



PARSHVANATH CHARITABLE TRUST'S

A. P. SHAH INSTITUTE OF TECHNOLOGY

Department of Information Technology

(NBA Accredited)



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.3

Aim: To implement two-sample Z-test.

Prerequisites: python.

Objectives: - At the end of this experiment, you will be able to:

- solving real life problems based on Statistical analysis
- Use Z test on the given problem

Theory: The two-sample z test is to tests the difference between means of two groups, whereas a one-sample z test is to tests the difference between a single group and the hypothesized population value.

Assumptions of Two sample Z hypothesis tests

- Population data is continuous
- Population follows a standard normal distribution
- Both sample ends must be higher than 30
- The population standard deviation is known
- Similar spread between the groups, in other words homogeneity of variance
- Both the samples should be randomly selected from the population
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Two sample Z-test Formula

$$Z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

- \bar{x}_1 = sample mean of first sample
- \bar{x}_2 = sample mean of second sample
- μ_1 = Mean of first population
- μ_2 = Mean of second population



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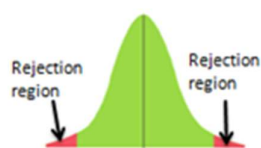


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- σ_1^2 = population variance in first population
- σ_2^2 = population variance in second population
- n_1 = sample size of first group
- n_2 = sample size of second group

Hypothesis Testing

A tailed hypothesis is an assumption about a population parameter. The assumption may or may not be true. A one-tailed hypothesis is a test of hypothesis where the area of rejection is only in one direction. Whereas two-tailed, the area of rejection is in two directions. The selection of one or two-tailed tests depends upon the problem.

Z- Test	Null Hypothesis (H_0)	Alternative Hypothesis (H_1)	Statistical conclusion
Two-tailed	$\mu_1 = \mu_2$	$\mu_1 \neq \mu_2$	
Left-tailed	$\mu_1 \geq \mu_2$	$\mu_1 < \mu_2$	
Right-tailed	$\mu_1 \leq \mu_2$	$\mu_1 > \mu_2$	

Steps to Calculate Two Sample Z hypothesis test

- Select appropriate statistic- one-tailed or two-tailed?
- Determine the null hypothesis and alternative hypothesis



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- Determine the level of significance
 - Find the critical value
 - Calculate the standardized test statistics
 - Then make a decision to reject or fail to reject the null hypothesis. Reject the null hypothesis, If the test statistic falls in the critical region.
 - Finally, interpret the decision in the context of the original claim.

Conclusion: - In this experiment, we have validated dataset by performing two-sample Z-test