VI. TESTING OF HYPOTHESIS – F AND CHI-SQUARE TESTING

Aim

The aim of this lab manual is to introduce students to hypothesis testing using the F-test and Chi-Square test in statistics. Students will learn how to perform these tests, interpret results, and apply these skills using R.

Exercises

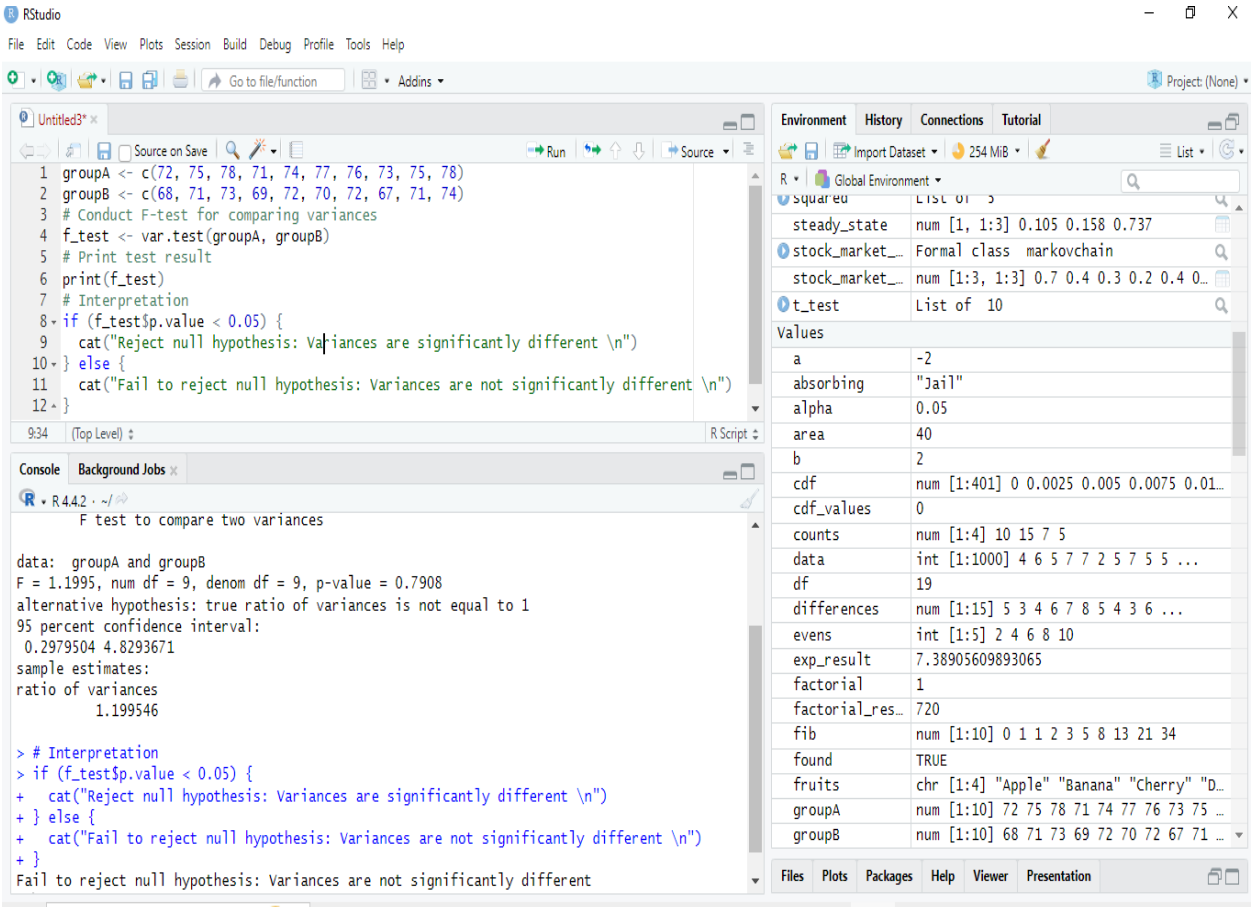
1. **Exercise 1: F-Test**
   - **Task:** Perform an F-test to compare the variances of two groups: Group A and Group B. Use the following data:

```
# Example data
groupA <- c(72, 75, 78, 71, 74, 77, 76, 73, 75, 78)
groupB <- c(68, 71, 73, 69, 72, 70, 72, 67, 71, 74)

# Conduct F-test for comparing variances
f_test <- var.test(groupA, groupB)

# Print test result
print(f_test)

# Interpretation
if (f_test$p.value < 0.05) {
  cat("Reject null hypothesis: Variances are significantly different \n")
} else {
  cat("Fail to reject null hypothesis: Variances are not significantly different \n")
}
```



2. Exercise 2: Chi-Square Test

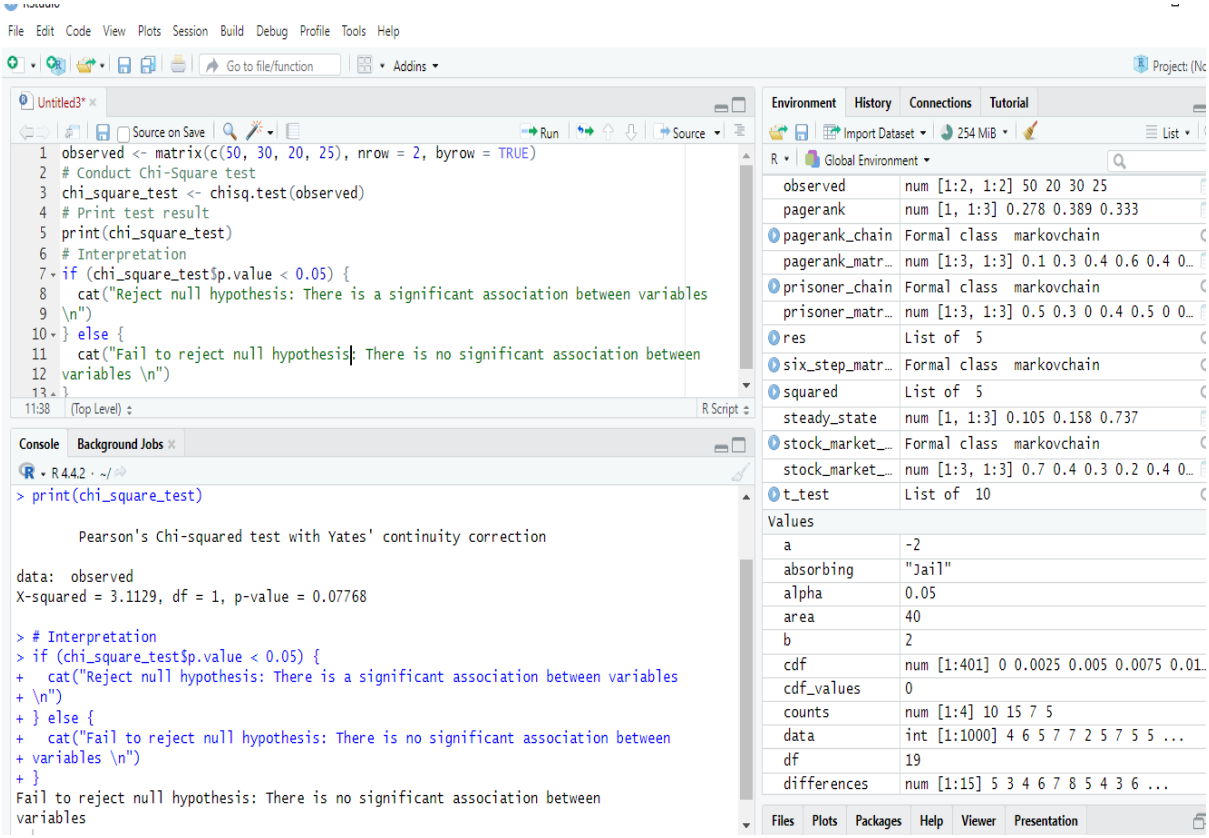
- **Task:** Perform a Chi-Square test to analyze the association between two categorical variables using the following contingency table:

```
# Example data (contingency table)
observed <- matrix(c(50, 30, 20, 25), nrow = 2, byrow = TRUE)

# Conduct Chi-Square test
chi_square_test <- chisq.test(observed)

# Print test result
print(chi_square_test)

# Interpretation
if (chi_square_test$p.value < 0.05) {
  cat("Reject null hypothesis: There is a significant association between variables
\n")
} else {
  cat("Fail to reject null hypothesis: There is no significant association between
variables \n")
}
```


File Edit Code View Plots Session Build Debug Profile Tools Help
Untitled3*
observed <- matrix(c(50, 30, 20, 25), nrow = 2, byrow = TRUE)
# Conduct Chi-Square test
chi_square_test <- chisq.test(observed)
# Print test result
print(chi_square_test)
# Interpretation
if (chi_square_test$p.value < 0.05) {
cat("Reject null hypothesis: There is a significant association between variables \n")
} else {
cat("Fail to reject null hypothesis: There is no significant association between variables \n")
}
Console
Background Jobs
> print(chi_square_test)
Pearson's Chi-squared test with Yates' continuity correction
data: observed
X-squared = 3.1129, df = 1, p-value = 0.07768
> # Interpretation
> if (chi_square_test$p.value < 0.05) {
+ cat("Reject null hypothesis: There is a significant association between variables
+ \n")
+ } else {
+ cat("Fail to reject null hypothesis: There is no significant association between
+ variables \n")
+ }
Fail to reject null hypothesis: There is no significant association between
variables
Environment
History
Connections
Tutorial
Import Dataset
Global Environment
observed num [1:2, 1:2] 50 20 30 25
pagerank num [1, 1:3] 0.278 0.389 0.333
pagerank_chain Formal class markovchain
pagerank_matr... num [1:3, 1:3] 0.1 0.3 0.4 0.6 0.4 0...
prisoner_chain Formal class markovchain
prisoner_matr... num [1:3, 1:3] 0.5 0.3 0 0.4 0.5 0 0...
res List of 5
six_step_matr... Formal class markovchain
squared List of 5
steady_state num [1, 1:3] 0.105 0.158 0.737
stock_market_... Formal class markovchain
stock_market_... num [1:3, 1:3] 0.7 0.4 0.3 0.2 0.4 0...
t_test List of 10
Values
a -2
absorbing "Jail"
alpha 0.05
area 40
b 2
cdf num [1:401] 0 0.0025 0.005 0.0075 0.01...
cdf_values 0
counts num [1:4] 10 15 7 5
data int [1:1000] 4 6 5 7 7 2 5 7 5 5 ...
df 19
differences num [1:15] 5 3 4 6 7 8 5 4 3 6 ...
Files
Plots
Packages
Help
Viewer
Presentation