NORMALITY TEST

INFERENTIAL STATISTICS

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TOPIC OUTLINE

Shapiro-Wilk

Anderson-Darling

SHAPIRO-WILK

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The Shapiro-Wilk normality test calculates a statistic based on the correlation between the data and the corresponding normal distribution; effective for sample size ($\boldsymbol{n \leq 50}$).

Shapiro Function

`shapiro()` is a statistical tool used to perform the Shapiro-Wilk test for normality.

Syntax

```
w_stat, p_value = stats.shapiro(data)
```

Null Hypothesis

$\boldsymbol{H_o}$: **p-value** $\geq \boldsymbol{\alpha}$ (Normal data)

Alternative Hypothesis

$\boldsymbol{H_a}$: **p-value** $< \boldsymbol{\alpha}$ (Non-normal data)

EXERCISE

Perform **Shapiro-Wilk** normality test for the given dataset.

dataset

"**defects-data-30-samples.csv**"

Solution

```
w_stat, p_value =
stats.shapiro(df['Defects'])
```

Let $\alpha = 0.05$

Null Hypothesis

$\boldsymbol{H_o}$: **p-value** $\geq \mathbf{0.05}$ (Normal data)

Alternative Hypothesis

$\boldsymbol{H_a}$: **p-value** $< \mathbf{0.05}$ (Non-normal data)

ANDERSON-DARLING

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The Anderson-Darling normality test provides a more sensitive test by giving weight to the tails of the distribution; effective for larger sample size ($\boldsymbol{n > 50}$).

Anderson Function

`anderson()` is a statistical tool used to perform the Aderson-Darling test for normality.

Syntax

```
a2_stat, critical_values, alpha =
stats.anderson(data)
```

Null Hypothesis

$\boldsymbol{H_o}$: $\boldsymbol{A^2 \leq}$ **critical value** (Normal data)

Alternative Hypothesis

$\boldsymbol{H_a}$: $\boldsymbol{A^2 >}$ **critical value** (Non-normal data)

EXERCISE

Perform **Anderson-Darling** normality test for the given dataset.

dataset

"**defects-dataset.csv**"

Solution

```
a2_stat, critical_values, alpha =
stats.anderson(df['Defects'])
```

Let $\alpha = 0.05$

Null Hypothesis

$\boldsymbol{H_o}$: $\boldsymbol{A^2} \leq$ **critical value** (Normal data)

Alternative Hypothesis

$\boldsymbol{H_a}$: $\boldsymbol{A^2} >$ **critical value** (Non-normal data)

LABORATORY