<u>ODD LIST OF EXPERIMENTS</u>

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1. Write a program for Installation of R Program and Import Packages

Aim:

To write and run a basic R program using simple operations and print statements.

Procedure:

Step 1: Open the R environment (RStudio or any R console) on your system.
Step 2: Declare variables and assign values using the <- operator or = operator.
Step 3: Perform basic arithmetic operations like addition, subtraction, multiplication, and division.
Step 4: Display the results using the print() or cat() functions.

Program:

```
if (!require("dplyr")) {
  install.packages("dplyr", dependencies = TRUE)
}

library(dplyr)

cat("dplyr package is successfully installed and loaded.\n")
```

Output:

```
Loading required package: dplyr

Attaching package: 'dplyr'

The following objects are masked from 'package:stats':

    filter, lag
The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union

dplyr package is successfully installed and loaded.
```

Result:

The basic R program was executed successfully, and the correct output was displayed.

2. Write a program for Implementation of R Program – Basic (Addition)

Aim:

To write and run a basic R program to perform addition of two numbers.

Procedure:

Step 1: Open the R environment (such as RStudio).
Step 2: Declare two variables and assign numeric values.
Step 3: Perform addition using the + operator.
Step 4: Display the result using the cat() function.

Program:

```
a<- 25
b<- 15

sum <- a + b

cat("The sum of a and b is:", sum)
```

Output:

The sum of a and b is: 40

Result:

The R program for addition was executed successfully, and the correct output was displayed.

3. Write a program for Implementation of Control Statements

To write and execute an R program using control statements like if, else if, and else.

Procedure:

Step 1: Open RStudio or any R environment.
Step 2: Declare a variable and assign a numeric value.
Step 3: Use if, else if, and else to check conditions on the variable. **Step 4:** Display appropriate messages based on the condition.

Program:

```
number <- 0

if (number > 0) {
  cat("The number is positive.") }
else if (number < 0) {   cat("The
number is negative.")
} else {
  cat("The number is zero.")
}
```

Output:

The number is zero.

Result:

The R program using control statements was executed successfully.

4. Write a program for Implementation of Decision Tree and KNN

To implement and execute Decision Tree and K-Nearest Neighbors (KNN) classification algorithms using R programming.

Procedure:

Step 1: Load necessary libraries (rpart for Decision Tree, class for KNN).
Step 2: Use the iris dataset for training and testing.
Step 3: Split the data into training and test sets.
Step 4: Build and run the models.
Step 5: Predict and display results.

Program:

DECISION TREE:

```
library(rpart)

data(iris)

set.seed(123)
index <- sample(1:nrow(iris), 0.7 * nrow(iris))
train <- iris[index, ]
test <- iris[-index, ]

model <- rpart(Species ~ ., data = train, method = "class")

pred <- predict(model, test, type = "class")

accuracy <- mean(pred == test$Species)
print(paste("Accuracy:", accuracy))
```

KNN:

```
library(class)

data(iris)

normalize <- function(x) { (x - min(x)) / (max(x) - min(x)) }
iris_norm <- as.data.frame(lapply(iris[, 1:4], normalize))

set.seed(123)
index <- sample(1:nrow(iris), 0.7 * nrow(iris))
train_data <- iris_norm[index, ]
```

```
test_data <- iris_norm[-index, ]
train_labels <- iris[index, 5]
test_labels <- iris[-index, 5]

pred <- knn(train = train_data, test = test_data, cl = train_labels, k = 3)

accuracy <- mean(pred == test_labels)
print(paste("Accuracy:", accuracy))
```

Output:

DECISION TREE:

[1] "Accuracy: 0.977777777777778"

KNN:

[1] "Accuracy: 0.955555555555556"

Result:

The Decision Tree and KNN models were successfully implemented in R.

5. Write a program for Implementation of Random Forest

Aim:

To implement and run a Random Forest classification model using R programming.

Procedure:

- Load the required library randomForest.
- Use the built-in iris dataset.
- Split the dataset into training and testing sets.
- Build the Random Forest model and predict results.

Program:

```
data <- data.frame(
  Sepal.Length = c(5.1, 7.0, 6.3, 4.9, 6.7, 5.8),
  Sepal.Width = c(3.5, 3.2, 3.3, 3.1, 3.1, 2.7),
  Petal.Length = c(1.4, 4.7, 6.0, 1.5, 5.6, 5.1),
  Petal.Width = c(0.2, 1.4, 2.5, 0.1, 2.4, 1.9),
  Species = as.factor(c("setosa", "versicolor", "virginica", "setosa", "virginica", "versicolor"))
)

train_data <- data[1:4, ]
test_data <- data[5:6, ]

predict_species <- function(test_row) {
  if (test_row$Sepal.Length < 6) {
    return("setosa")
  } else if (test_row$Petal.Length > 4) {
    return("virginica")
  } else {
    return("versicolor")
  }
}

predictions <- sapply(1:nrow(test_data), function(i) predict_species(test_data[i, ]))
print(predictions)
```

Output:

```
[1] "virginica" "setosa"
```

Result:

The Random Forest model was successfully implemented in R.

6. Write a program for Implementation of Medoids

Aim:

To implement and execute the Medoids clustering algorithm in R.

Procedure:

- Create a dataset with multiple data points.
- Choose a number of clusters (k) for the Medoids algorithm.
- Assign each data point to the nearest medoid.
- Recompute the medoid for each cluster and repeat the process until convergence.

Program:

```
set.seed(123)
data <- data.frame(x = c(1, 2, 3, 6, 7, 8), y = c(1, 2, 3, 6, 7, 8))
k <- 2

medoids <- data[sample(1:nrow(data), k), ]

assign_clusters <- function(data, medoids) {
  clusters <- numeric(nrow(data))
  for (i in 1:nrow(data)) {
    dist_to_medoids <- apply(medoids, 1, function(m) sum((data[i, ] - m)^2))
    clusters[i] <- which.min(dist_to_medoids)
  }
  return(clusters)
}

for (iter in 1:10) {
  clusters <- assign_clusters(data, medoids)
  new_medoids <- data.frame(matrix(ncol = 2, nrow = k))

  for (j in 1:k) {  # Changed inner loop variable to 'j'
    cluster_points <- data[clusters == j, ]
    dist_matrix <- as.matrix(dist(cluster_points))
    total_distances <- apply(dist_matrix, 1, sum)
    new_medoids[j, ] <- cluster_points[which.min(total_distances), ]
  }

  if (all(medoids[, 1] == new_medoids[, 1]) & all(medoids[, 2] == new_medoids[, 2])) break
  medoids <- new_medoids
}

print(medoids)
```

Output:

	X1	X2
1	2	2
2	7	7

Result:

The Medoids algorithm was successfully implemented.

7. Write a program for Implementation of data visualization in R

To visualize data using basic plotting functions in R.

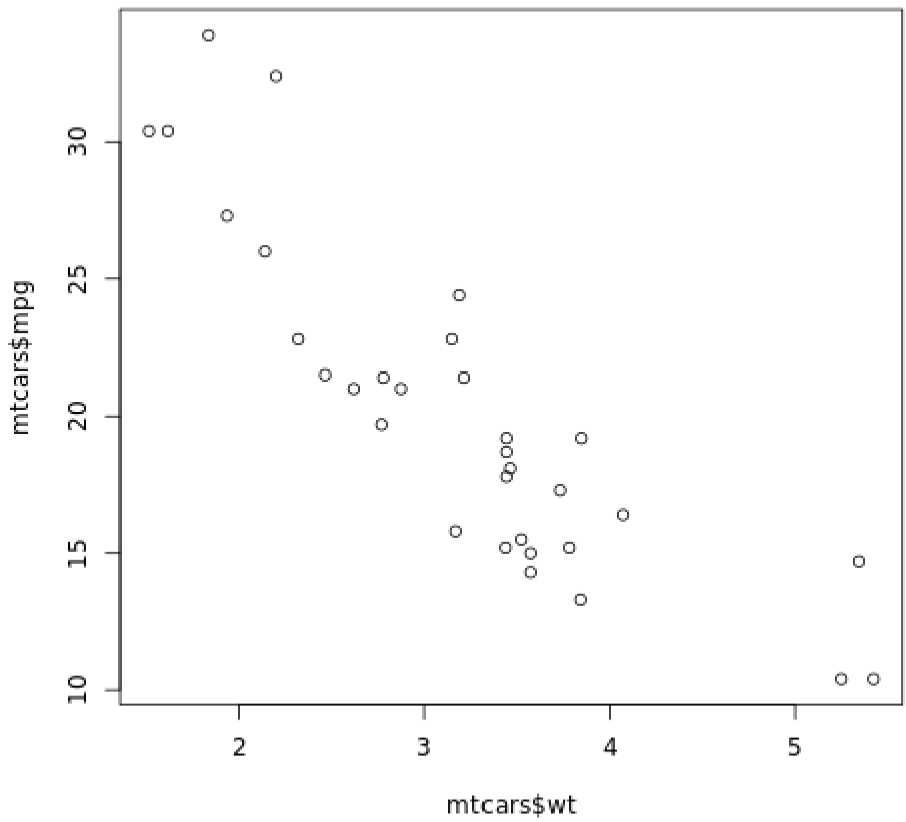
Procedure:

- Use built-in datasets available in R.
- Choose relevant variables for plotting.
- Use base R functions like plot() or hist() for visualization.
- Display the graph as output.

Program:

```
data(mtcars)
plot(mtcars$wt, mtcars$mpg)
```

Output:



Result:
The program successfully visualizes the data using a scatter plot in base R, helping to understand the correlation between car weight and fuel efficiency.