AB testing can help with optimizing website or mobile app. However, it can be used also for other scenarios such as determining probability threshold for second time conversion rate. After building churn prediction what is the best probability threshold to encourage user to contact with the business. AB testing cannot tell you if you miss something. It compares old to new design / method / style.

In this project due to data availability I will concentrate on introducing new feature on the website. You will exposure new and existing user to 2 different versions old, called control and the new method, called test group and will measure response from the user. In the current version we have gate on level 30 and we want to test if this gate would be good to put on level 40 or keep in the old place.

Important is to check if the number of users in control and each of the tests groups is similar. In our case it is but if the number of user in each of the cases is different it is better to convert into probabilities. For example CTR = number of clicks / number of page views or similarly we could use number of retention / number of users in the group. Since the CTR may count users more than once depending on how many times they visit the website we may want to use click through probability, rather than CTR, defined by unique visitors who clicked / unique visitors to page.

1. Formulating hypothesis.

Hypothesis is made of two words: hypo – under / less than and thesis – refer to place / generally held view. It is effective way to use this fact when writing hypothesis. I will refer to this way of writing the hypothesis:

**Writing the “If” section of your Hypothesis**1. Start your sentence with the word “If”  
2. Write down one of the variables  
3. Connect statement with one of the following:  
\* is related to  
\* is affected by  
\* causes  
**Write down other variables**  
**Writing the “then” section of your Hypothesis  
1.** Make a comment on the relationship between those two variables.

**Primary hypothesis** - main hypothesis of our interest

H0: If sum\_gamerounds is related to version then by placing the gate at level 40 we will change the average sum\_gamerounds.

HA: If sum\_gamerounds is not related to version then by placing the gate at level 40 we will not change the average sum\_gamerounds.

**Secondary hypothesis** – this can be related to the variable from primary hypothesis. For example with the increase of sum game rounds that player played can decrease the retention date if we will take on account time that user needs to play for completing each round.

H0: If retention rate is affected by version of game where gate is placed on different stage, then by placing the gate at level 40 we will change the retention rate.

HA: If retention rate is not affected by the version of game then placing the gate at level 40 will not change the retention rate.

**Statistics behind AB testing.**

The distribution of AB test can be seen as Binomial – success or failure of the experiment. Either retention rate increased or not, either number of games played increased or not.

Mean = µ = and SEmean = We can use binomial distribution if: there are two outcomes success or failure, Ho or HA, the events are independent and the events follow an identical distribution <probability of success needs to be identical for all of them>

First we calculate statistics in the control group as that’s what we know. In our example we can see that probability of retention day 1 in the control group is 0.448 while retention day 7 is 0.190 . 99% confidence interval means that if we would theoretically repeat the experiment over and over again we would expect our interval around the sample mean to cover true value of population 99% of time. Use normality assumption for calculating confidence interval for retention rate at control group I need to use the rule of thumb that if N\*p > 5 I can use normal distribution In our case is much more than that. This means that if you run experiment again with similar number of players the number of retention in day 1 would be between 19,763 and 20,305 players and in day 7 between 8,288 and 8,716 players.