Statistics and Data Analysis

Unit 03 – Lecture 06: Non-parametric Tests and p-value Interpretation

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https://github.com/tali7c/Statistics-and-Data-Analysis

Quick Links

Overview When to Use Common Tests Exercises Demo Summary

Agenda

Learning Outcomes

- Explain why non-parametric tests are used

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- Explain multiple testing risk

When to Use: Key Points

- Skewed data/outliers

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- Small sample and doubtful normality

Common Tests: Key Points

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- 3+ groups: Kruskal-Wallis

Exercise 1: Choose test

Same students before/after training (skewed). Which test?

Solution 1

- Wilcoxon signed-rank

Exercise 2: Practical vs statistical

Very small p-value but tiny difference: what should you report?

Solution 2

- Report effect size and context; significance != importance.

Exercise 3: Multiple testing

20 tests at alpha=0.05: expected false positives?

Solution 3

- About 1 on average.

Mini Demo (Python)

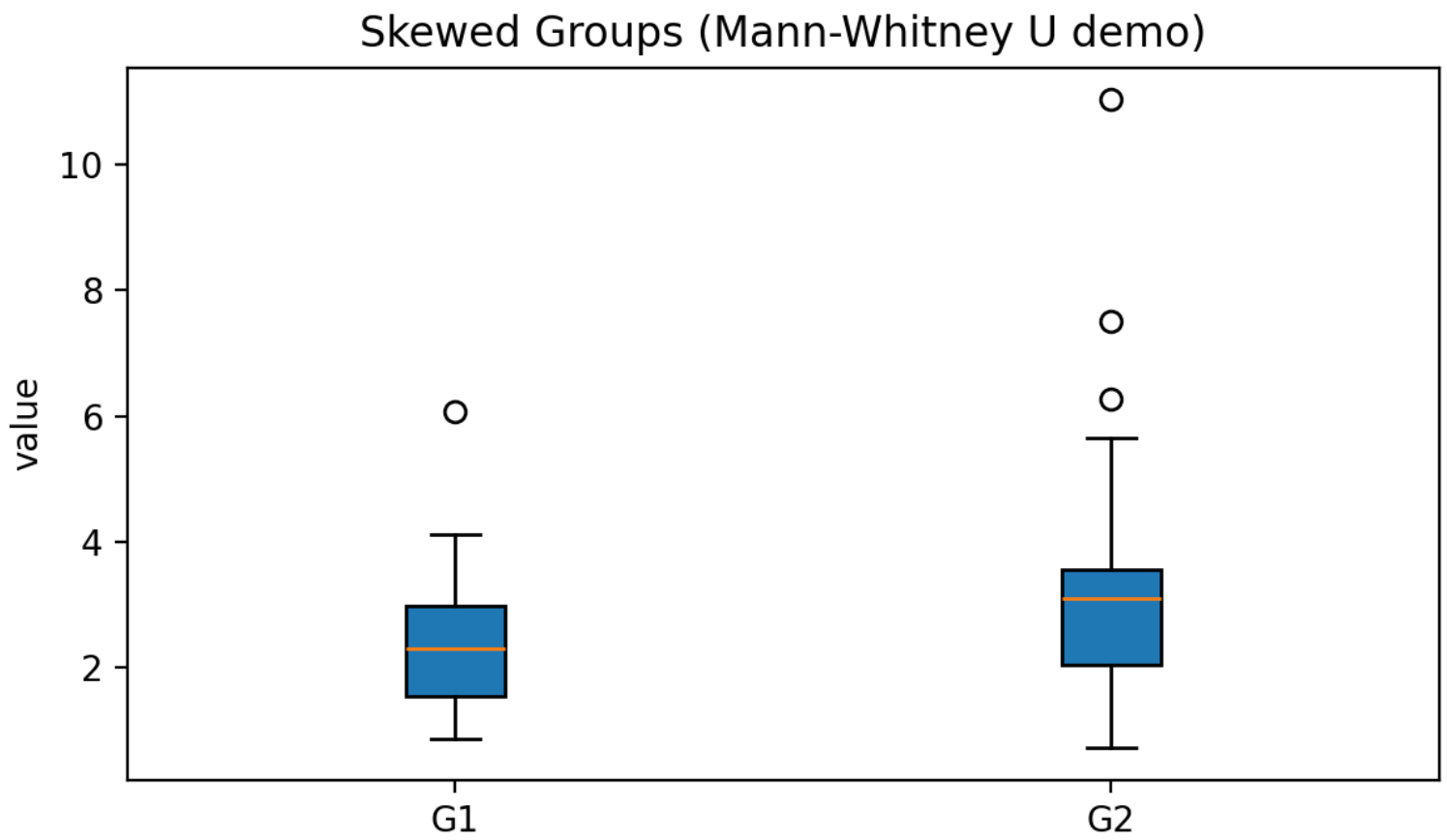
Run from the lecture folder:

```
python demo/demo.py
```

Outputs:

- `images/demo.png`
- `data/results.txt`

Demo Output (Example)



Summary

- Key definitions and the main formula.

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- How to interpret results in context.

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- Key definitions and the main formula.
- How to interpret results in context.
- How the demo connects to the theory.

Exit Question

Give one reason to prefer a rank-based test over a mean-based test.