SAVEETHA SCHOOL OF ENGINEERING

ITA0443-STATISTICS WITH R-PROGRAMMING

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LAB ASSESSMENT– 4

1) (i)Write suitable R code to compute the mean, median ,mode of the following values
c(90, 50, 70, 80, 70, 60, 20, 30, 80, 90, 20)
(ii) Write R code to find 2nd highest and 3 rd Lowest value of above problem.

INPUT:

```
x <- c(90, 50, 70, 80, 70, 60, 20, 30, 80, 90, 20)
mean(x)
median(x)
mode(x)

x <- c(90, 50, 70, 80, 70, 60, 20, 30, 80, 90, 20)

second_highest <- sort(unique(x), decreasing = TRUE)[2]
cat("The 2nd highest value is:", second_highest, "\n")

third_lowest <- sort(unique(x))[3]
cat("The 3rd lowest value is:", third_lowest)
```

OUTPUT:

```
> mean(values)
[1] 60
> median(values)
[1] 70
> mode(values)
[1] 80
```

The 2nd highest value is: 80
The 3rd lowest value is: 50

2. (i)Get the Summary Statistics of air quality dataset
(ii)Melt airquality data set and display as a long – format data?
(iii)Melt airquality data and specify month and day to be “ID variables”?
(iv)Cast the molten airquality data set with respect to month and date features

(v) Use cast function appropriately and compute the average of Ozone, Solar.R , Wind
and temperature per month?

INPUT:
summary(airquality)
library(reshape2)
airquality_melt <- melt(airquality, id.vars = c("Month", "Day"))
airquality_melt2 <- melt(airquality, id.vars = c("Month", "Day"))
airquality_cast <- dcast(airquality_melt, Month + Day ~ variable, mean)
airquality_mean <- dcast(airquality_melt, Month ~ variable, mean)

3.(i) Find any missing values(na) in features and drop the missing values if its less than
10%
else replace that with mean of that feature.
(ii) Apply a linear regression algorithm using Least Squares Method on “Ozone” and
“Solar.R”
(iii)Plot Scatter plot between Ozone and Solar and add regression line created by above model

INPUT:

```
library(tidyverse)
data("airquality")
missing_values <- airquality %>%
  is.na() %>%
  sum()
if (sum(missing_values) / nrow(airquality) < 0.1)
{
  airquality <- airquality %>%
    drop_
model <- lm(Ozone ~ Solar.R, data = airquality)
ggplot(airquality, aes(x = Solar.R, y = Ozone)) +
  geom_point() +
  geom_smooth(method = "lm", formula = model, se = FALSE) +
  labs(x = "Solar Radiation", y = "Ozone")
```

4. Load dataset named ChickWeight,
(i).Order the data frame, in ascending order by feature name “weight” grouped by feature
“diet” and Extract the last 6 records from order data frame.
(ii).a Perform melting function based on “Chick", "Time", "Diet" features as ID
variables

b. Perform cast function to display the mean value of weight grouped by Diet
c. Perform cast function to display the mode of weight grouped by Diet

INPUT:

```
library(tidyverse)

data("ChickWeight")

ordered_df <- ChickWeight %>%
  group_by(Diet) %>%
  arrange(weight) %>%
  slice_tail(6)
melted_df <- ChickWeight %>%
  melt(id.vars = c("Chick", "Time", "Diet"))
mean_df <- melted_df %>%
  cast(Diet ~ variable, mean)
mode_df <- melted_df %>%
  group_by(Diet, value) %>%
  summarize(n = n()) %>%
  arrange(desc(n)) %>%
  group_by(Diet) %>%
  slice_head(1) %>%
  select(Diet, value)
```

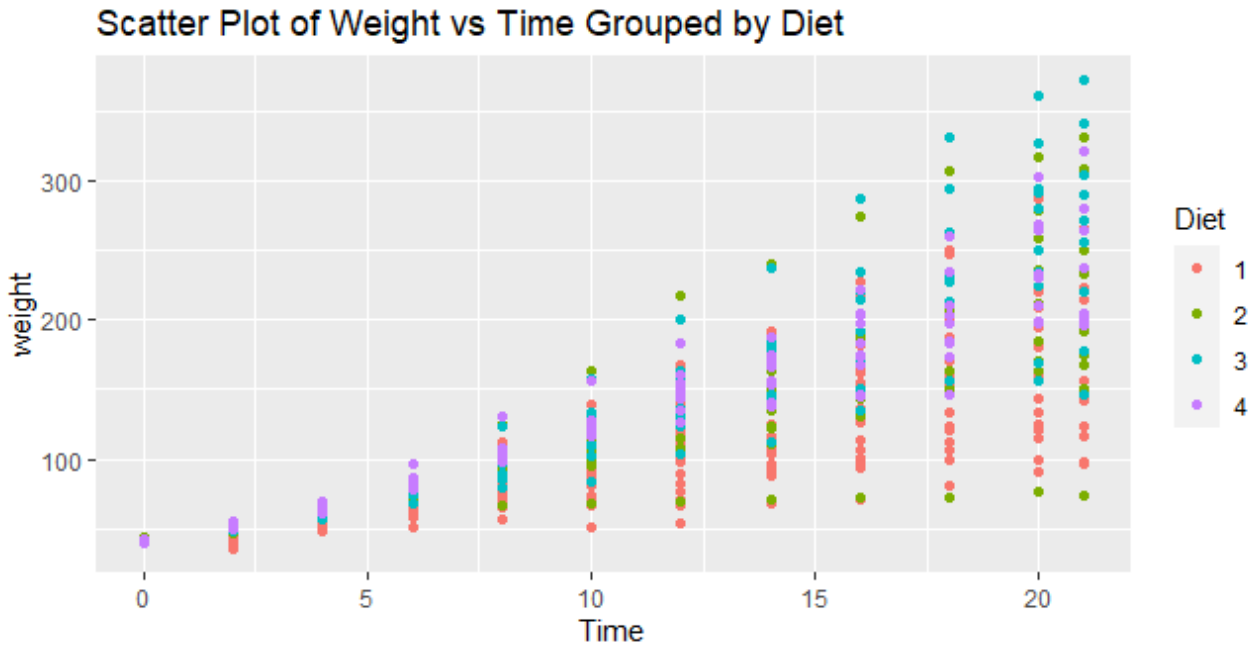
7. a. Create Box plot for “weight” grouped by “Diet”
b. Create a Histogram for “weight” features belong to Diet- 1 category
c. Create Scatter plot for “ weight” vs “Time” grouped by Diet

INPUT:

```
library(ggplot2)

ggplot(ChickWeight, aes(x = Diet, y = weight)) +
  geom_boxplot() +
  ggtitle("Box Plot of Weight Grouped by Diet")
ggplot(ChickWeight[ChickWeight$Diet == 1, ], aes(x = weight)) +
  geom_histogram(fill = "blue", color = "black") +
  ggtitle("Histogram of Weight for Diet 1")
ggplot(ChickWeight, aes(x = Time, y = weight, color = Diet)) +
  geom_point() +
  ggtitle("Scatter Plot of Weight vs Time Grouped by Diet")
```

OUTPUT:



8.a. Create multi regression model to find a weight of the chicken , by “Time” and

“Diet” as as

predictor variables

b. Predict weight for Time=10 a and c. Find the error in model for same

INPUT:

```
df <- data.frame(Time = c(...), Diet = c(...), Weight = c(...))
model <- lm(Weight ~ Time + Diet, data = df)
new_data <- data.frame(Time = 10, Diet = 1)
predicted_weight <- predict(model, new_data)
residuals <- residuals(model)
MSE <- mean(residuals^2)
RMSE <- sqrt(MSE)93.-
```

9 .For this exercise, use the (built-in) dataset Titanic.

a. Draw a Bar chart to show details of “Survived” on the Titanic based on passenger

Class

b. Modify the above plot based on gender of people who survived

c. Draw histogram plot to show distribution of feature “Age”

INPUT:

```
data("Titanic")
ggplot(Titanic, aes(x = Class, fill = Survived)) +
  geom_bar(position = "dodge") +
  labs(x = "Passenger Class", y = "Number of Survivors", fill = "Survived") +
  ggtitle("Survived on the Titanic Based on Passenger Class")

ggplot(Titanic, aes(x = Class, fill = Survived, color = Sex)) +
  geom_bar(position = "dodge") +
  labs(x = "Passenger Class", y = "Number of Survivors", fill = "Survived", color =
"Gender") +
  ggtitle("Survived on the Titanic Based on Passenger Class and Gender")

ggplot(Titanic, aes(x = Age)) +
  geom_histogram(binwidth = 5) +
  labs(x = "Age", y = "Frequency") +
  ggtitle("Distribution of Age on the Titanic")
```

10. a. Create a data frame based on below table.
b. Create a regression model for that data frame table to show the amount of sales(Sales) based
on the how much the company spends (Spends) in advertising
c. Predict the Sales if Spend=13500

INPUT:

```
Month <- c(1,2,3,4,5,6,7,8,9,10,11,12)
Spend <-
c(100,0,4000,5000,4500,3000,4000,9000,11000,15000,12000,7000,3000)
Sales <-
c(991,4,4048,7,5432,4,5004,4,3471,9,4255,1,9487,1,11891,4,15848,4,13134,8,785
0,4,3628,4)

df <- data.frame(Month, Spend, Sales)
model <- lm(Sales ~ Spend, data = df)
summary(model)
predict(model, data.frame(Spend = 13500))
```

SET-2

1.(i) Write a R program to extract the five of the levels of factor created from a random
sample from the LETTERS (Part of the base R distribution.)

(ii)Write R function to find the range of given vector. Range=Max-Min
Sample input, C<-(9,8,7,6,5,4,3,2,1),
output=8

(iii)Wirte the R function to find the number of vowels in given string
Sample input c<- “matrix”, output<-2
INPUT:

```
letters_sample <- sample(LETTERS, 5)
letters_factor <- factor(letters_sample)
levels(letters_factor)
find_range <- function(vec) {
  max_val <- max(vec)
  min_val <- min(vec)
  range <- max_val - min_val
  return(range)
}
C <- c(9,8,7,6,5,4,3,2,1)
find_range(C)
find_vowels <- function(string) {
  vowels <- c("a", "e", "i", "o", "u", "A", "E", "I", "O", "U")
  count <- 0
  for (i in 1:nchar(string)) {
    if (string[i] %in% vowels) {
      count <- count + 1
    }
  }
  return(count)
}
string <- "matrix"
find_vowels(string)
```

OUTPUT:

```
> levels(letters_factor)
[1] "D" "H" "O" "W" "Y"

> find_range(C)
[1] 8
> find_vowels(string)
[1] 0
```

2.Load inbuild dataset “ChickWeight” in R
(i) Explore the summary of Data set, like number of Features and its type. Fins the number
of records for each features
(ii)Extract last 6 records of dataset
(iii) order the data frame, in ascending order by feature name “weight” grouped by feature “diet”
(iv)Perform melting function based on
“Chick","Time","Diet" features as ID variables
(v)Perform cast function to display the mean value of weight grouped by Diet

INPUT:

```
data("ChickWeight")
str(ChickWeight)
summary(ChickWeight)
tail(ChickWeight, 6)
ChickWeight_grouped <- group_by(ChickWeight, Diet)
ChickWeight_ordered <- arrange(ChickWeight_grouped, weight)
library(reshape2)
ChickWeight_melted <- melt(ChickWeight, id.vars=c("Chick", "Time", "Diet"))
ChickWeight_cast <- dcast(ChickWeight_melted, Diet ~ variable, mean)
```

OUTPUT:

```
> tail(ChickWeight, 6)
    weight Time Chick Diet
573    155   12    50    4
574    175   14    50    4
575    205   16    50    4
576    234   18    50    4
577    264   20    50    4
578    264   21    50    4
```

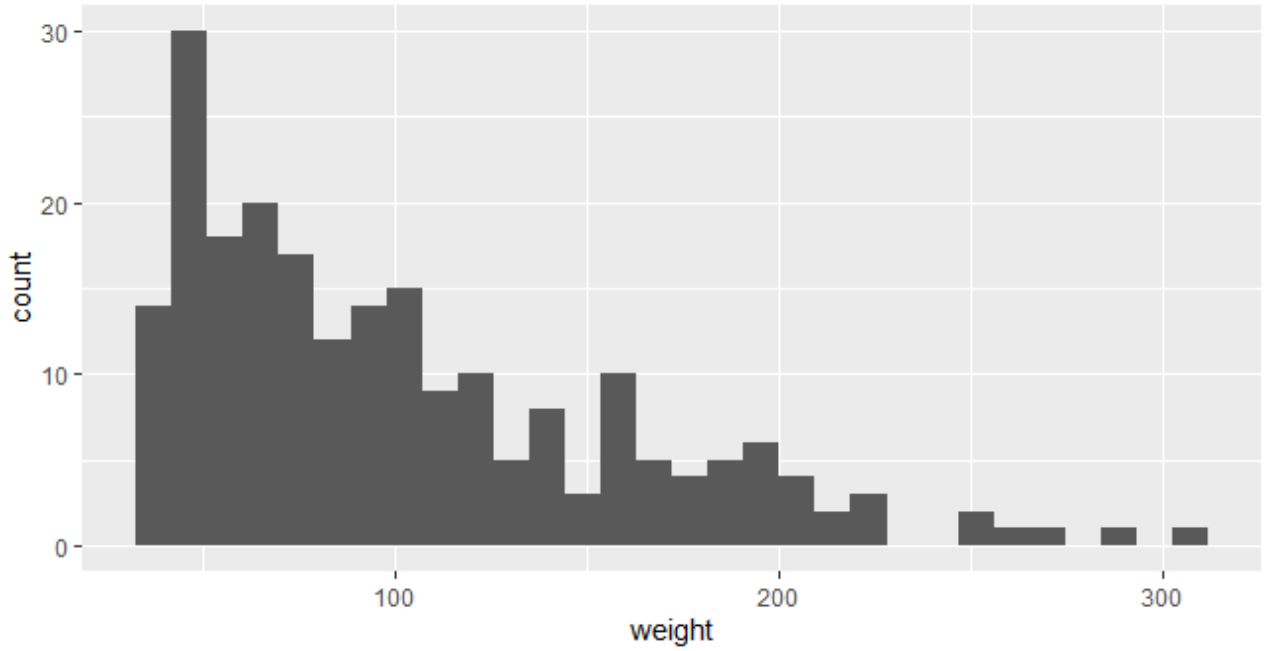
3.(i)Get the Statistical Summary of “ChickWeight” dataset
(ii)Create Box plot for “weight” grouped by “Diet”
(iii)Create a Histogram for “Weight” features belong to Diet- 1 category
(iv) Create a Histogram for “Weight” features belong to Diet- 4 category
(v) Create Scatter plot for weight vs Time grouped by Diet

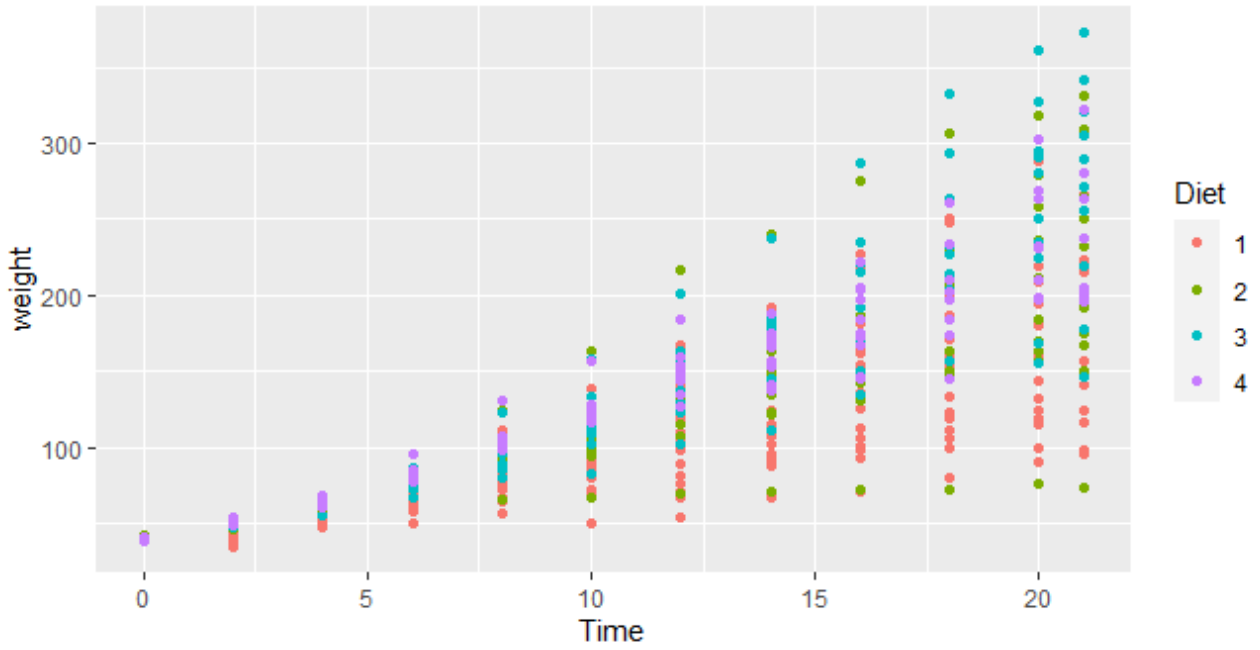
INPUT:

```
summary(ChickWeight)
library(ggplot2)
```

```
ggplot(ChickWeight, aes(x=Diet, y=weight)) + geom_boxplot()
library(ggplot2)
diet1 <- subset(ChickWeight, Diet == 1)
ggplot(diet1, aes(x=weight)) + geom_histogram()
library(ggplot2)
diet4 <- subset(ChickWeight, Diet == 4)
ggplot(diet4, aes(x=weight)) + geom_histogram()
library(ggplot2)
ggplot(ChickWeight, aes(x=Time, y=weight, color=Diet)) + geom_point()
```

OUTPUT:



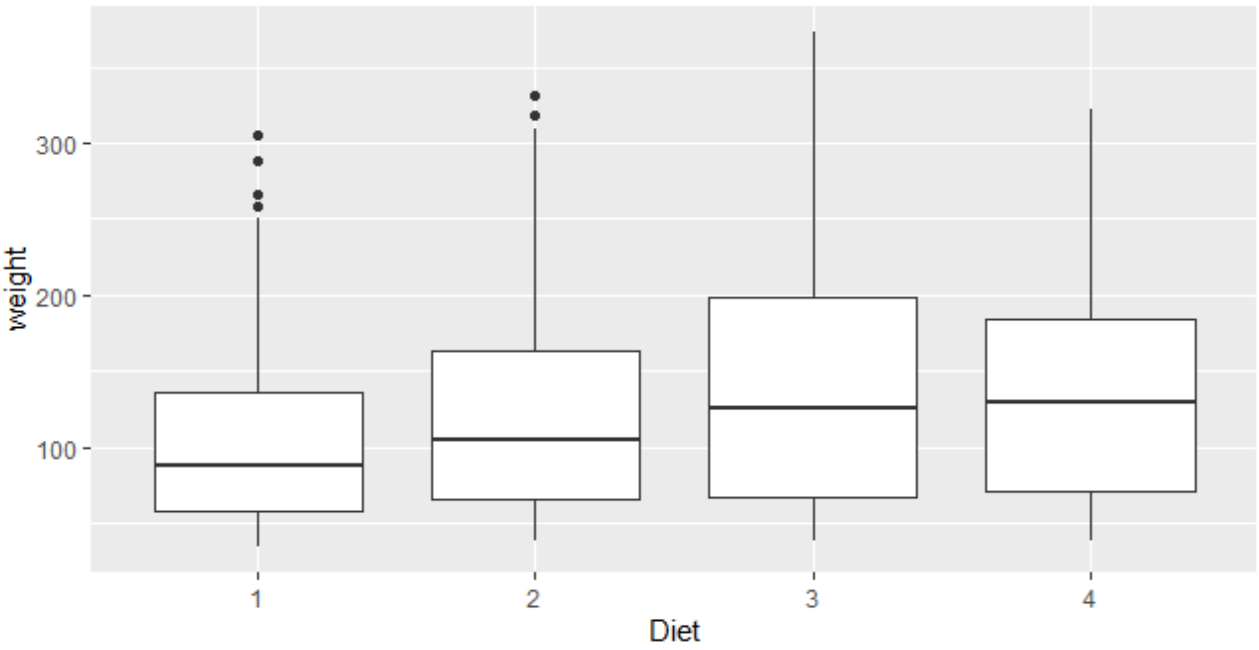


4.(i) Create multi regression model to find a weight of the chicken , by “Time” and “Diet”
as as predictor variables
(ii) Predict weight for Time=10 and Diet=1
(iii)Find the error in model for smae

INPUT:

```
library(tidyverse)
data(chickwts)
model <- lm(weight ~ Time + Diet, data = chickwts)
summary(model)
predictors <- data.frame(Time = 10, Diet = 1)
prediction <- predict(model, newdata = predictors)
prediction
library(caret)
results <- train(weight ~ Time + Diet, data = chickwts, method = "lm", trControl =
trainControl(method = "cv", number = 10))
print(results)
```

OUTPUT:


weight
300
200
100
1
2
3
4
Diet