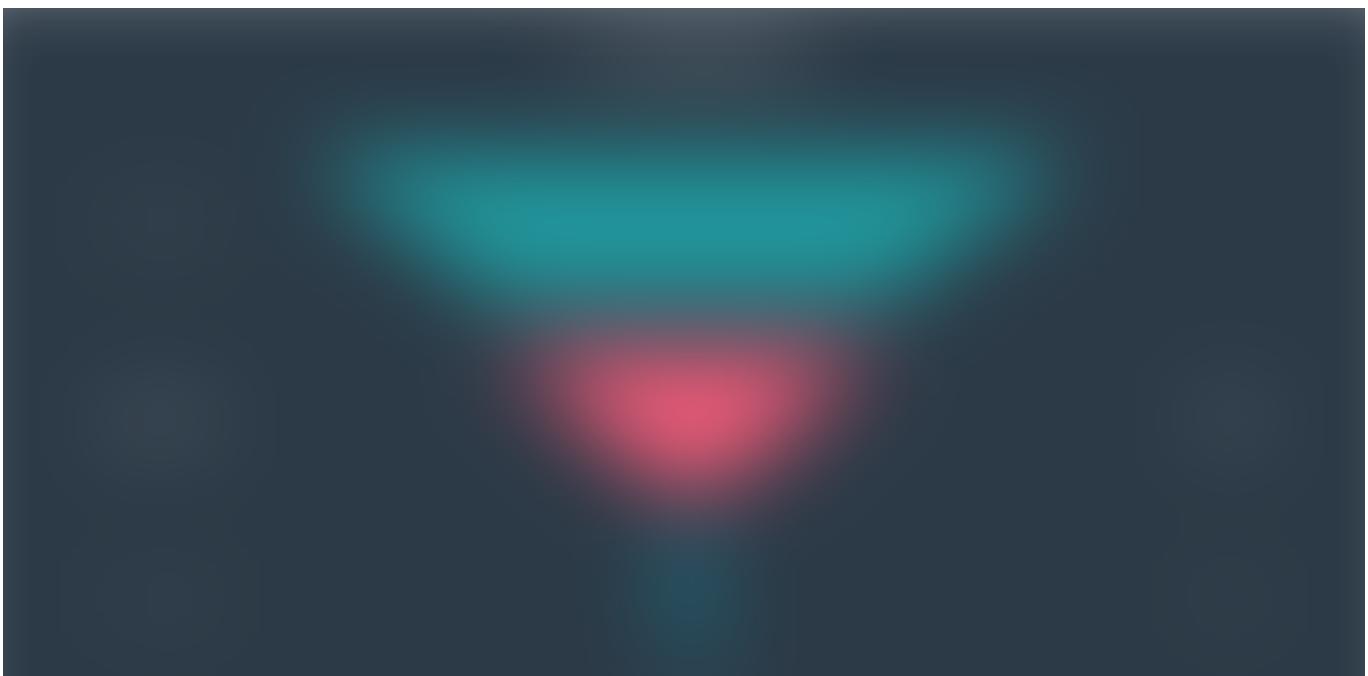
Solving problems

How's the overall Funnel looks like?

First thing first, we should have a general idea of what the **Funnel** looks like without any further segmentation, by doing this, hopefully we can answer the following questions:

- What's the conversion rate of each process? It is healthy enough?
- Through which process we lost the most customers?

By doing this, I used Python package *plotly* to do the visualizations.



From the Funnel chart above we can see that:

- Only 50% of customers get to search page, 13.3% get to payment page from search page and only 7.5% of customers get to payment confirmation page from payment page.
- The Funnel doesn't look very healthy for me
- We lost too many customers on the transformation from search page to payment page and the transformation from payment page to payment confirmation page

So Why is that? What factors are causing the small conversion rate?

Segmentation analysis

To dig into the reasons, we have to do segmentation analysis to segment the data and see which section perform the worst concerning to conversion rate.

Based on what we have in our data set, I will do the following:

- Trend analysis: How conversion changed over time? Is there some abnormal date particular?
- Customer segmentation

Based on Gender

Based on Devices

- Combination of Trend and Customer segmentation

Trend Analysis

Home page visitors

Firstly, Let's take a lot at how the number of visitors of the home page changed over time.



From the Time series plot above we can see that, **there is a rise of visitors on Feb 1 and a obvious drop on Mar 1.**



However, although the time series shows clear cut on Feb 1 and Mar 1, but the volatility of the number of visitors shows not clear pattern.

Conversion rate over time

After analyzed the trend of home page visitors, now I do a analysis on the trend of conversion rate .

In terms of the initial conversion rate, payment page and payment confirmation page are very low from the very beginning.(Only 10–20%)

Clearly, there is a HUGE DROP of conversion rate from home page to search page on Mar 1 and also a CLEAR DROP of conversion rate from payment page to confirmation page on Mar 1 as well.

Customer segmentation

From the trend analysis we know that besides constantly low conversion rate on payment and payment confirmation pages. There MUST BE something happened on **MAR 1**. Furthermore, we should also get a better understanding of which group of customers are mainly causing the decrease of conversion rate, that leads to our customer segmentation analysis.

Based on Gender group

Using the same method to draw the Segmented Funnel



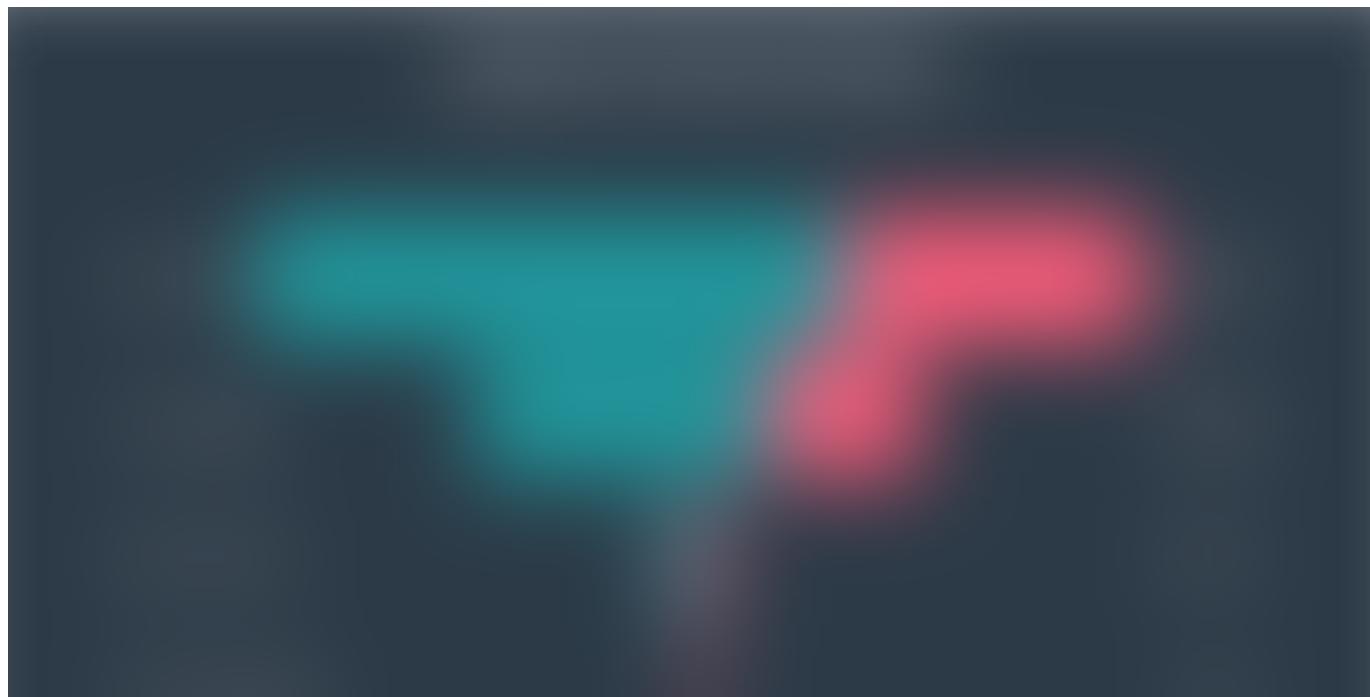
We can see that the segmented funnel chart is quite balanced, meaning that **gender might not be a factor that drive the decrease of conversion rate**.



To see how the conversion rate changed overtime within each group and make a comparison. Let's take a look at the chart above, we can see that, align with our finding above, there is no huge distinction between the trend of conversion rate of Male group and Female group, they all changed in same direction. Now it is concrete to say that **gender might not be a factor that drive the decrease of conversion rate.**

Based on devices

Besides comparing male and female group, we should also compare the difference between mobile and desktop users.



Unlike the segmented funnel of gender, this funnel segmented by Devices is very unbalanced. Few things can be observed:

- **More users are using Desktop rather than mobile**
- **Desktop conversion rate changed more significant than mobile on payment page**

To further investigate, let's look at the trend of conversion rate through time of those two groups. Few things to noted:

- **Mobile Conversion rate on payment page and search page are both higher than Desktop**

- There is a huge drop(almost 60%) of conversion rate on MAR 1 of Mobile device on search page and drop of conversion rate on Desktop on payment page.

Conclusion & Recommendation

After our thorough analysis, we can address our CEO's concerns, specifically in two directions.

Acquire new users

Based on our finding, the number of visitors visiting our home page is quite volatile. We can observed some plump of visitors, like on Feb 1st. **If we want to acquire some new users, maybe we can check those time points that our visitors go up and see what are actually causing that , maybe we did some promotion? Maybe we did some A/B testing, maybe some new products launched, and then we can try do adjust and implement those visitor-growing activities.**

Besides, Most of our visitors access our website through Desktop, **if we want to acquire new users, maybe we can start from acquiring more mobile users.**

Improve conversion rate

Situation

- There is a sharp drop of conversion rate on search page(20%) and payment page(10%) on Mar 1st.
- Conversion rates on **payment page and payment confirmation page** are constantly low, which are between 20% to 10%
- Conversion rate on search page on Desktop is 20% less than the conversion rate on Mobile devices.
- The sharp drop of conversion rate on search page mainly came from the Mobile side and the decrease of conversion rate on confirmation page was mainly due to Desktop

Actions

- Find out what happened on Mar 1st, did we ran some AB testing or modification on that day?
- Access and evaluate our payment and payment confirmation process both on mobile and desktop version, find out what's stopping our customers to move from the current phase to the next, a mouse heat map maybe helpful.
- Do some modification and updates of the search page on Desktop version

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