CHI-SQUARE TEST FOR VARIANCE

HYPOTHESIS TESTING

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TOPIC OUTLINE

Chi-Square Test for Variance

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The **chi-square test for variance** is a statistical method that compares the **sample variance** to the hypothesized population variance.

Hypothesis

$\boldsymbol{H_o: \sigma_1 = \sigma_o}$

$\boldsymbol{H_a: \sigma_1 \neq \sigma_o}$ (p-value $\leq \alpha$)

Assumptions

- Continuous data
- Normal data and non-normal data

Test Statistic

$$x^2 = (n-1)\frac{s^2}{\sigma^2}$$

where:

n = sample size

s^2 = sample variance

σ^2 = population variance

CHI-SQUARE TEST FOR VARIANCE

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syntax

```
from scipy import stats
```

Left-Tailed Test

```
p_value = stats.chi2.cdf(chi_sq_stat, dof)
```

Right-Tailed Test

```
p_value =
    1 - stats.chi2.cdf(chi_sq_stat, dof)
```

Two-Tailed Test

```
p_value = 2*min(
    stats.chi2.cdf(chi_sq_stat, dof),
    1 - stats.chi2.cdf(chi_sq_stat, dof))
```

EXERCISE

The dataset contains the electricity production in MWh by the following production types:

Type	μ	σ
Nuclear	1283.78	32.50
Wind	779.86	88.28
Hydroelectric	1796.86	96.24
Oil and Gas	1160.69	60.66
Coal	1139.33	42.59
Solar	167.58	36.08
Biomass	55.12	2.13

dataset

"**electricity-normal-sample-cleaned.csv**"

Perform a **chi-square test for variance** to determine whether the variance of electricity production (in MWh) for each production type in the given dataset differs significantly from known population parameters.

LABORATORY