Statistics and Data Analysis

Unit 06 – Lecture 06: ADF Test for Stationarity

Tofik Ali

School of Computer Science, UPES Dehradun

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

Quick Links

Overview ADF Test Interpretation Exercises Demo Summary

Agenda

Learning Outcomes

- State null and alternative of ADF test (unit root)

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- Interpret ADF p-value for stationarity decision

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- State null and alternative of ADF test (unit root)
- Interpret ADF p-value for stationarity decision
- Apply ADF to original and differenced series (idea)
- Explain why tests are not the only evidence (plots matter)

ADF Test: Key Points

- H0: unit root (non-stationary)

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- H1: stationary

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- H0: unit root (non-stationary)
- H1: stationary
- Small p-value -¿ reject H0

Interpretation: Key Points

- If non-stationary, difference and test again

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- Seasonality can require seasonal differencing

Interpretation: Key Points

- If non-stationary, difference and test again
- Seasonality can require seasonal differencing
- Use ACF/PACF + diagnostics too

Exercise 1: ADF null

What is H0 in ADF?

Solution 1

- Unit root; non-stationary.

Exercise 2: Decision

If p=0.02 at alpha=0.05, what do you conclude?

Solution 2

- Reject H0; evidence of stationarity.

Exercise 3: Next step

If p=0.6, what next step?

Solution 3

- Difference and test again; consider seasonal differencing.

Mini Demo (Python)

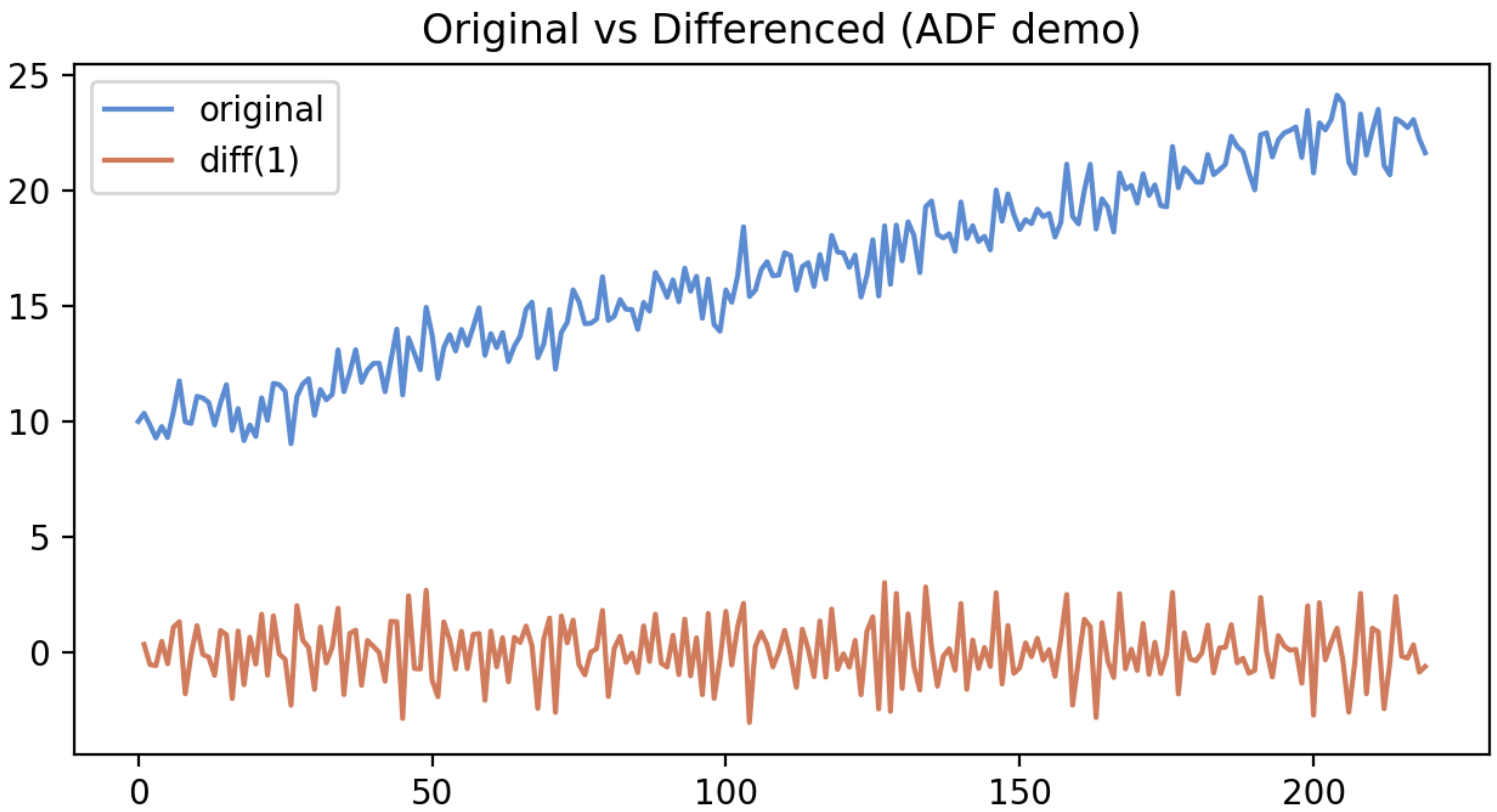
Run from the lecture folder:

```
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

Why should we not rely on only one test to decide stationarity?