Experiment:1

Write R Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform them into

I.0 to 1 range with min-max normalization.

II.a value around 0 with z-score normalization

Aim: Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform them into.

Description:

Iris dataset in R

The Iris dataset comprises measurements of iris flowers from three different species: Setosa, Versicolor, and Virginica. Each sample consists of four features: sepal length, sepal width, petal length, and petal width. Additionally, each sample is labeled with its corresponding species.

lapply() function

The lapply() function helps us in applying functions on list objects and returns a list object of the same length. The lapply() function in the R Language takes a list, vector, or data frame as input and gives output in the form of a list object. Since the lapply() function applies a certain operation to all the elements of the list it doesn't need a MARGIN.

Syntax: lapply(x, fun)

Parameters:

x: determines the input vector or an object.

fun: determines the function that is to be applied to input data.

Min-Max normalization: This technique scales the values of a feature to a range between 0 and 1. This is done by subtracting the minimum value of the feature from each value, and then dividing by the range of the feature.

Z-score normalization: This technique scales the values of a feature to have a mean of 0 and a standard deviation of 1. This is done by subtracting the mean of the feature from each value, and then dividing by the standard deviation.

I.0 to 1 range with min-max normalization.

Program:

```
head(iris)
min_max=function(v)
{
 (v-min(v))/(max(v)-min(v))
```

```
}
r=data.frame(lapply(iris[1:4],min_max))
r
r$Species=iris$Species
head(r)
```

Output:

```
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

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

  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
```

II.a value around 0 with z-score normalization

Program:

```
head(iris)
zsc=function(v)
{
  (v-mean(v)/sd(v))
}
r=data.frame(lapply(iris[1:4],zsc))head(r)
```

```
r$Species=iris$Species
head(r)
```

Output:

```
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

  Sepal.Length Sepal.Width Petal.Length Petal.Width
1   -1.956602   -3.514384   -0.7288188   -1.373438
2   -2.156602   -4.014384   -0.7288188   -1.373438
3   -2.356602   -3.814384   -0.8288188   -1.373438
4   -2.456602   -3.914384   -0.6288188   -1.373438
5   -2.056602   -3.414384   -0.7288188   -1.373438
6   -1.656602   -3.114384   -0.4288188   -1.173438

  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1   -1.956602   -3.514384   -0.7288188   -1.373438  setosa
2   -2.156602   -4.014384   -0.7288188   -1.373438  setosa
3   -2.356602   -3.814384   -0.8288188   -1.373438  setosa
4   -2.456602   -3.914384   -0.6288188   -1.373438  setosa
5   -2.056602   -3.414384   -0.7288188   -1.373438  setosa
6   -1.656602   -3.114384   -0.4288188   -1.173438  setosa
```