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

Exercise 1: F-Test

o 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")
```

```
}
```

F test to compare two variances

data: groupA and groupB

F = 1.1995, num df = 9, denom df = 9, p-value = 0.7908

alternative hypothesis: true ratio of variances is not equal to 1

95 percent confidence interval:

0.2979504 4.8293671

sample estimates:

ratio of variances

1.199546

```
> # 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
```

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```
different \n")
+ }
Fail to reject null hypothesis: Variances are not significantly different
```

Exercise 2: Chi-Square Test

o 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)
```

51

```
# 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")
}
```

F test to compare two variances

```
data: groupA and groupB
F = 1.1995, num df = 9, denom df = 9, p-value = 0.7908
alternative hypothesis: true ratio of variances is not equal to 1
95 percent confidence interval:
 0.2979504 4.8293671
sample estimates:
```

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ratio of variances

1.199546

```
> # 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")
+ }
Fail to reject null hypothesis: Variances are not significantly different
```

Exercise 3: Real-World Application

o Task: Conduct either an F-test or Chi-Square test using a dataset of your choice (e.g., from a CSV file or a built-in dataset in R). Formulate a hypothesis, perform the test, and interpret the results.

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