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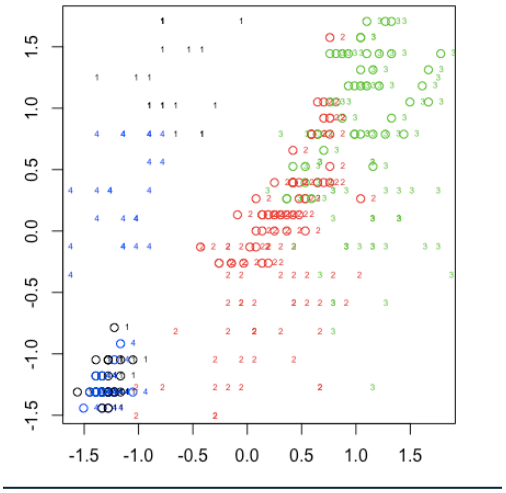
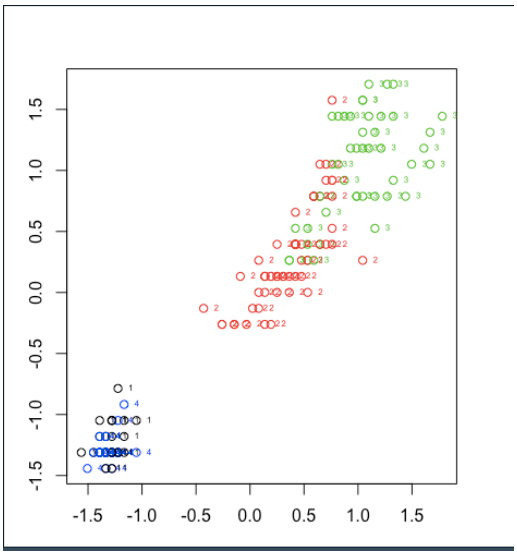
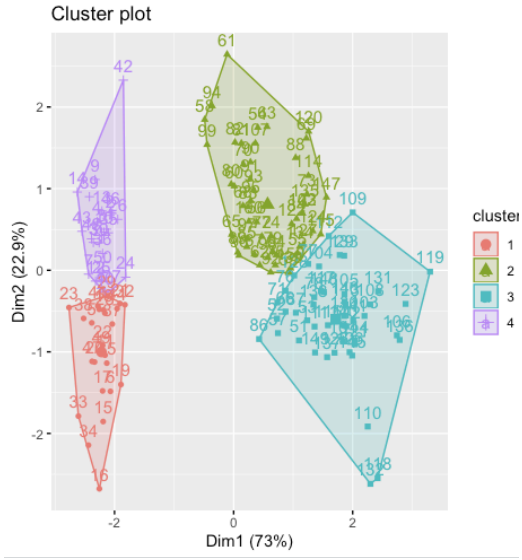
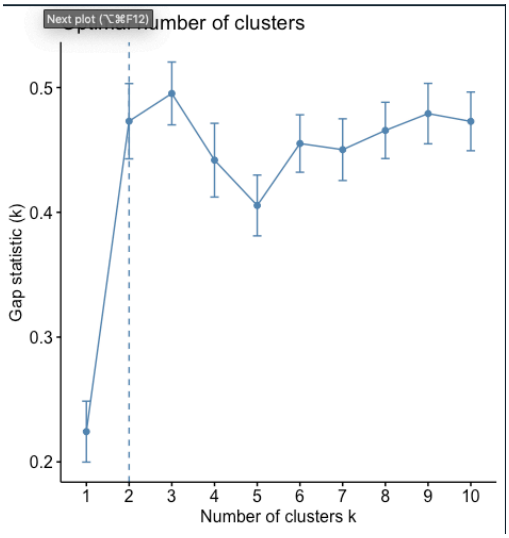
MSTM ADV

Find out the best "k" for k means, and use the best "k" to run k-means clustering. Plot 2-d plots with all pairs of features, use the clustering results as color.









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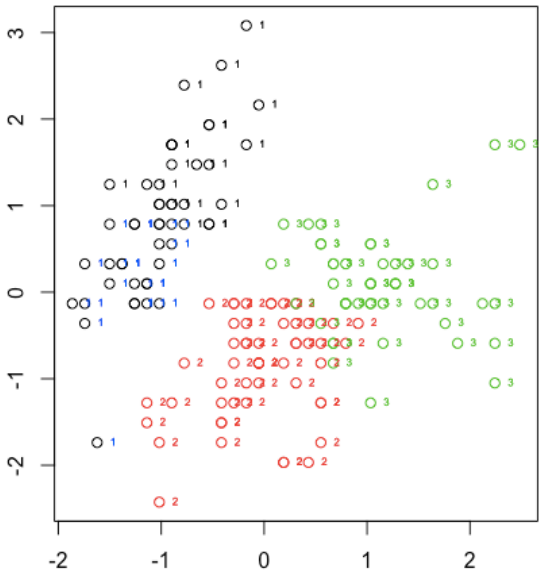

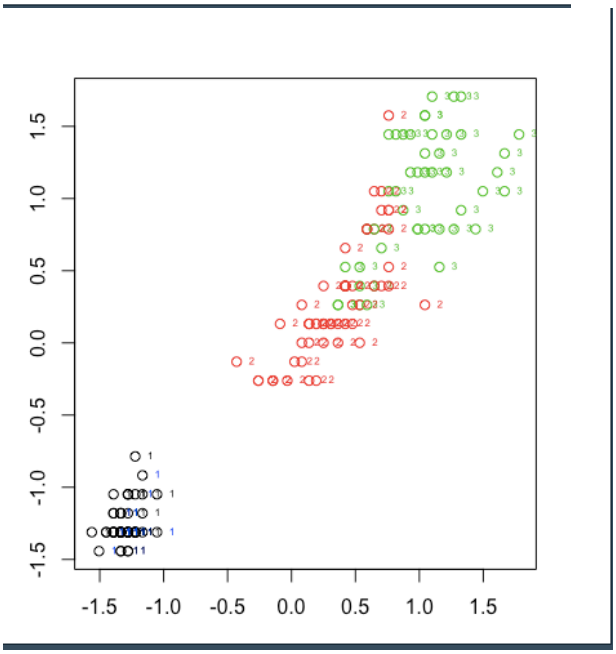

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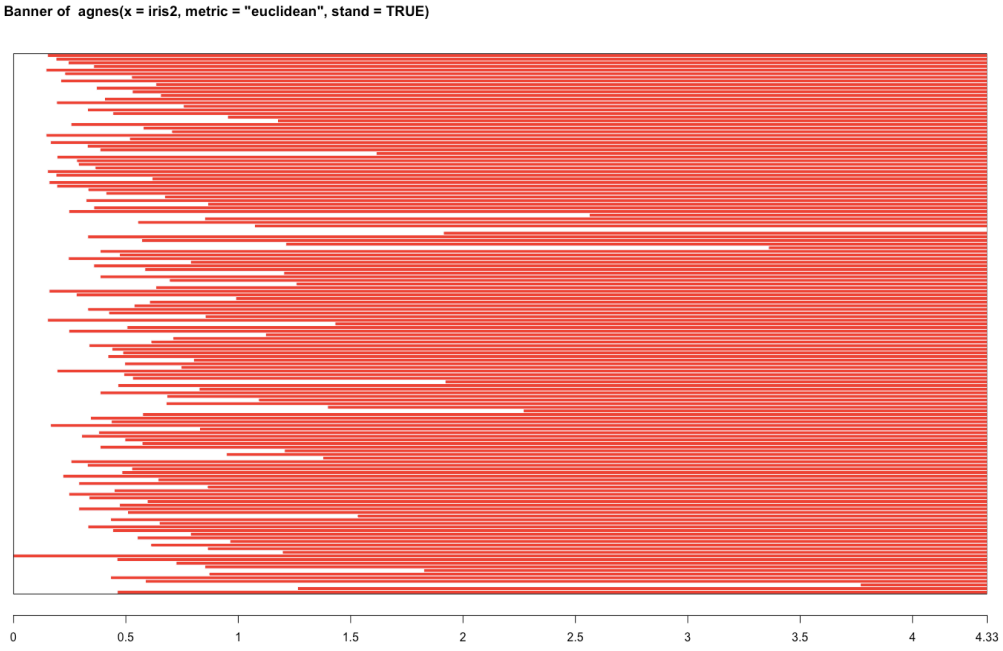
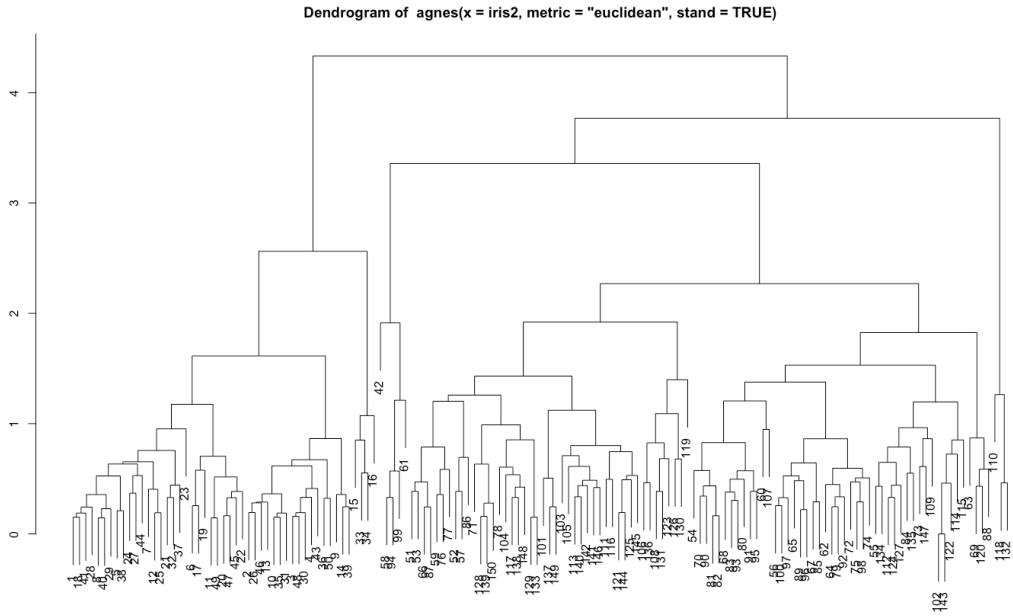
Use agn() to run hierarchical clustering on iris dataset.

Present the dendrogram

Plot 2-d plots with all pairs of features, use the clustering results when we preserve 2 clusters as color.





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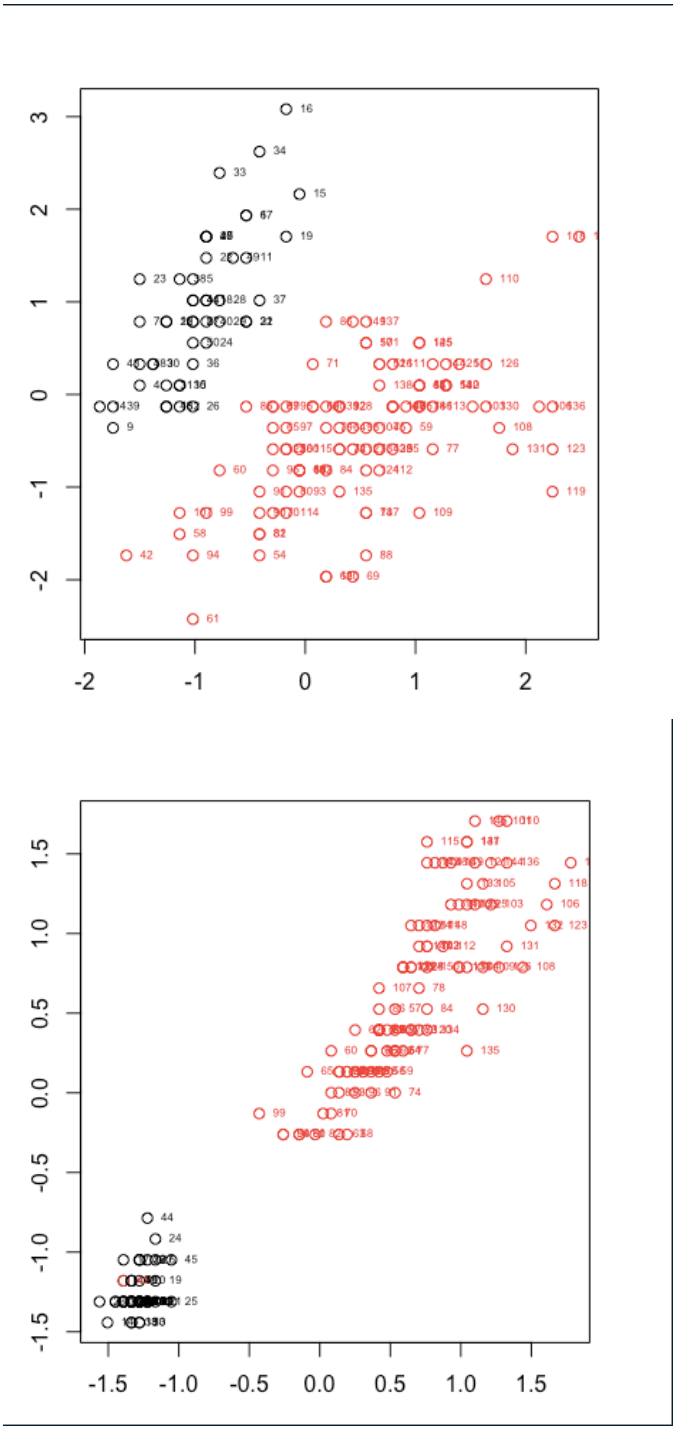

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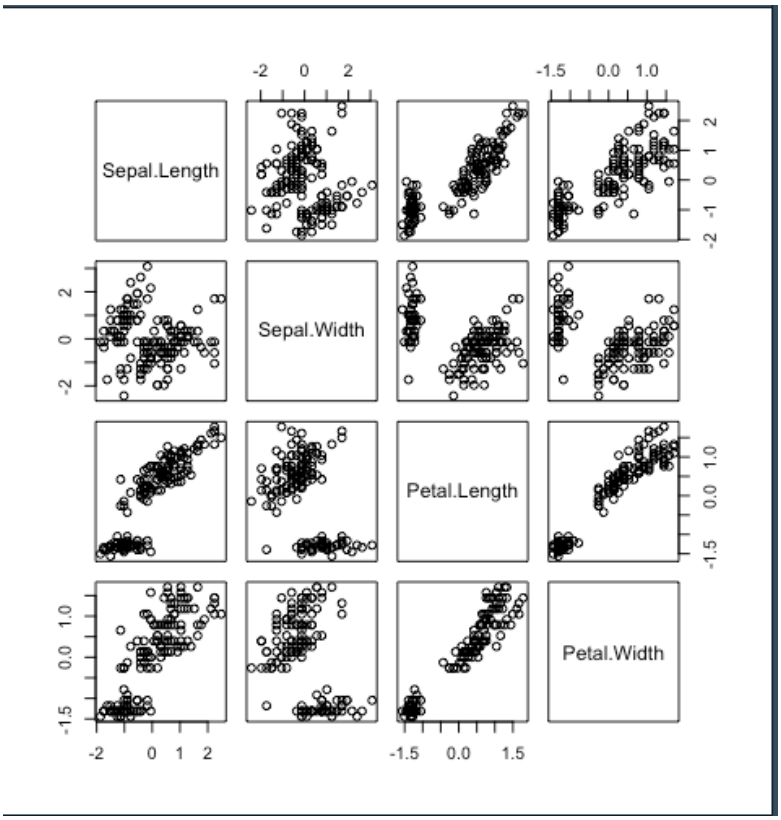
Use dbscan to cluster the dataset. Tune the parameters so that there will be 2-5 clusters. Plot 2-d plots with all pairs of features, use the clustering results as color.



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```
data("iris")
View(iris)
temp=scale (iris,center=TRUE, scale =TRUE)
iris2<-data.frame(scale (iris[-5], center=TRUE, scale =TRUE))
k4 = kmeans (iris2, centers=4, nstart = 25)
k4
result = cbind (iris2 , k4$cluster)
View(result)
plot(result$Sepal.Length , result$Sepal.Width,col = k4$cluster)
text(result$Sepal.Length , result$Sepal.Width,k4$cluster, cex=0.5, col=k4$cluster, pos=4)
plot(result$Petal.Length , result$Petal.Width,col = k4$cluster)
text(result$Petal.Length , result$Petal.Width,k4$cluster, cex=0.5, col=k4$cluster, pos=4)
install.packages("factoextra")
library(factoextra)
fviz_cluster (k4, data = iris2)
fviz_nbclust(iris2, kmeans, method = "gap_stat")
k3=kmeans(iris2,centers=3, nstart = 25)
fviz_cluster(k3, data = iris2)
plot(result$Sepal.Length , result$Sepal.Width,col = k3$cluster)
text(result$Sepal.Length , result$Sepal.Width,k3$cluster, cex=0.5, col=k4$cluster, pos=4)
plot(result$Petal.Length , result$Petal.Width,col = k3$cluster)
text(result$Petal.Length , result$Petal.Width,k3$cluster, cex=0.5, col=k4$cluster, pos=4)
install.packages(cluster)
library(cluster)
k.medois.fit <- pam(iris2, 3, diss=FALSE)
k.medois.fit
fviz_cluster(k.medois.fit, data = iris2)
library(cluster)
agn = agnes (iris2, metric = "euclidean", stand = TRUE)
View(agn)
plot(agn)
group.2<-cutree(agn,2)
group.2
group.10<-cutree(agn,10)
group.10
result.agnes.2<-cbind(iris2,group.2)
View(result.agnes.2)
plot(result.agnes.2$Sepal.Length , result.agnes.2$Sepal.Width,col = group.2)
text(result.agnes.2$Sepal.Length , result.agnes.2$Sepal.Width,  cex=0.5, col=group.2, pos=4)
plot(result.agnes.2$Petal.Length , result.agnes.2$Petal.Width,col = group.2)
text(result.agnes.2$Petal.Length , result.agnes.2$Petal.Width,  cex=0.5, col=group.2, pos=4)
install.packages("dbscan")
library(dbscan)
dbresult=dbscan(iris2, 30, minPts = 5)
dbresult
dbresult$cluster
plot (iris2,col=dbresult$cluster)
iris4<-cbind(iris2,dbresult$cluster)
par("mar")
par(mar=c(3,3,3,3))
```

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Outputs

```
> View(iris)
> iris2<-data.frame(scale (iris[-5], center=TRUE, scale =TRUE))
> View(iris2)
> View(iris2)
> k3 = kmeans (iris2, centers=3, nstart = 25)
> k3
K-means clustering with 3 clusters of sizes 50, 53, 47

Cluster means:
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1  -1.01119138  0.85041372   -1.3006301  -1.2507035
2  -0.05005221 -0.88042696    0.3465767   0.2805873
3   1.13217737  0.08812645    0.9928284   1.0141287

Clustering vector:
  [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 3 3 3
2 2 2 3 2 2
 [60] 2 2 2 2 2 2 3 2 2 2 2 3 2 2 2 2 3 3 3 2 2 2 2 2 2 3 3 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 3 3 3 2 3 3 3 3 3
3 2 2 3 3 3
[119] 3 2 3 2 3 2 3 3 2 3 3 3 3 3 3 2 2 3 3 3 2 3 3 3 2 3 3 3 2 3 3 2

Within cluster sum of squares by cluster:
[1] 47.35062 44.08754 47.45019
 (between_SS / total_SS =  76.7 %)
Available components:
[1] "cluster"     "centers"     "totss"       "withinss"    "tot.withinss" "betweenss"   "size"        "iter"
[9] "ifault"

K-means clustering with 4 clusters of sizes 25, 53, 47, 25

Cluster means:
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1  -0.71894419  1.50198969   -1.2972312  -1.2165934
2  -0.05005221 -0.88042696    0.3465767   0.2805873
3   1.13217737  0.08812645    0.9928284   1.0141287
4  -1.30343857  0.19883774   -1.3040289  -1.2848136

Clustering vector:
  [1] 1 4 4 4 1 1 4 4 4 4 1 4 4 4 1 1 1 1 1 1 1 1 4 4 4 4 1 1 4 4 1 1 1 4 4 1 1 4 4 1 4 4 1 1 4 1 4 1 4 3 3 3
2 2 2 3 2 2
 [60] 2 2 2 2 2 2 3 2 2 2 2 3 2 2 2 2 3 3 3 2 2 2 2 2 2 3 3 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 3 3 3 2 3 3 3 3 3
3 2 2 3 3 3
[119] 3 2 3 2 3 2 3 3 2 3 3 3 3 3 3 2 2 3 3 3 2 3 3 3 2 3 3 3 2 3 3 2

Within cluster sum of squares by cluster:
[1] 12.147537 44.087545 47.450194  9.646348
 (between_SS / total_SS =  81.0 %)
Available components:
[1] "cluster"     "centers"     "totss"       "withinss"    "tot.withinss" "betweenss"   "size"        "iter"
```

```
[9] "ifault"

Medoids:
     ID Sepal.Length Sepal.Width Petal.Length Petal.Width
[1,]   8   -1.0184372   0.7861738   -1.2791040  -1.3110521
[2,] 113    1.1553023  -0.1315388    0.9868021   1.1816087
[3,]  56   -0.1730941  -0.5903951    0.4203256   0.1320673
Clustering vector:
  [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 2 2
3 3 3 2 3 3
 [60] 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 2 2 2 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 2 3 2 2 2 2 3 2 2 2 2
2 3 2 2 2 2
[119] 2 3 2 3 2 3 2 2 3 3 2 2 2 2 2 3 3 2 2 2 3 2 2 2 3 2 2 2 3 2 2 2 3 2 2 3
Objective function:
   build     swap
0.9205107 0.8757051

Available components:
 [1] "medoids"    "id.med"     "clustering" "objective"  "isolation"  "clusinfo"   "silinfo"    "diss"       "call"
[10] "data"

> group.2<-cutree(agn,2)
> group.2
  [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 1 1 1 2 2 2
2 2 2 2 2 2
 [60] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
2 2 2 2 2 2
[119] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
> group.10<-cutree(agn,10)
> group.10
  [1]  1  2  2  2  1  1  1  1  2  2  1  1  2  2  3  3  1  1  1  1  1  1  1  1  2  1  1  1  2  2  1  3  3  2  2  1  1  2
 [40]  1  1  4  2  1  1  2  1  2  1  2  5  5  5  6  6  6  5  7  5  6  7  6  8  6  6  5  6  6  8  6  5  6  6  6  6  5  5  5
 [79]  6  6  6  6  6  6  6  5  5  8  6  6  6  6  6  7  6  6  6  6  7  6  5  6  5  5  5  9  6  9  6 10  5  6  5  6  6  5  5
[118] 10  9  8  5  6  9  6  5  9  6  5  5  9  9 10  5  6  6  9  5  5  5  5  5  5  6  5  5  5  6  5  5  5

DBSCAN clustering for 150 objects.
Parameters: eps = 30, minPts = 5
The clustering contains 1 cluster(s) and 0 noise points.

  1
150

Available fields: cluster, eps, minPts
> dbresult$cluster
  [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
 [60] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1
[119] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
```