22BCE0476AMAN.R

amssr

2024-10-03

```
#CustomerID Genre   Age Annual Income (k$)  Spending Score (1-100)
# K-Means Clustering

# Importing the dataset - Mall_Customers and extract 4th and 5th column

# Splitting the dataset into the Training set and Test set - load the library
caTools

#Identify the Dependent variable ad spit the data into 80% for training and
20% for testing

# Feature Scaling
# Using the elbow method to find the optimal number of clusters - wcss
# Fitting K-Means to the dataset

#Identify the the number of cluster and plot

#Mail_Customers.csv Mall_Customers.csv

#install.packages("caTools")
library(caTools)

## Warning: package 'caTools' was built under R version 4.3.3

#install.packages("cluster")
library(cluster)

## Warning: package 'cluster' was built under R version 4.3.3

dataset <- read.csv("C:/Users/amssr/Desktop/Mall_Customers.csv")
dataset

##     CustomerID  Genre Age Annual.Income..k.. Spending.Score..1.100.
## 1            1   Male  19                 15                     39
## 2            2   Male  21                 15                     81
## 3            3 Female  20                 16                      6
## 4            4 Female  23                 16                     77
## 5            5 Female  31                 17                     40
## 6            6 Female  22                 17                     76
## 7            7 Female  35                 18                      6
## 8            8 Female  23                 18                     94
## 9            9   Male  64                 19                      3
```

```
## 10          10 Female  30                19                72
## 11          11   Male  67                19                14
## 12          12 Female  35                19                99
## 13          13 Female  58                20                15
## 14          14 Female  24                20                77
## 15          15   Male  37                20                13
## 16          16   Male  22                20                79
## 17          17 Female  35                21                35
## 18          18   Male  20                21                66
## 19          19   Male  52                23                29
## 20          20 Female  35                23                98
## 21          21   Male  35                24                35
## 22          22   Male  25                24                73
## 23          23 Female  46                25                 5
## 24          24   Male  31                25                73
## 25          25 Female  54                28                14
## 26          26   Male  29                28                82
## 27          27 Female  45                28                32
## 28          28   Male  35                28                61
## 29          29 Female  40                29                31
## 30          30 Female  23                29                87
## 31          31   Male  60                30                 4
## 32          32 Female  21                30                73
## 33          33   Male  53                33                 4
## 34          34   Male  18                33                92
## 35          35 Female  49                33                14
## 36          36 Female  21                33                81
## 37          37 Female  42                34                17
## 38          38 Female  30                34                73
## 39          39 Female  36                37                26
## 40          40 Female  20                37                75
## 41          41 Female  65                38                35
## 42          42   Male  24                38                92
## 43          43   Male  48                39                36
## 44          44 Female  31                39                61
## 45          45 Female  49                39                28
## 46          46 Female  24                39                65
## 47          47 Female  50                40                55
## 48          48 Female  27                40                47
## 49          49 Female  29                40                42
## 50          50 Female  31                40                42
## 51          51 Female  49                42                52
## 52          52   Male  33                42                60
## 53          53 Female  31                43                54
## 54          54   Male  59                43                60
## 55          55 Female  50                43                45
## 56          56   Male  47                43                41
## 57          57 Female  51                44                50
## 58          58   Male  69                44                46
## 59          59 Female  27                46                51
```

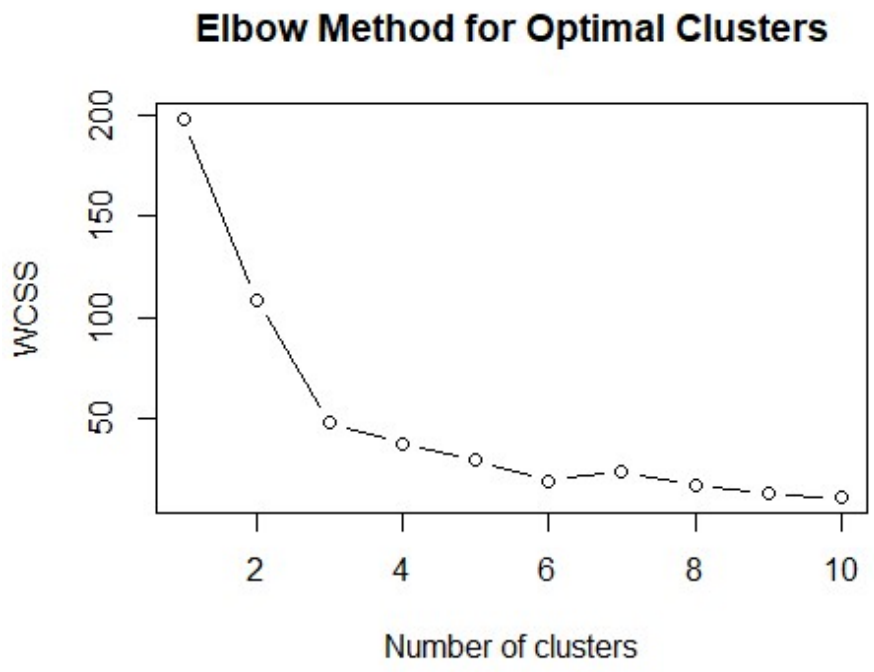
```
## 60          60   Male  53                  46                  46
## 61          61   Male  70                  46                  56
## 62          62   Male  19                  46                  55
## 63          63 Female  67                  47                  52
## 64          64 Female  54                  47                  59
## 65          65   Male  63                  48                  51
## 66          66   Male  18                  48                  59
## 67          67 Female  43                  48                  50
## 68          68 Female  68                  48                  48
## 69          69   Male  19                  48                  59
## 70          70 Female  32                  48                  47
## 71          71   Male  70                  49                  55
## 72          72 Female  47                  49                  42
## 73          73 Female  60                  50                  49
## 74          74 Female  60                  50                  56
## 75          75   Male  59                  54                  47
## 76          76   Male  26                  54                  54
## 77          77 Female  45                  54                  53
## 78          78   Male  40                  54                  48
## 79          79 Female  23                  54                  52
## 80          80 Female  49                  54                  42
## 81          81   Male  57                  54                  51
## 82          82   Male  38                  54                  55
## 83          83   Male  67                  54                  41
## 84          84 Female  46                  54                  44
## 85          85 Female  21                  54                  57
## 86          86   Male  48                  54                  46
## 87          87 Female  55                  57                  58
## 88          88 Female  22                  57                  55
## 89          89 Female  34                  58                  60
## 90          90 Female  50                  58                  46
## 91          91 Female  68                  59                  55
## 92          92   Male  18                  59                  41
## 93          93   Male  48                  60                  49
## 94          94 Female  40                  60                  40
## 95          95 Female  32                  60                  42
## 96          96   Male  24                  60                  52
## 97          97 Female  47                  60                  47
## 98          98 Female  27                  60                  50
## 99          99   Male  48                  61                  42
## 100        100   Male  20                  61                  49
## 101        101 Female  23                  62                  41
## 102        102 Female  49                  62                  48
## 103        103   Male  67                  62                  59
## 104        104   Male  26                  62                  55
## 105        105   Male  49                  62                  56
## 106        106 Female  21                  62                  42
## 107        107 Female  66                  63                  50
## 108        108   Male  54                  63                  46
## 109        109   Male  68                  63                  43
```

```
## 110        110   Male  66                63                48
## 111        111   Male  65                63                52
## 112        112 Female  19                63                54
## 113        113 Female  38                64                42
## 114        114   Male  19                64                46
## 115        115 Female  18                65                48
## 116        116 Female  19                65                50
## 117        117 Female  63                65                43
## 118        118 Female  49                65                59
## 119        119 Female  51                67                43
## 120        120 Female  50                67                57
## 121        121   Male  27                67                56
## 122        122 Female  38                67                40
## 123        123 Female  40                69                58
## 124        124   Male  39                69                91
## 125        125 Female  23                70                29
## 126        126 Female  31                70                77
## 127        127   Male  43                71                35
## 128        128   Male  40                71                95
## 129        129   Male  59                71                11
## 130        130   Male  38                71                75
## 131        131   Male  47                71                 9
## 132        132   Male  39                71                75
## 133        133 Female  25                72                34
## 134        134 Female  31                72                71
## 135        135   Male  20                73                 5
## 136        136 Female  29                73                88
## 137        137 Female  44                73                 7
## 138        138   Male  32                73                73
## 139        139   Male  19                74                10
## 140        140 Female  35                74                72
## 141        141 Female  57                75                 5
## 142        142   Male  32                75                93
## 143        143 Female  28                76                40
## 144        144 Female  32                76                87
## 145        145   Male  25                77                12
## 146        146   Male  28                77                97
## 147        147   Male  48                77                36
## 148        148 Female  32                77                74
## 149        149 Female  34                78                22
## 150        150   Male  34                78                90
## 151        151   Male  43                78                17
## 152        152   Male  39                78                88
## 153        153 Female  44                78                20
## 154        154 Female  38                78                76
## 155        155 Female  47                78                16
## 156        156 Female  27                78                89
## 157        157   Male  37                78                 1
## 158        158 Female  30                78                78
## 159        159   Male  34                78                 1
```

```
## 160        160 Female  30                  78                  73
## 161        161 Female  56                  79                  35
## 162        162 Female  29                  79                  83
## 163        163   Male  19                  81                   5
## 164        164 Female  31                  81                  93
## 165        165   Male  50                  85                  26
## 166        166 Female  36                  85                  75
## 167        167   Male  42                  86                  20
## 168        168 Female  33                  86                  95
## 169        169 Female  36                  87                  27
## 170        170   Male  32                  87                  63
## 171        171   Male  40                  87                  13
## 172        172   Male  28                  87                  75
## 173        173   Male  36                  87                  10
## 174        174   Male  36                  87                  92
## 175        175 Female  52                  88                  13
## 176        176 Female  30                  88                  86
## 177        177   Male  58                  88                  15
## 178        178   Male  27                  88                  69
## 179        179   Male  59                  93                  14
## 180        180   Male  35                  93                  90
## 181        181 Female  37                  97                  32
## 182        182 Female  32                  97                  86
## 183        183   Male  46                  98                  15
## 184        184 Female  29                  98                  88
## 185        185 Female  41                  99                  39
## 186        186   Male  30                  99                  97
## 187        187 Female  54                 101                  24
## 188        188   Male  28                 101                  68
## 189        189 Female  41                 103                  17
## 190        190 Female  36                 103                  85
## 191        191 Female  34                 103                  23
## 192        192 Female  32                 103                  69
## 193        193   Male  33                 113                   8
## 194        194 Female  38                 113                  91
## 195        195 Female  47                 120                  16
## 196        196 Female  35                 120                  79
## 197        197 Female  45                 126                  28
## 198        198   Male  32                 126                  74
## 199        199   Male  32                 137                  18
## 200        200   Male  30                 137                  83
```

```r
X <- dataset[, 4:5]

set.seed(123)

split <- sample.split(X, SplitRatio = 0.8)
training_set <- subset(X, split == TRUE)
test_set <- subset(X, split == FALSE)
```

```r
training_set_scaled <- scale(training_set)
test_set_scaled <- scale(test_set)


# Using the elbow method to find the optimal number of clusters
set.seed(123)
wcss <- vector()
for (i in 1:10) {
  kmeans_model <- kmeans(training_set_scaled, centers = i)
  wcss[i] <- kmeans_model$tot.withinss
}

# Plot the elbow graph
plot(1:10, wcss, type = "b", main = "Elbow Method for Optimal Clusters",xlab
= "Number of clusters", ylab = "WCSS")
```




```r
#5. Fitting K-Means to the Dataset
# Fitting K-Means to the dataset
set.seed(123)
kmeans_model <- kmeans(training_set_scaled, centers = 5, nstart = 25)

#visualize the clusters

library(cluster)
```

```r
clusplot(training_set_scaled,
         kmeans_model$cluster,
         lines = 0,
         shade = TRUE,
         color = TRUE,
         labels = 2,
         plotchar = FALSE,
         span = TRUE,
         main = "Clusters of customers",
         xlab = "Annual Income (k$)",
         ylab = "Spending Score (1-100)")
```