df_data=USArrests

scaled_df=scale(df_data)

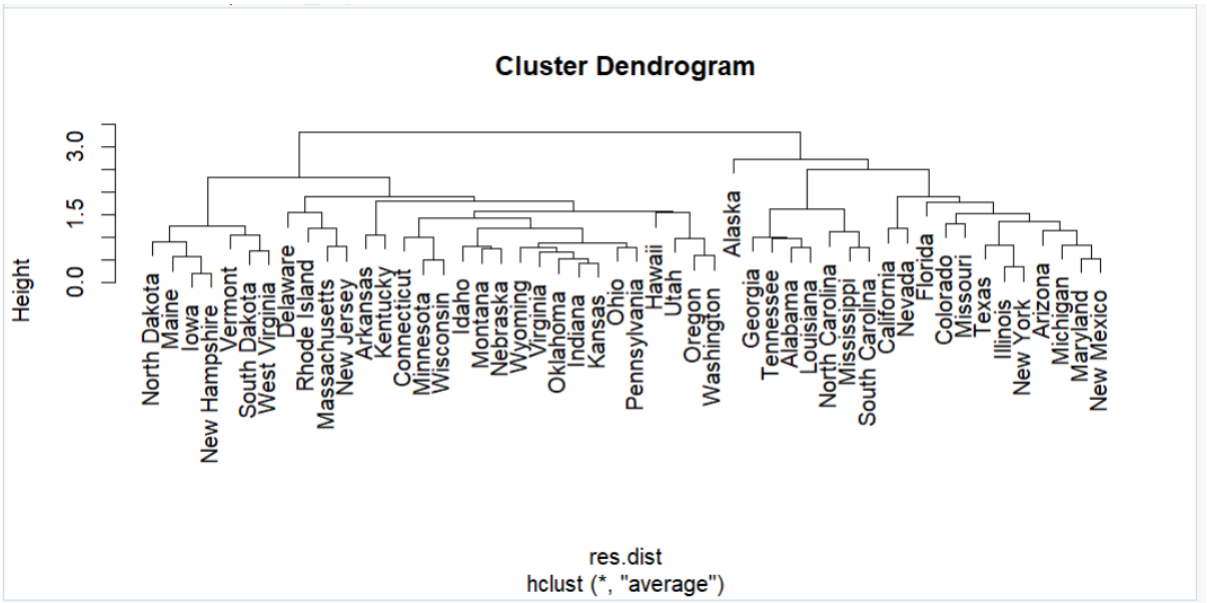
res.dist=dist(scaled_df,method="euclidean")

res.hc=hclust(res.dist,method="average")

res.hc	list [7] (S3: hclust)	List of length 7
merge	integer [49 x 2]	-15 -13 -14 -23 -36 -20 -29 -32 -16 -49 3 -31 ...
height	double [49]	0.206 0.350 0.429 0.494 0.525 0.535 ...
order	integer [50]	34 19 15 29 45 41 ...
labels	character [50]	'Alabama' 'Alaska' 'Arizona' 'Arkansas' 'California' 'Col...
method	character [1]	'average'
call	language	hclust(d = res.dist, method = "average")
dist.method	character [1]	'euclidean'

Data	
df_data	50 obs. of 4 variables
res.hc	List of 7
scaled_df	num [1:50, 1:4] 1.2426 0.5079 0.0716 0.2323 0.2783 ...
Values	
res.dist	'dist' num [1:1225] 2.7 2.29 1.29 3.26 2.65 ...

plot(res.hc)



data=iris

data=data[,1:4]

scaled_iris=scale(data)

dist_iris=dist(scaled_df,method="euclidean")

dist_iris	'dist' num [1:1225] 2.7 2.29 1.29 3.26 2.65 ...

dist_iris

```
               Alabama    Alaska   Arizona  Arkansas California  Colorado
Alaska       2.7037541
Arizona      2.2935197 2.7006429
Arkansas     1.2898102 2.8260386 2.7177583
California   3.2631104 3.0125415 1.3104842 3.7636409
Colorado     2.6510673 2.3265187 1.3650307 2.8310512  1.2876185
Connecticut  3.2152975 4.7399125 3.2628575 2.6076395  4.0663898 3.3279920
Delaware     2.0192927 3.6213633 1.9093696 1.8003239  3.0737852 2.5547456
Florida      2.2981353 2.9967642 1.7493928 3.3721968  2.0250039 2.4458600
Georgia      1.1314351 2.8194388 2.7871963 2.2117614  3.3780585 2.8649105
Hawaii       3.3885300 4.5301340 3.2621208 2.9723097  3.6589083 2.8233524
Idaho        2.9146623 4.0580555 3.5210071 1.7687255  4.4879436 3.4767685
Illinois     1.8734993 3.2670626 1.0825512 2.4626424  1.9117469 1.7898322
Indiana      2.0761411 3.3655952 2.6407486 1.4450503  3.4061273 2.3655622
Iowa         3.4878952 4.7251910 4.1157513 2.4252661  4.9708591 3.9406898
Kansas       2.2941096 3.6808173 2.7762838 1.5718411  3.6071725 2.6272281
Kentucky     1.8475879 3.5440903 3.3567681 1.0598104  4.2463809 3.2274013
Louisiana    0.7722224 2.9631431 2.2178519 2.0254276  3.0176625 2.6546743
Maine        3.4851115 4.8322605 4.2961903 2.3621893  5.2699843 4.2713441
Maryland     1.2896460 2.2777590 1.2117356 2.0582244  2.2312581 1.9667562
Massachusetts 2.9874810 4.3729925 2.5162281 2.6881270  3.2156499 2.6522793
             Connecticut  Delaware   Florida   Georgia    Hawaii
```

head(dist_iris)[1:3]

```
[1] 2.703754 2.293520 1.289810
```

df_dist_iris=as.matrix(dist_iris)

View(df_dist_iris)

	Alabama	Alaska	Arizona	Arkansas	California	Colorado	Connecticut
Alabama	0.0000000	2.703754	2.293520	1.2898102	3.263110	2.651067	3.2152975
Alaska	2.7037541	0.000000	2.700643	2.8260386	3.012541	2.326519	4.7399125
Arizona	2.2935197	2.700643	0.000000	2.7177583	1.310484	1.365031	3.2628575
Arkansas	1.2898102	2.826039	2.717758	0.0000000	3.763641	2.831051	2.6076395
California	3.2631104	3.012541	1.310484	3.7636409	0.000000	1.287619	4.0663898
Colorado	2.6510673	2.326519	1.365031	2.8310512	1.287619	0.000000	3.3279920
Connecticut	3.2152975	4.739912	3.262858	2.6076395	4.066390	3.327992	0.0000000
Delaware	2.0192927	3.621363	1.909370	1.8003239	3.073785	2.554746	1.7568475
Florida	2.2981353	2.996764	1.749393	3.3721968	2.025004	2.445860	4.4700701
Georgia	1.1314351	2.819439	2.787196	2.2117614	3.378058	2.864910	3.9738227
Hawaii	3.3885300	4.530134	3.262121	2.9723097	3.658908	2.823352	1.3843291
Idaho	2.9146623	4.058055	3.521007	1.7687255	4.487944	3.476768	1.6354214
Illinois	1.8734993	3.267063	1.082551	2.4626424	1.911747	1.789832	2.7400560
Indiana	2.0761411	3.365595	2.640749	1.4450503	3.406127	2.365562	1.6147898
Iowa	3.4878952	4.725191	4.115751	2.4252661	4.970859	3.940690	1.5470089
Kansas	2.2941096	3.680817	2.776284	1.5718411	3.607173	2.627228	1.2280424

dim(data)

```
[1] 150   4
```

dim(df_dist_iris)

```
[1] 50 50
```

write.table(df_dist_iris,file="dist_iris",sep="\t")

res.hc_iris=hclust(dist_iris,method="complete")

res.hc	List of 7

grp2=cutree(res.hc_iris,k=2)

table(grp2)

```
grp2
 1  2
19 31
```

grp3=cutree(res.hc_iris,k=3)

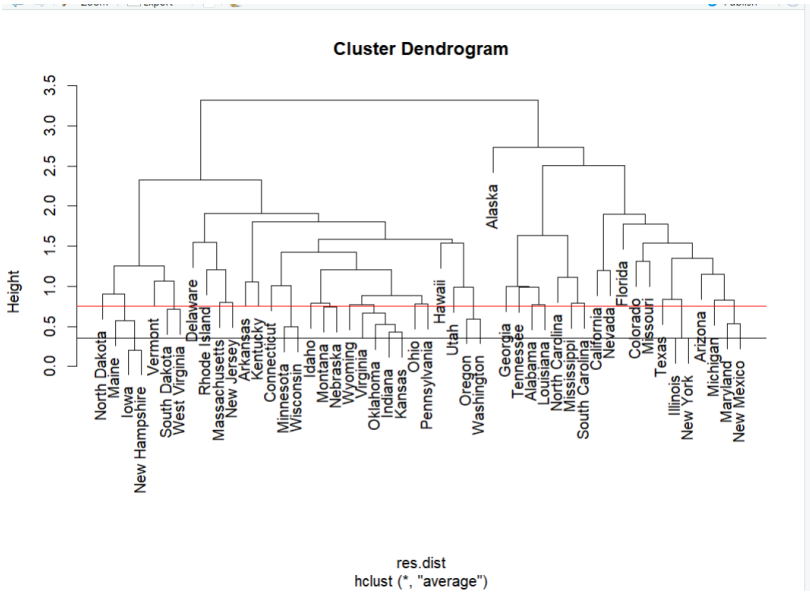
table(grp3)

```
grp3
 1  2  3
 8 11 31
```

plot(res.hc)

abline(h=.35)

abline(h=.75,col=("red"))



grp1=cutree(res.hc,k=4)

table(grp1)

```
grp1
 1  2  3  4
 7  1 12 30
```

grp4=cutree(res.hc,h=.75)

table(grp4)

```
grp4
 1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
 1  1  1  1  1  1  1  1  1  1  1  1  2  4  3  1  1  2  1  1  2  1  1  2  1
26 27 28 29 30 31 32 33 34 35 36 37 38 39
 1  1  1  1  2  1  1  1  2  1  1  1  1  1
```

grp4=cutree(res.hc,h=2.0)

table(grp4)

```
grp4
 1  2  3  4  5
 7  1 12 23  7
```