**PROGRAM:**

x=head(iris)

x

head(iris)

min\_max\_norm<- function(x) {

(x-min(x)) / (max(x) - min(x))

}

iris\_norm<-as.data.frame(lapply(iris[1:4], min\_max\_norm))

head(iris\_norm)

iris\_norm$Species<-iris$Species

head(iris\_norm)

**OUTPUT:**

> View(iris)

> x=head(iris)

> x

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

1 5.1 3.5 1.4 0.2 setosa

2 4.9 3.0 1.4 0.2 setosa

3 4.7 3.2 1.3 0.2 setosa

4 4.6 3.1 1.5 0.2 setosa

5 5.0 3.6 1.4 0.2 setosa

6 5.4 3.9 1.7 0.4 setosa

> head(iris)

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

1 5.1 3.5 1.4 0.2 setosa

2 4.9 3.0 1.4 0.2 setosa

3 4.7 3.2 1.3 0.2 setosa

4 4.6 3.1 1.5 0.2 setosa

5 5.0 3.6 1.4 0.2 setosa

6 5.4 3.9 1.7 0.4 setosa

> min\_max\_norm<- function(x) {

(x-min(x)) / (max(x) - min(x))

}

> iris\_norm<-as.data.frame(lapply(iris[1:4], min\_max\_norm))

> head(iris\_norm)

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 0.22222222 0.6250000 0.06779661 0.04166667

2 0.16666667 0.4166667 0.06779661 0.04166667

3 0.11111111 0.5000000 0.05084746 0.04166667

4 0.08333333 0.4583333 0.08474576 0.04166667

5 0.19444444 0.6666667 0.06779661 0.04166667

6 0.30555556 0.7916667 0.11864407 0.12500000

> iris\_norm$Species<-iris$Species

> head(iris\_norm)

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

1 0.22222222 0.6250000 0.06779661 0.04166667 setosa

2 0.16666667 0.4166667 0.06779661 0.04166667 setosa

3 0.11111111 0.5000000 0.05084746 0.04166667 setosa

4 0.08333333 0.4583333 0.08474576 0.04166667 setosa

5 0.19444444 0.6666667 0.06779661 0.04166667 setosa

6 0.30555556 0.7916667 0.11864407 0.12500000 setosa

**PROGRAM:**

#Z-Score Normalization Code

#1. Standardize one variable

iris$Sepal.Width <- (iris$Sepal.Width - mean(iris$Sepal.Width))/ sd(iris$Sepal.Width)

head(iris)

#find mean of Sepal.Width

mean(iris$Sepal.Width)

#find standard deviation of Sepal.Width

sd(iris$Sepal.Width)

#standardize first four columns of iris dataset

iris\_standardize <- as.data.frame(scale(iris[1:4]))

#view first six rows of standardized dataset

head(iris\_standardize)

**OUTPUT:**

> iris$Sepal.Width <- (iris$Sepal.Width - mean(iris$Sepal.Width))/ sd(iris$Sepal.Width)

> head(iris)

Sepal.Length Sepal.Width Petal.Length Petal.Width Species

1 5.1 1.01560199 1.4 0.2 setosa

2 4.9 -0.13153881 1.4 0.2 setosa

3 4.7 0.32731751 1.3 0.2 setosa

4 4.6 0.09788935 1.5 0.2 setosa

5 5.0 1.24503015 1.4 0.2 setosa

6 5.4 1.93331463 1.7 0.4 setosa

> #find mean of Sepal.Width

> mean(iris$Sepal.Width)

[1] 2.034094e-16

> #find standard deviation of Sepal.Width

> sd(iris$Sepal.Width)

[1] 1

> #standardize first four columns of iris dataset

> iris\_standardize <- as.data.frame(scale(iris[1:4]))

> #view first six rows of standardized dataset

> head(iris\_standardize)

Sepal.Length Sepal.Width Petal.Length Petal.Width

1 -0.8976739 1.01560199 -1.335752 -1.311052

2 -1.1392005 -0.13153881 -1.335752 -1.311052

3 -1.3807271 0.32731751 -1.392399 -1.311052

4 -1.5014904 0.09788935 -1.279104 -1.311052

5 -1.0184372 1.24503015 -1.335752 -1.311052

6 -0.5353840 1.93331463 -1.165809 -1.048667