

ABtest

October 26, 2024

Use a dynamic simulation to vary the sample sizes n [100, 1000, step = 50] and click-through rates c [50, 600, step = 10] for Versions A and B. Observe how the p-value and hypothesis test decision change as you modify these parameters.”

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[2]: import numpy as np
import ipywidgets as widgets
from IPython.display import display

import scipy.stats as stats
import matplotlib.pyplot as plt

# Function to perform the hypothesis test and plot the results
def update_plot(n, c):
    # Generate random data for Versions A and B
    np.random.seed(0)
    version_a = np.random.binomial(1, c/1000, n)
    version_b = np.random.binomial(1, c/1000, n)

    # Perform t-test
    t_stat, p_value = stats.ttest_ind(version_a, version_b)

    # Clear the previous output
    out.clear_output()

    with out:
        # Print the results
        print(f"Sample Size: {n}, Click-Through Rate: {c}")
        print(f"T-Statistic: {t_stat}, P-Value: {p_value}")
        if p_value < 0.05:
            print("Reject the null hypothesis (significant difference).")
        else:
            print("Fail to reject the null hypothesis (no significant_
↵difference).")

    # Plot the data
    plt.figure(figsize=(10, 5))
    plt.hist(version_a, alpha=0.5, label='Version A')
    plt.hist(version_b, alpha=0.5, label='Version B')
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plt.legend(loc='upper right')
plt.title('Histogram of Click-Through Rates')
plt.xlabel('Click')
plt.ylabel('Frequency')
plt.show()

# Create the interactive widgets
n_slider = widgets.IntSlider(value=100, description='Sample Size (n)', min=100,
    ↪max=1000, step=50)
c_slider = widgets.IntSlider(value=50, description='Click-Through Rate (c)',
    ↪min=50, max=600, step=10)
ui = widgets.VBox([n_slider, c_slider])
out = widgets.Output()

# Link the widgets to the update function
widgets.interactive_output(update_plot, {'n': n_slider, 'c': c_slider})

# Display the widgets and output
display(ui, out)

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VBox(children=(IntSlider(value=100, description='Sample Size (n)', max=1000,
    ↪min=100, step=50), IntSlider(valu...

```

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Output()

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[ ]:

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