

A/B Testing for Conversion Rate Analysis

Data Analysis Internship - Project 2

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Objective



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To analyze whether a new webpage design (Variant B) performs better than the original version (Variant A) in terms of **conversion rate** using A/B testing.



Method:

- Simulate user behavior
- Calculate conversion rates and confidence intervals
- Perform hypothesis testing using z-test



Data Simulation



We simulated data using Python for 10,000 visitors on each variant.

Used `np.random.binomial()` to simulate real-world results.

Variant	Total Visitors	Assumed CR	Simulated Conversions
A	10,000	10%	1000
B	10,000	12%	1200

Conversion Rates & Confidence Intervals

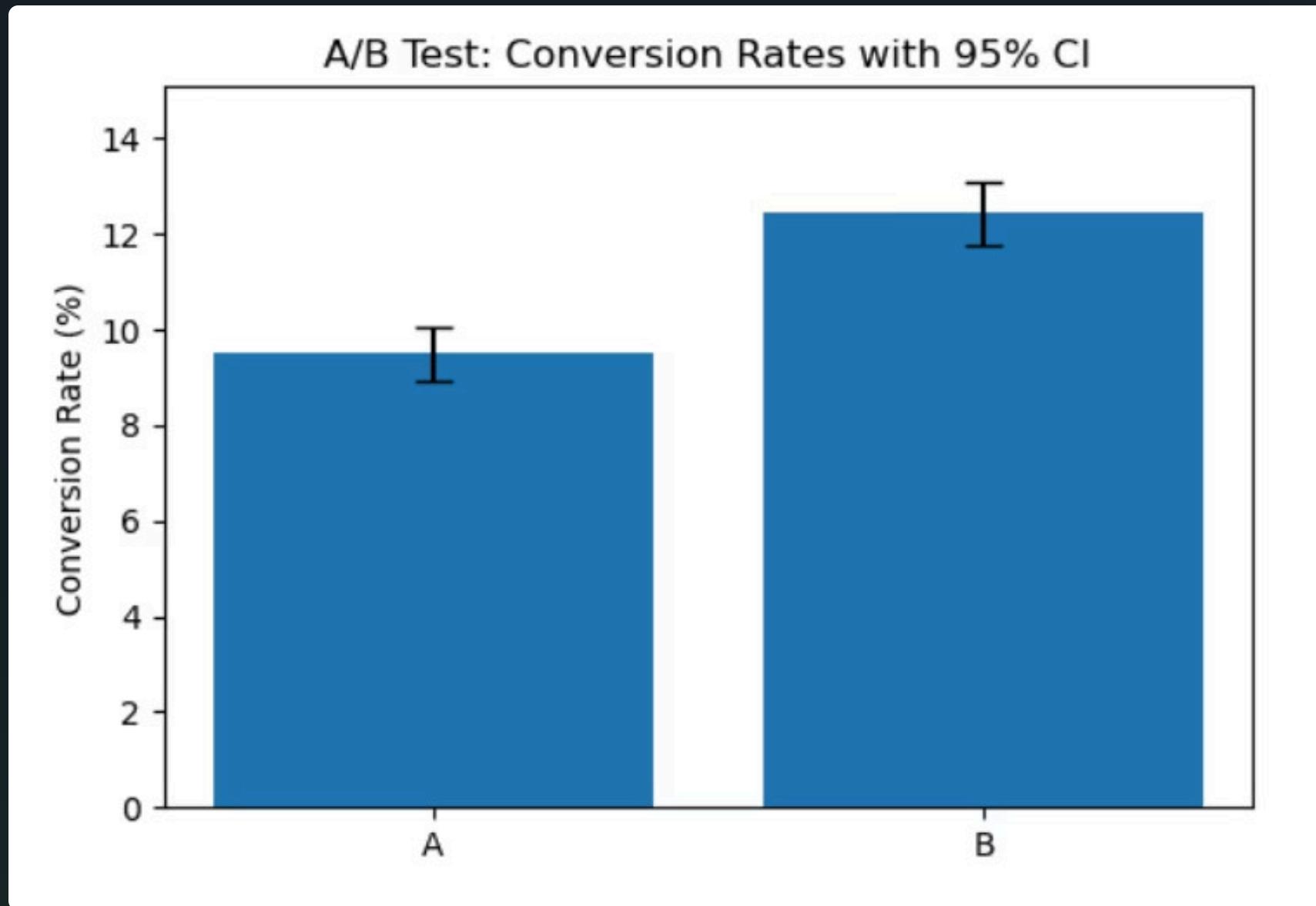
Calculated conversion rates and 95% confidence intervals using a custom function.

These ranges help estimate the **true success rate** for each version.

Variant	Conversion Rate	95% CI (Lower)	95% CI (Upper)
A	·10%	e.g. 9.4%	e.g. 10.6%
B	·12%	e.g. 11.3%	e.g. 12.7%



Visualization



Bar chart showing conversion rate comparison with confidence intervals.

Variant A — 10%

Variant B — 12%

Visual gap suggests Variant B might be statistically better.



Hypothesis Testing

We used a two-proportion **z-test** to test the difference in conversion rates.

Hypotheses:

- H_0 : Variant B is **not** better than A
- H_1 : Variant B **is** better than A

If $p\text{-value} < 0.05$, we reject H_0 .

✓ Result: **Statistically significant improvement** in Variant B

Conclusion & Insights

- Variant B **outperformed** Variant A in conversion rates
- Confidence Intervals did **not** overlap much
- z-test confirmed results were **not by chance**
- 💡 Insight:** A/B testing is a powerful tool to make **data-driven product decisions.**



Tools & Learnings

Tools Used:

- Python
- Numpy
- Pandas
- Matplotlib
- Statsmodels
- Scipy

What I Learned:

- Simulating real data
- Understanding confidence intervals
- Running statistical tests to validate decisions
- Visualizing and interpreting business data