

Домашняя работа 6

Задание 1:

Продакт на главной mail.ru решил протестировать в рекомендательной ленте контента вместо карточек со статьями видеоплеер с короткими видео.

Нынешний таймспент на юзера в день в среднем равен 25 минут, а стандартная ошибка (SD) равна 156.

Мы предполагаем, что в новой версии таймспент на юзера в день изменится на 10%.

Средний трафик 20000 человек в день.

Посчитайте, сколько дней необходимо держать эксперимент при $\alpha = 5\%$ и $\beta = 20\%$.

```
In [7]: import math
```

```
In [2]: ts1 = 25 # time spent per user
ts2 = 25*1.1
sd = 156
ts1, ts2
```

```
Out[2]: (25, 27.500000000000004)
```

Calculate

Visualise

Tabulate

Input Values

Select one of the two options to specify input values. Hover over the ? sign to obtain help.

☒ Expected Means ?

Mean of the Reference Group: ?

25

Mean of the Test Group: ?

27.5

Standard Deviation: ?

156

☐ Expected Difference between Means ?

Click the Options button to change the default options for Power, Significance, Alternate Hypothesis and Group Sizes. Use the Adjust button to adjust sample sizes for t-distribution (option applied by default), and clustering.

▶ Calculate

Options

Adjust

↺ Reset

Results and Live Interpretation

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Assuming a pooled standard deviation of 156 units, the study would require a sample size of:

77858

for each group (i.e. a total sample size of 155716, assuming equal group sizes), to achieve a power of 80% and a level of significance of 5% (two sided), for detecting a true difference in means between the test and the reference group of 2.5 (i.e. 27.5 - 25) units.

In other words, if you select a random sample of 77858 from each population, and determine that the means of the test and the reference groups are 27.5 and 25 units, respectively, and the standard deviation is 156 units, you would have 80% power to declare that the two groups have significantly different means, i.e. a two sided p-value of less than 0.05.

Reference: Dhand, N. K., & Khatkar, M. S. (2014). Statulator: An online statistical calculator. Sample Size Calculator for Comparing Two Independent Means. Accessed 27 April 2023 at <http://statulator.com/SampleSize/ss2M.html>

Note: Statulator used the input values of a power of 80%, a two sided level of significance of 5% and equal group sizes for sample size calculation and adjusted the sample size for t-distribution. You may change the options by clicking [here](#) or the 'Options' button and the adjustments by clicking [here](#) or the 'Adjust' button.

```
In [4]: print('The test requires: {:,} users.'.format(77858*2).replace(',', ' '))
```

The test requires: 155 716 users.

```
In [11]: print("aDAU = {:,}. The number of days required for test is: {:,} days.".format(20000, 8))
aDAU = 20 000. The number of days required for test is: 8 days.
```

Задание 2:

Наша продуктовая команда в ecommerce магазине планирует запустить тест, направленный на ускорение загрузки сайта.

Одна из основных метрик bounce rate в GA = 40%.

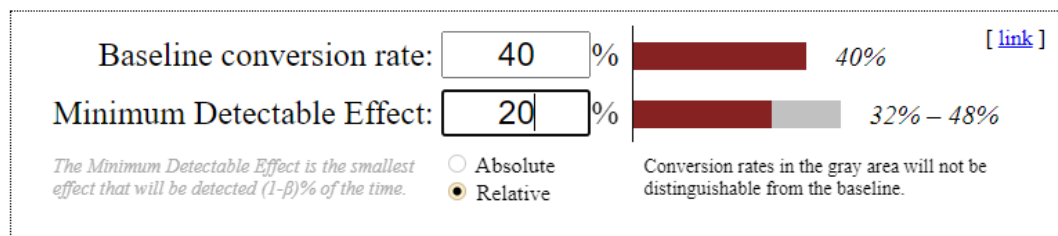
Мы предполагаем, что при оптимизации сайта она изменится минимум на 20%.

Средний трафик 4000 человек в день.

Посчитайте сколько нам нужно дней держать эксперимент при $\alpha = 5\%$ и $\beta = 20\%$

```
In [ ]: br1 = 0.4  
delta = 0.2
```

Question: How many subjects are needed for an A/B test?



Sample size:

592

per variation

Statistical power $1-\beta$: 80% *Percent of the time the minimum effect size will be detected, assuming it exists*

Significance level α : 5% *Percent of the time a difference will be detected, assuming one does NOT exist*

```
In [12]: print('The test requires: {:,} users.'.format(592*2).replace(',', ' '))
```

The test requires: 1 184 users.

```
In [14]: print("aDAU = {:,}. The number of days required for test is: {:,} day(s)".format(aDAU, days))  
aDAU = 4 000. The number of days required for test is: 1 day(s).
```