Universidad Nacional del Altiplano
Facultad de Ingeniería Estadística e Informática
Docente: Fred Torres Cruz
Autor : Russbel Rimualdy Mamani Fernandez.

Trabajo Encargado - Nº 003
https://github.com/V4LM0R/tare3.git

Student's t-Test

The Student's t-test is used to compare the means of two independent groups, determining whether the observed difference between them is statistically significant. This test requires that:

- The dependent variable is numerical.
- The independent variable has two levels or groups.
- The data follow an approximately normal distribution.
- The variances are equal (in the classical version) or different (using Welch's test).

Application: It is applied when, for example, we want to compare whether there is a significant difference in satisfaction levels between two teaching methodologies.

Analysis of Variance (ANOVA)

ANOVA is used when comparing the means among three or more groups. It assesses whether at least one of the means is significantly different from the others. The test starts with the null hypothesis that all means are equal.

- The dependent variable must be numerical.
- The independent variable must have three or more levels.
- The groups must have approximately normal distributions.
- The variances must be homogeneous.

Application: Comparing academic performance of students enrolled in three different study programs.

Implementation in the Shiny Application

In the Shiny application, the selection of the statistical test is automated based on the number of groups detected in the categorical variable:

- If there are 2 groups, the Student's t-test is applied using the `t.test()` function.
- If there are 3 groups, ANOVA is applied using the `aov()` function.

The code also allows:

- Selecting variables from the interface.
- Displaying the analysis results in text format.
- Visualizing the results with various types of plots (bar, scatter, density).

This provides an interactive and accessible tool to perform statistical comparisons without needing to code manually.

Shiny Application Images

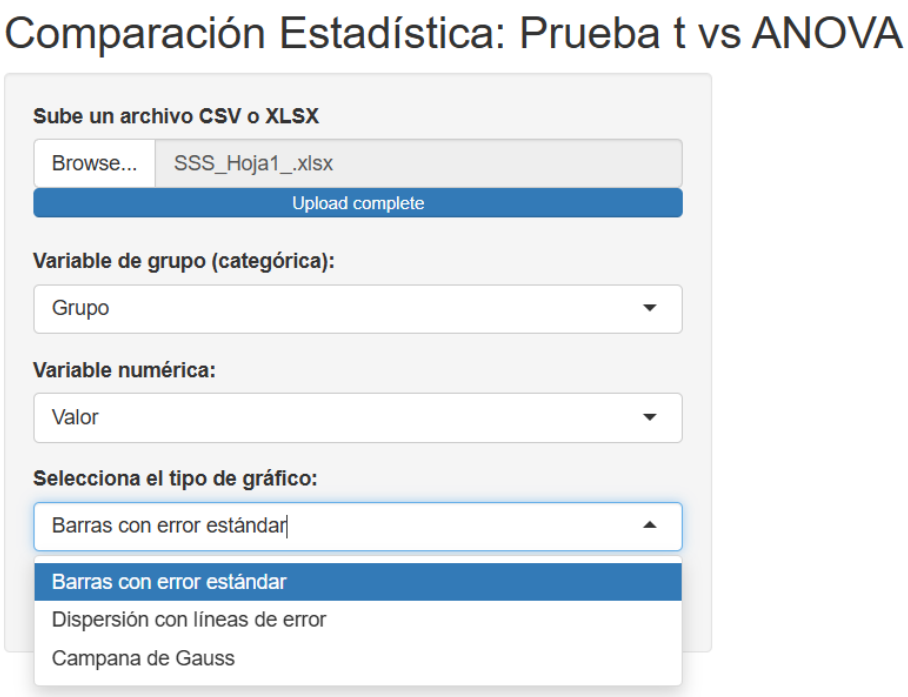

Figura 1: Interface for loading and selecting file

Se ha aplicado la prueba t de Student (2 grupos).

```
        Welch Two Sample t-test

data:  numeric_var by group_var
t = -0.70711, df = 2, p-value = 0.5528
alternative hypothesis: true difference in means between group A and group B is not equal to 0
95 percent confidence interval:
 -7.08487  5.08487
sample estimates:
mean in group A mean in group B
              6               7
```

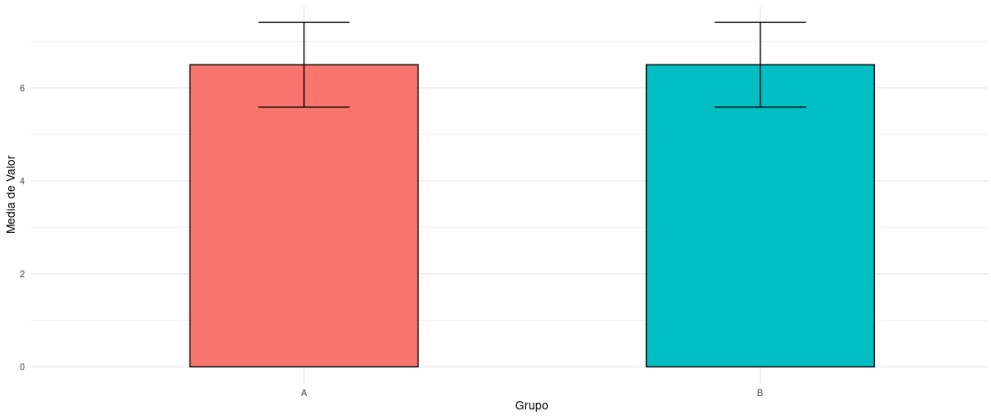

Figura 2: Selecting dependent and independent variables

Se ha aplicado la prueba t de Student (2 grupos).

```
        Welch Two Sample t-test

data:  numeric_var by group_var
t = -0.70711, df = 2, p-value = 0.5528
alternative hypothesis: true difference in means between group A and group B is not equal to 0
95 percent confidence interval:
 -7.08487  5.08487
sample estimates:
mean in group A mean in group B
              6               7
```

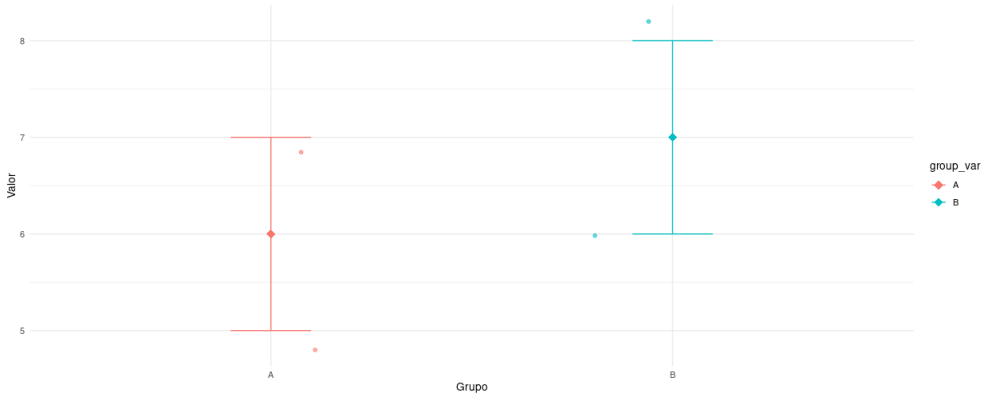

Figura 3: Results of the Student's t-test

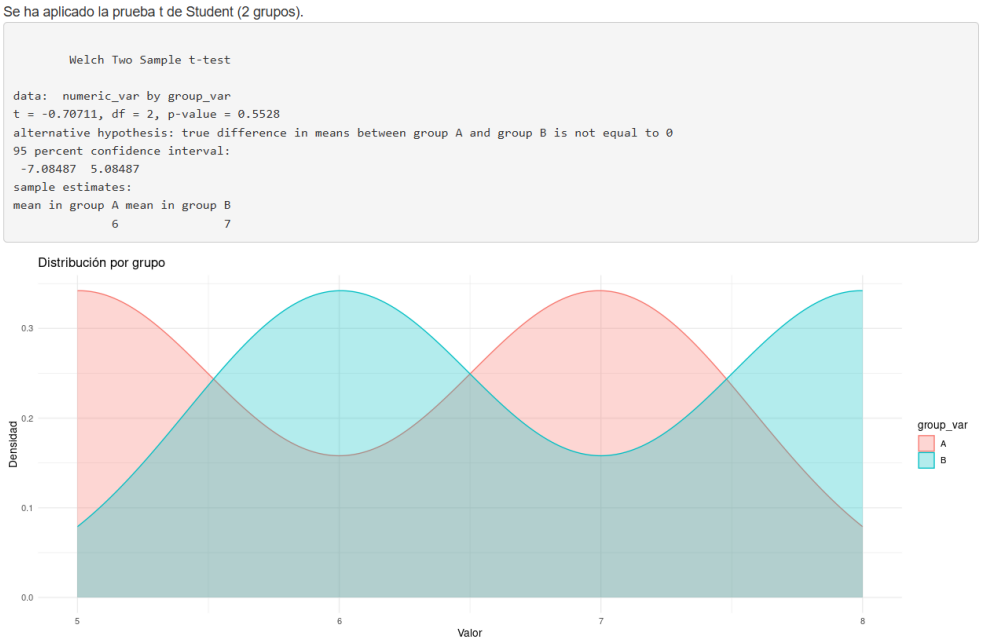

Figura 4: Results of the ANOVA test

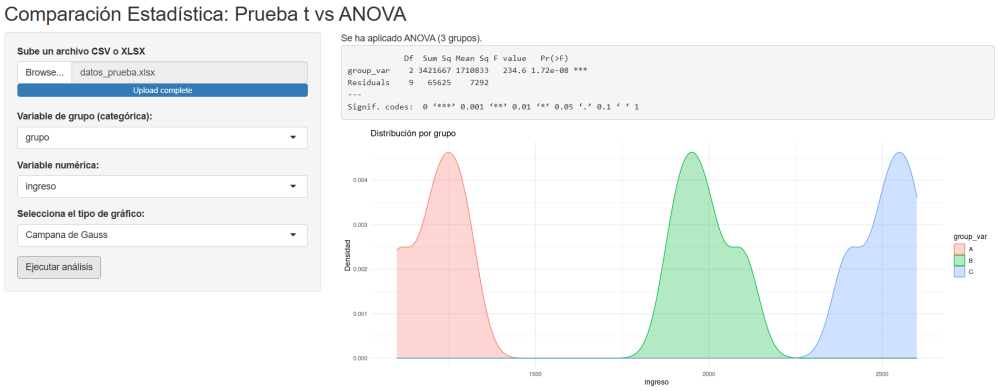

Figura 5: Graphical visualization of results

Figura 6: Automatically generated comparison plots

Figura 7: https://russbel.shinyapps.io/TAREA3/