EXPERIMENT 14

Hypothetical Using ANOVA – Test

Aim:

To compare the growth rates of plants under three different fertilizer treatments (Treatment A,B and C) to determine if there is a significant difference in their mean growth.

Algorithm:

1. Import necessary libraries — numpy, scipy.stats, and statsmodels.

2. Generate or input data for multiple groups (e.g., different treatments).

3. Compute the mean of each group to observe basic differences.

4. Perform one-way ANOVA using stats.f\_oneway() to compare group means.

5. Obtain the F-statistic and p-value from the ANOVA result.

6. Set a significance level (α), typically 0.05.

7. Compare the p-value with α to decide whether to reject the null hypothesis.

8. If rejected, perform Tukey’s HSD post-hoc test to find which groups differ significantly.

Program:

import numpy as np

import scipy.stats as stats

from statsmodels.stats.multicomp import pairwise\_tukeyhsd

np.random.seed(42)

n\_plants = 25

growth\_A = np.random.normal(loc=10, scale=2, size=n\_plants)

growth\_B = np.random.normal(loc=12, scale=3, size=n\_plants)

growth\_C = np.random.normal(loc=15, scale=2.5, size=n\_plants)

f\_statistic, p\_value = stats.f\_oneway(growth\_A, growth\_B, growth\_C)

print("Treatment A Mean Growth:", np.mean(growth\_A))

print("Treatment B Mean Growth:", np.mean(growth\_B))

print("Treatment C Mean Growth:", np.mean(growth\_C))

print(f"\nF-Statistic: {f\_statistic:.4f}")

print(f"P-Value: {p\_value:.4f}")

alpha = 0.05

if p\_value < alpha:

print("Reject the null hypothesis: Significant difference in mean growth among treatments.")

else:

print("Fail to reject the null hypothesis: No significant difference in mean growth among treatments.")

if p\_value < alpha:

all\_data = np.concatenate([growth\_A, growth\_B, growth\_C])

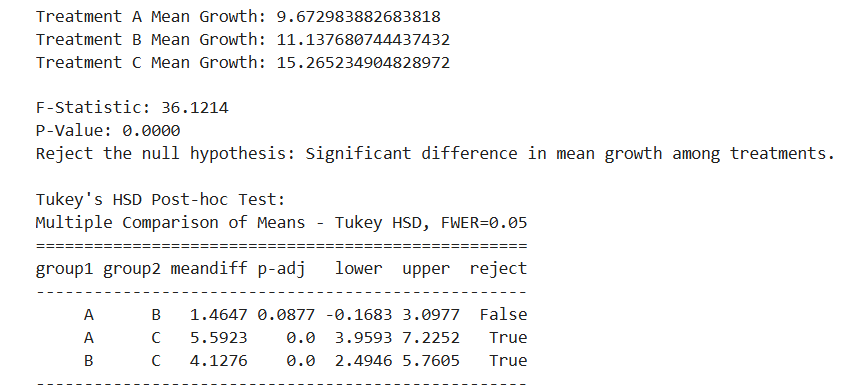
labels = ['A'] \* n\_plants + ['B'] \* n\_plants + ['C'] \* n\_plants

tukey\_results = pairwise\_tukeyhsd(all\_data, labels, alpha=0.05)

print("\nTukey's HSD Post-hoc Test:")

print(tukey\_results)

Output:



Result:

Hence a python program for hypothetical ANOVA- Test is written and executed successfully.