Academic Year: 2022-23
Semester: VI
Class / Branch/ Div: TE- IT A/B
Subject: DS Using Python Skill based Lab
Name of Instructor:

Name of Student:
Student ID:
Roll No.
Date of Submission:

Experiment No.4

Aim: To implementation of Statistical Hypothesis Test using Scipy.

Prerequisites: Python3, numpy, pandas,seaborn.

Objectives: At the end of this experiment, students will be able to perform :

1. Student's t-test
2. Paired Student's t-test
3. Analysis of Variance Test (ANOVA)

Theory: -

Student's t-test, paired t-test, and ANOVA test are statistical techniques commonly used in data analysis. In this experiment, we will study a detailed overview of each of these tests, their respective applications, and the conclusions that can be drawn from their results.

Student's t-test

The Student's t-test is a statistical test used to determine whether there is a significant difference between the means of two independent groups. It is commonly used in medical and social science research to test hypotheses. The t-test can be used when the population standard deviation is unknown, and the sample size is small.

There are two types of t-tests: the one-sample t-test and the two-sample t-test. The one-sample t-test is used to determine whether the mean of a single sample is significantly different from a known population mean. The two-sample t-test, on the other hand, is used to compare the means of two independent groups. The t-test produces a t-value, which is used to determine the significance of the results. If the calculated t-value is greater than the critical value, then the results are considered statistically significant.

Paired t-test

The paired t-test is used when we have two related samples or measurements. This test is useful when we are interested in measuring the difference between two measurements taken from the same sample, such as pre- and post-treatment measurements. The paired t-test is used to test whether the means of the two measurements are significantly different from each other.

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The paired t-test is a modification of the Student's t-test, and it involves calculating the difference between the two measurements for each subject and then calculating the mean of those differences. The paired t-test produces a t-value, which is used to determine the significance of the results.

ANOVA test

The ANOVA test, or Analysis of Variance, is a statistical test used to determine whether there is a significant difference between the means of three or more independent groups. The ANOVA test is used to test hypotheses by comparing the variance between groups to the variance within groups. If the variance between groups is significantly greater than the variance within groups, then the results are considered statistically significant.

The ANOVA test produces an F-value, which is used to determine the significance of the results. If the calculated F-value is greater than the critical value, then the results are considered statistically significant.

Conclusion: - In conclusion, statistical tests such as the Student's t-test, paired t-test, and ANOVA test are powerful tools for analyzing data and drawing conclusions. The selection of a particular test depends on the research question, the type of data, and the number of groups being compared. The results of these tests can provide valuable insights and inform future research and decision-making.