A/B testing

STATISTICAL THINKING IN PYTHON (PART 2)

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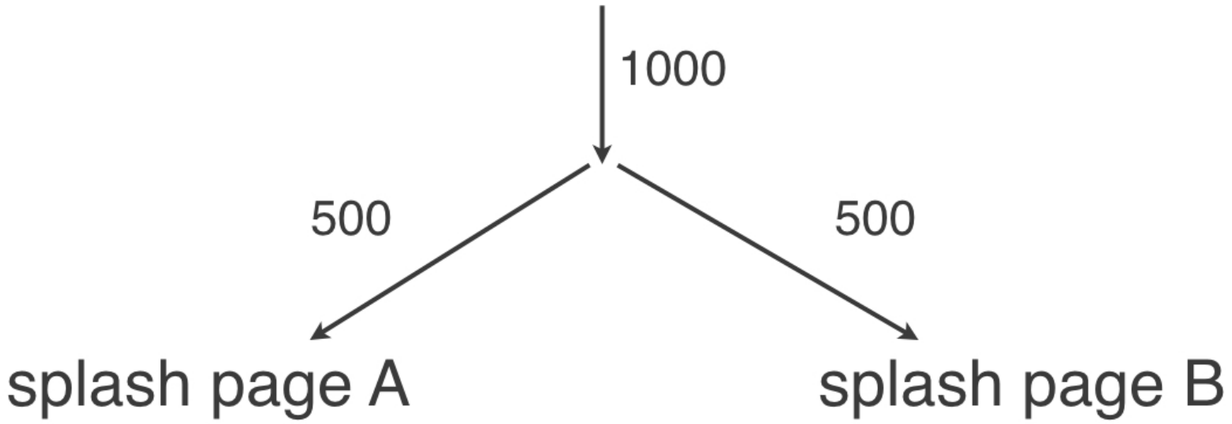
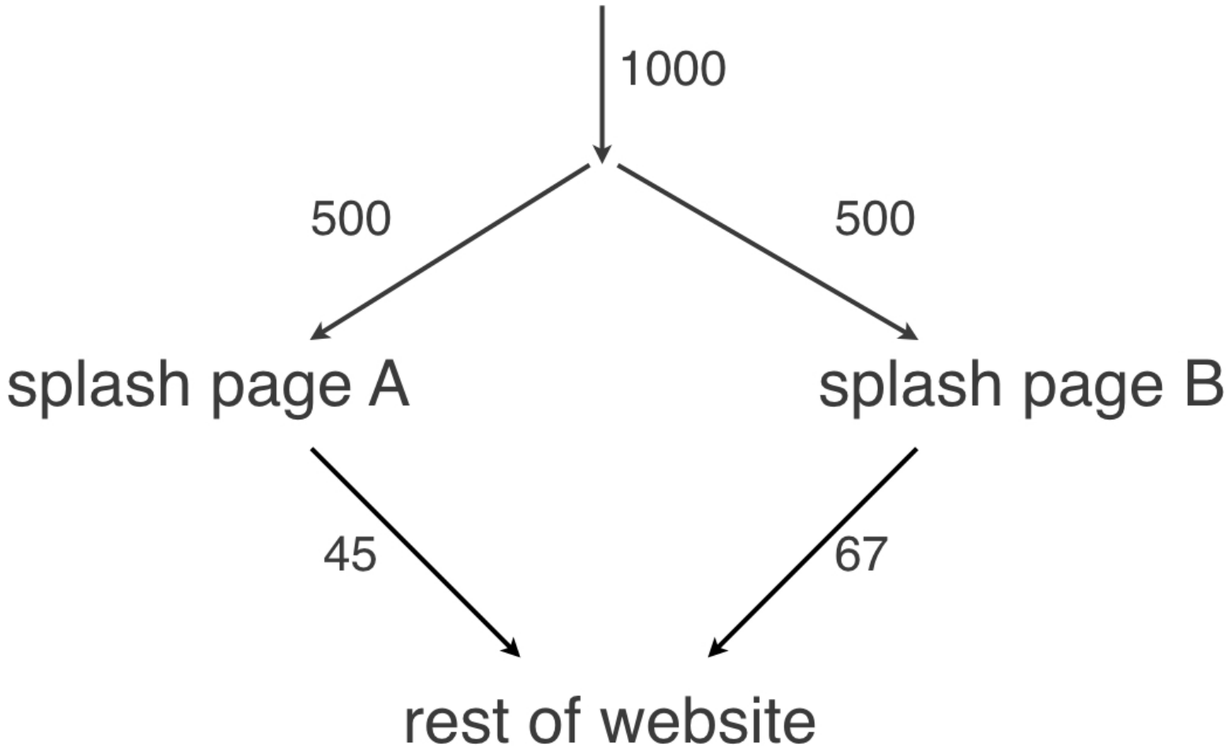
datacamp

Is your redesign effective?



Is your redesign effective?



Null hypothesis

- The click-through rate is not affected by the redesign

Permutation test of clicks through

```
import numpy as np
# clickthrough_A, clickthrough_B: arr. of 1s and 0s
def diff_frac(data_A, data_B):
        frac_A = np.sum(data_A) / len(data_A)
        frac_B = np.sum(data_B) / len(data_B)
        return frac_B - frac_A
diff_frac_obs = diff_frac(clickthrough_A,
                          clickthrough_B)
```

Permutation test of clicks through

```
perm_replicates = np.empty(10000)
for i in range(10000):
     perm_replicates[i] = permutation_replicate(
                 clickthrough_A, clickthrough_B, diff_frac)
p_value = np.sum(perm_replicates >= diff_frac_obs) / 10000
p_value
```

```
0.016
```

A/B test

- Used by organizations to see if a strategy change gives a better result

Null hypothesis of an A/B test

- The test statistic is impervious to the change

Let's practice!

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Test of correlation

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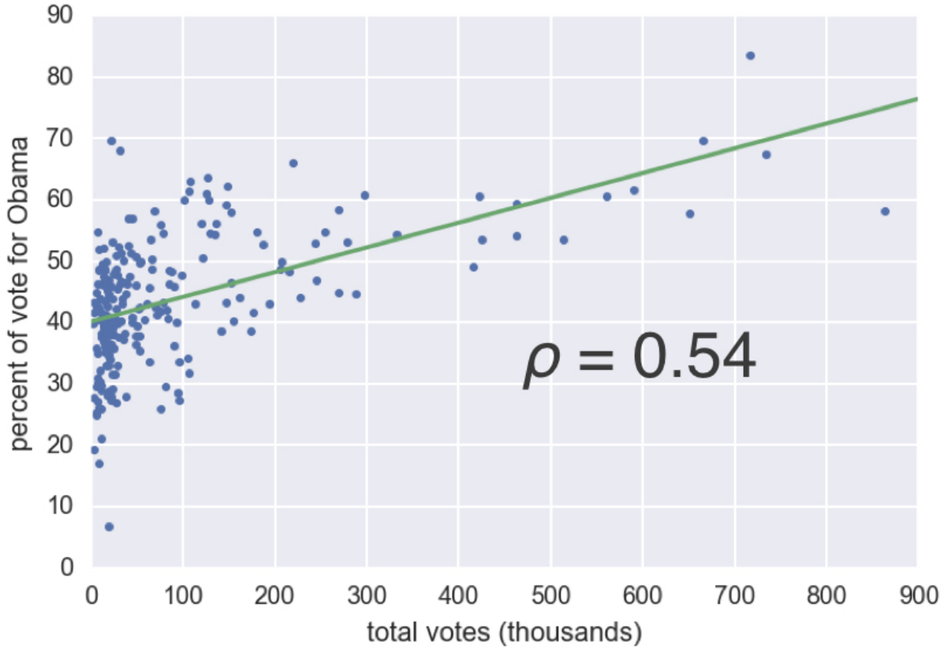
2008 US swing state election results

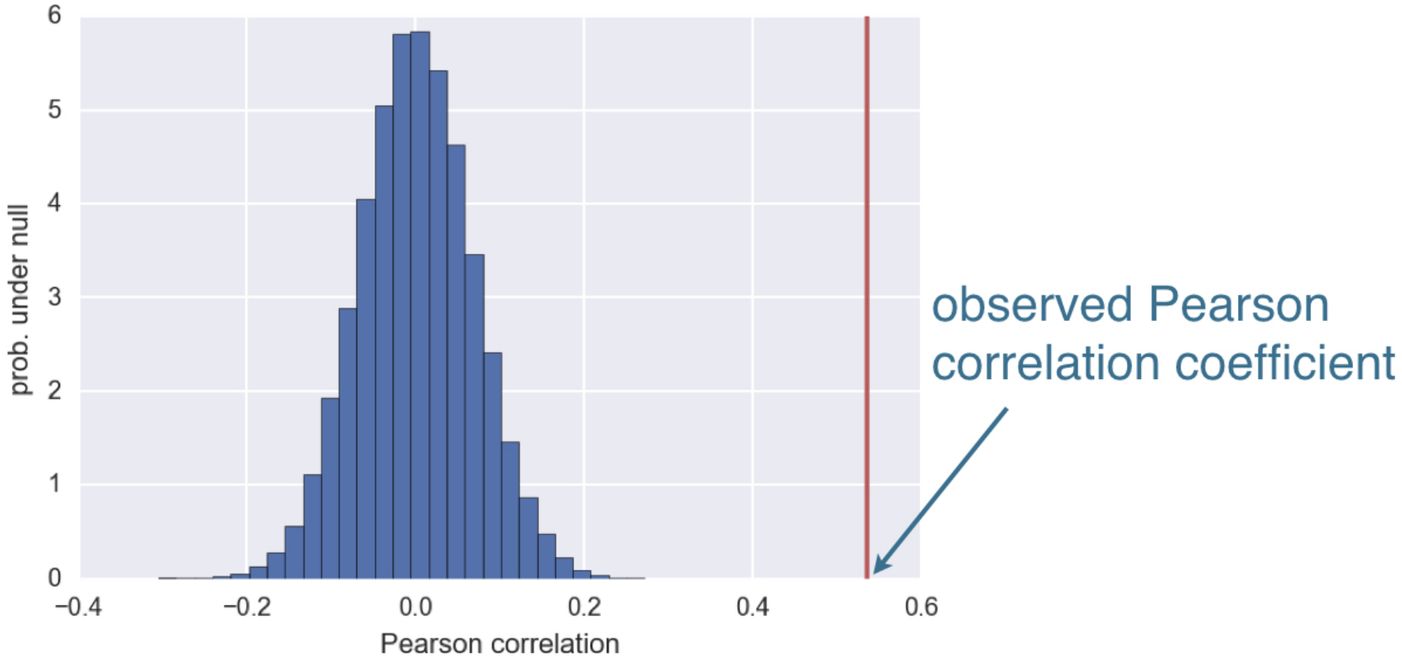


[1] Data retrieved from Data.gov (https://www.data.gov/)

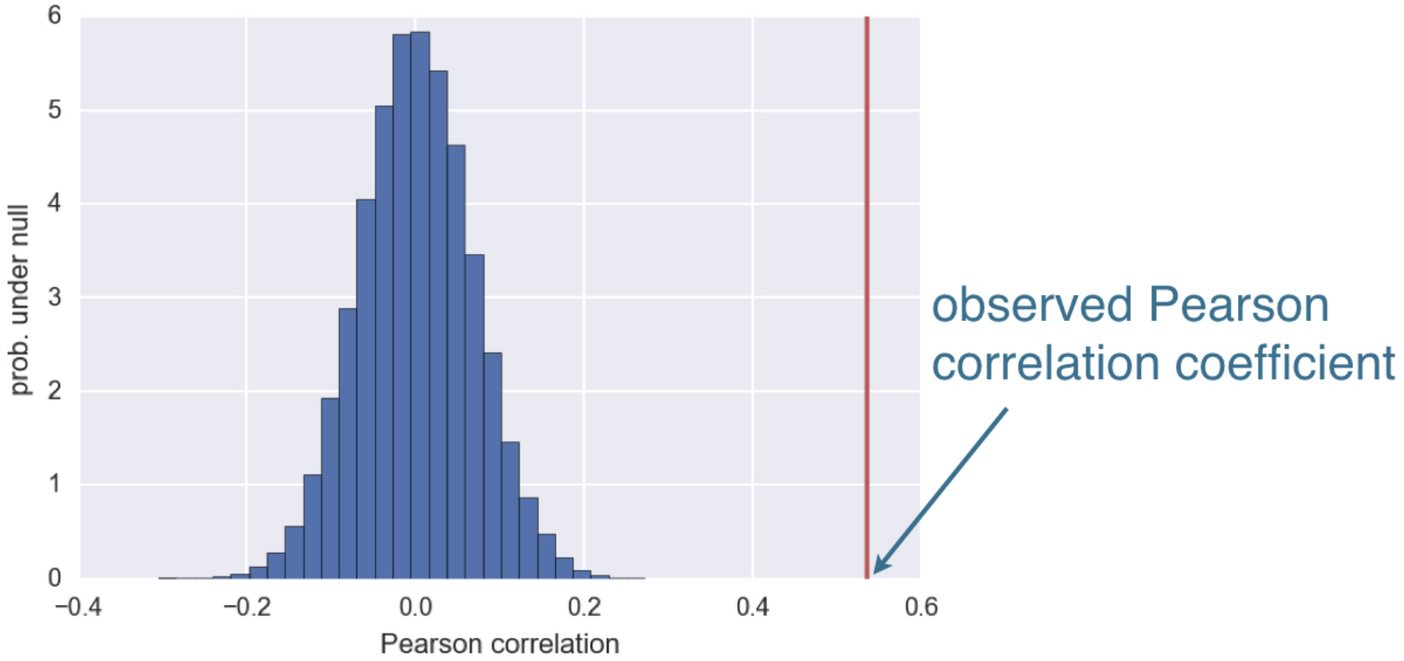
Hypothesis test of correlation

- Posit null hypothesis: the two variables are completely uncorrelated
- Simulate data assuming null hypothesis is true
- Use Pearson correlation, ρ, as test statistic
- Compute p-value as fraction of replicates that have ρ at least as large as observed.

More populous counties voted for Obama



More populous counties voted for Obama



p-value is very very small

Let's practice!

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