Sri Lanka Institute of Information Technology

Lab Submission

Lab sheet No 10

IT23756564

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Probability and Statistics | IT2120

B.Sc. (Hons) in Information Technology

IT23756564 Lab 10.R

```r
setwd("C:\\Users\\Mavindu Karunaratne\\Desktop\\IT23756564 Lab 10")
getwd()
observed <- c(A =120, B = 95, C = 85, D = 100)
# i) State the hypothses
cat("i) Hypotheses:\n")
cat("H0: Customers choose A, B, C, D equally (p_A = p_B = p_C = P_D =0.25)\n")
cat("H1: The choice probabilities are not all equal (some p_i !=0.25)\n")

# ii) Apply chi-square goodness-pf-fit test
total <- sum(observed)
expected <- rep(total / 4, 4)

cat("Observed counts:\n"); print(observed)
cat("Expected counts under H0 (each = total/4):\n");print(expected); cat("\n")

# Use built-in chi-square test
chisq_test <- chisq.test(x = observed, p = rep(0.25,4))

# Display test output
cat("ii) Chi-square test result (chisq.test):\n")
print(chisq_test)
cat("\n")

# Manual calculation (same result)
chisq_manual <- sum((observed - expected)^2 / expected)
df <- length(observed) - 1
p_value_manual <- pchisq(chisq_manual, df = df, lower.tail = FALSE)

cat("Manual chi-square calculation:\n")
cat(sprintf("Chi-square = %.4f, df = %d, p-value = %.4f\n\n",chisq_manual, df, p_value_manual))

# iii) Conclusion for results

#At the 5% significance level (α = 0.05), the p-value is greater than 0.05, so we do not have enough evidence to reject the null hypothesis.
#This means the data do not show a significant difference from equal snack perference - customers apper to chooseA, B, C, and D roughly equally.
#However, at the 10% level (α = 0.10), the p-value is slightly smaller than 0.10, which suggests weak or marginal evidence that customers may perfer some snacks more than others.
```

36:179 (Top Level) R Script

Console Terminal Background Jobs

R 4.5.1 · C:/Users/Mavindu Karunaratne/Desktop/IT23756564 Lab 10/

```
> setwd("C:\\Users\\Mavindu Karunaratne\\Desktop\\IT23756564 Lab 10")
> getwd()
[1] "C:/Users/Mavindu Karunaratne/Desktop/IT23756564 Lab 10"
> observed <- c(A =120, B = 95, C = 85, D = 100)
> cat("i) Hypotheses:\n")
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> cat("H0: Customers choose A, B, C, D equally (p_A = p_B = p_C = P_D =0.25)\n")
H0: Customers choose A, B, C, D equally (p_A = p_B = p_C = P_D =0.25)
> cat("H1: The choice probabilities are not all equal (some p_i !=0.25)\n")
H1: The choice probabilities are not all equal (some p_i !=0.25)
> total <- sum(observed)
> expected <- rep(total / 4, 4)
> cat("Observed counts:\n"); print(observed)
Observed counts:
   A   B   C   D
120  95  85 100
> cat("Expected counts under H0 (each = total/4):\n");print(expected); cat("\n")
Expected counts under H0 (each = total/4):
[1] 100 100 100 100

> chisq_test <- chisq.test(x = observed, p = rep(0.25,4))
> cat("ii) Chi-square test result (chisq.test):\n")
ii) Chi-square test result (chisq.test):
> print(chisq_test)

        Chi-squared test for given probabilities

data:  observed
X-squared = 6.5, df = 3, p-value = 0.08966

> cat("\n")

> chisq_manual <- sum((observed - expected)^2 / expected)
> df <- length(observed) - 1
> p_value_manual <- pchisq(chisq_manual, df = df, lower.tail = FALSE)
> cat("Manual chi-square calculation:\n")
Manual chi-square calculation:
> cat(sprintf("Chi-square = %.4f, df = %d, p-value = %.4f\n\n",chisq_manual, df, p_value_manual))
Chi-square = 6.5000, df = 3, p-value = 0.0897

> #At the 5% significance level (α = 0.05), the p-value is greater than 0.05, so we do not have enough evidence to
> reject the null hypothesis.
Error: unexpected symbol in "reject the"

> #At the 5% significance level (α = 0.05), the p-value is greater than 0.05, so we do not have enough evidence to reject the null hypothesis.
> #This means the data do not show a significant difference from equal snack perference - customers apper to chooseA, B, C, and D roughly equally.
> #However, at the 10% level (α = 0.10), the p-value is slightly smaller than 0.10, which suggests weak or marginal evidence that customers may perfer some snacks more than others.
>
```

Environment History Connections Tutorial

Import Dataset 217 MiB List

R Global Environment

Data	
chisq_test	List of 9
Values	
Chisq_manual	6.5
df	3
expected	num [1:4] 100 100 100 100
observed	Named num [1:4] 120 95 85 100
p_value_manual	0.0896625039881679
total	400