De La Salle University- Manila
Gokongwei College of Engineering

PROLOGI
Programming Logic and Design

Project Proposal

Hippopotamus (Hypothesis Testing Calculator)

Marcus Alden Taraya
Tayshaun Pierce Alabado
Win Clarence Sy

Project Description

- The goal of this project is to develop a program that can perform hypothesis testing for various statistical scenarios.
- The program should take in user inputs for the statistical data, the level of significance, and the type of test.
- The program will handle a range of statistical scenarios, including one-sample tests, two-sample tests, chi-squared tests, and more.
- The program will used the given data to get the scores and critical point then summing up with either rejecting or accepting the null hypothesis.
- Based on these inputs, the program should calculate the test statistic and the p-value and interpret the results.

IPO

Input	Process	Output
Case A x, u_0, o, n, alpha **Case B** x, u_0, s, n, alpha **Single Population Test Proportions** x, n, p_0, alpha **Case C** x_1, s_1, n_1, x_2, s_2, n_2, d_0, alpha **Case D** x_1, s_1, n_1, x_2, s_2, n_2, d_0, alpha **Case E** x_1, s_1, n_1, x_2, s_2, n_2, d_0, alpha	**Case A** $z = \frac{\bar{x} - \mu_0}{\left(\sigma/\sqrt{n}\right)}$ **Case B** $t = \frac{\bar{x} - \mu_0}{\left(s/\sqrt{n}\right)} \quad df = n - 1$ **Single Population Test Proportion** $\hat{p} = \frac{x}{n} \quad z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$ **Case C** $z = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$ **Case D** $s_p^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$ $df = n_1 + n_2 - 2$	Test Statistic P-Value **(if any)** Critical Value Degree of Freedom **(if any)** Sample Proportions **(if any)** Pooled Sample Proportion **(if any)** Pooled Standard Deviation **(if any)** Difference **(if any)** Difference Standard Deviation **(if any)** Whether to Reject or Not Reject the Null Hypothesis

Case F

d, d_0, s, n, alpha

Two Populations Test Proportions

x_1, n_1, x_2, n_2, alpha

One Population Variances

n, s, o_0, alpha

Two Population Variances

n_1, s_1, n_2, s_2, alpha

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Case E

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - d_0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$

Case F

$$t = \frac{\bar{d} - d_0}{\left(s_d/\sqrt{n}\right)}$$

$$df = n - 1$$

Test Proportions for Two Population

$\hat{p}_1 = \frac{x_1}{n_1}$ and $\hat{p}_2 = \frac{x_2}{n_2}$ $\hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}\hat{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

One Population Variances

$$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$$

$\nu = n - 1.$

Two Population Variances

$$f = \frac{s_1^2}{s_2^2}$$

$v_1 = n_1 - 1$ and $v_2 = n_2 - 1.$

Methodology

We will be utilizing Python Libraries such as ***numpy*** and ***math*** for calculating the values, ***scipy*** for getting the critical points, and ***colorma*** for adding color to the program. We will be utilizing several functions such as if-else statements. For the formula, we would be getting it from the course FNDSTAT from Term 1 AY2022-2023. We will be using modular functions in order to simplify the code and avoiding code duplication would make troubleshooting easier. We would be separating each case with its own functions so that it would be more user-friendly.

Schedule of Activities

Tasks	Description	Date	Person-In-Charge
Planning	In this part, we will decide on the project that we will make. We would plan on the division of tasks to make it more efficient and faster to complete the project. We will find the resources we need that would be utilized in this project.	March 6-8, 2023	Everyone in the Group will be assigned to do a portion of each task.
Structuring and IPO	In this part, we will be planning on the structuring of the code by laying out the IPO so that we will know what variables to use.	March 9-12, 2023	
Finalizing Project Proposal	We would be finalizing the project proposal and uploading it into the GitHub repository.	March 12-20, 2023	
Coding	In this part, we will be coding the program for the project.	March 20-23, 2023	
Making Hierarchy Chart	We will be making the hierarchy chart to explain how the chart would work.	March 24, 2023	
Documentation	In this part, we will be documenting the code and the project. This includes finishing all parts of the project paper.	March 24-April 4, 2023	

Reviewing Documentation and GitHub repository	This is to make sure that there are little to no errors that can be found.	April 5, 2023	
Project Presentation and Demo	We would be making the project presentation and demo which would be posted to YouTube and the link would be added to README.md in the GitHub repository	April 5, 2023	
Demonstration	This would be the part where we demonstrate how the program works.	April 17, 2023	

References

- Mathematics and Statistics Department. (2022). FNDSTAT Hypothesis Testing Formula Sheet For Variances. *De La Salle University*. https://drive.google.com/drive/folders/1Y1mhqy8yeHZB9YC7WBPkQCNMH8Icvorh?usp=sharing
- Mathematics and Statistics Department. (2022). FNDSTAT Hypothesis Testing Formula Sheet for Two Populations. *De La Salle University*. https://drive.google.com/drive/folders/1Y1mhqy8yeHZB9YC7WBPkQCNMH8Icvorh?usp=sharing
- Mathematics and Statistics Department. (2022). FNDSTAT Hypothesis Testing Formula Sheet for Single Populations. *De La Salle University*. https://drive.google.com/drive/folders/1Y1mhqy8yeHZB9YC7WBPkQCNMH8Icvorh?usp=sharing