

实验五：聚类分析

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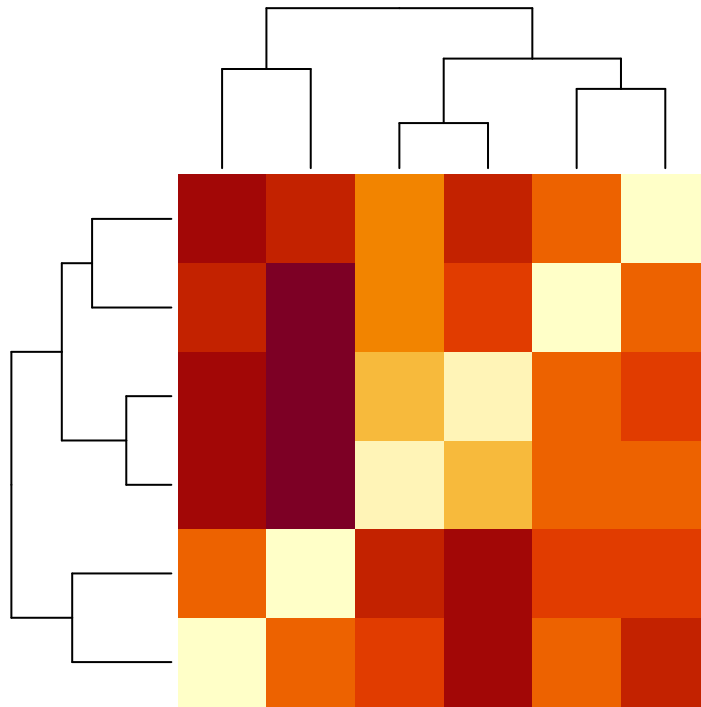
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1 1. 6 个弹头分类

```
data_0 <- read.csv("6-10.csv",encoding = "UTF-8",na.strings=c("", " ", "NA"),header=T,row.names = 1)
X<-data_0
# 极差标准化
center<-sweep(X, 2, apply(X, 2, mean))# 按列中心化
R<-apply(X, 2, max)-apply(X, 2, min)# 计算列极差
X_star<-sweep(center, 2, R, "/")# 极差标准化，均值为 0，极差为 1

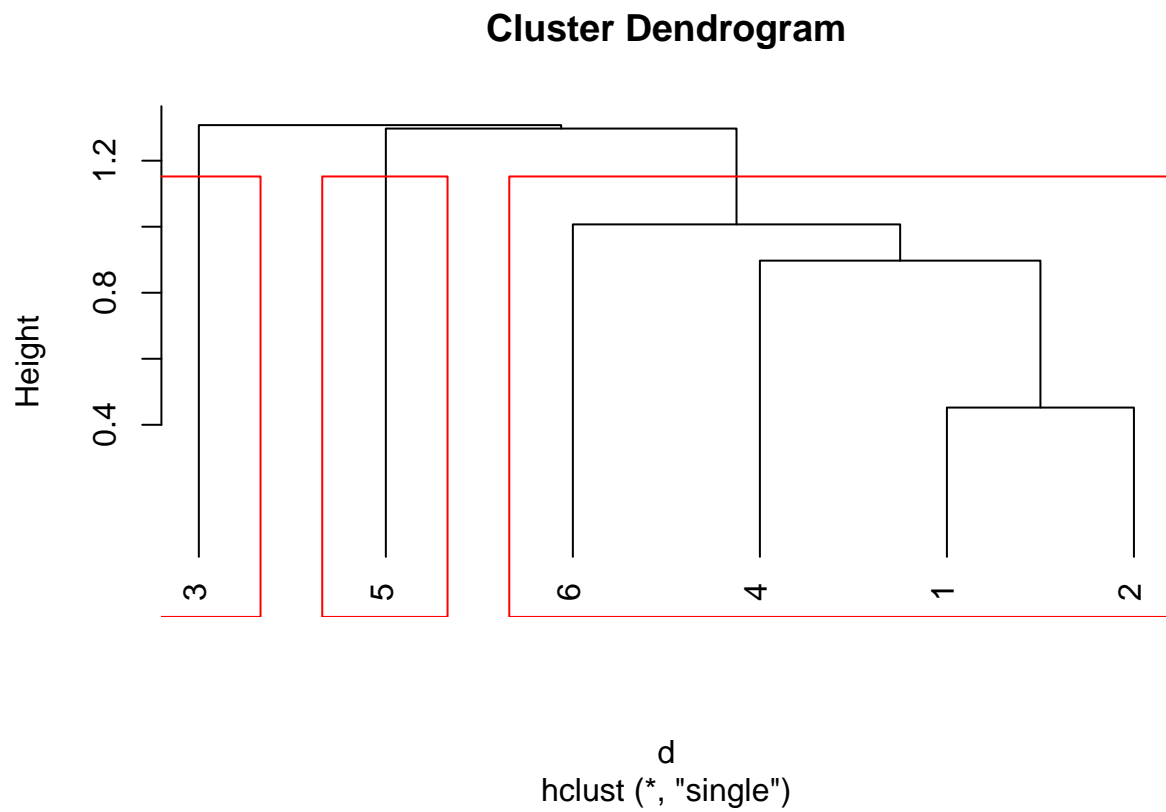
d<-dist(X_star,method = "euclidean")
heatmap(as.matrix(d),labRow = F, labCol = F)
```



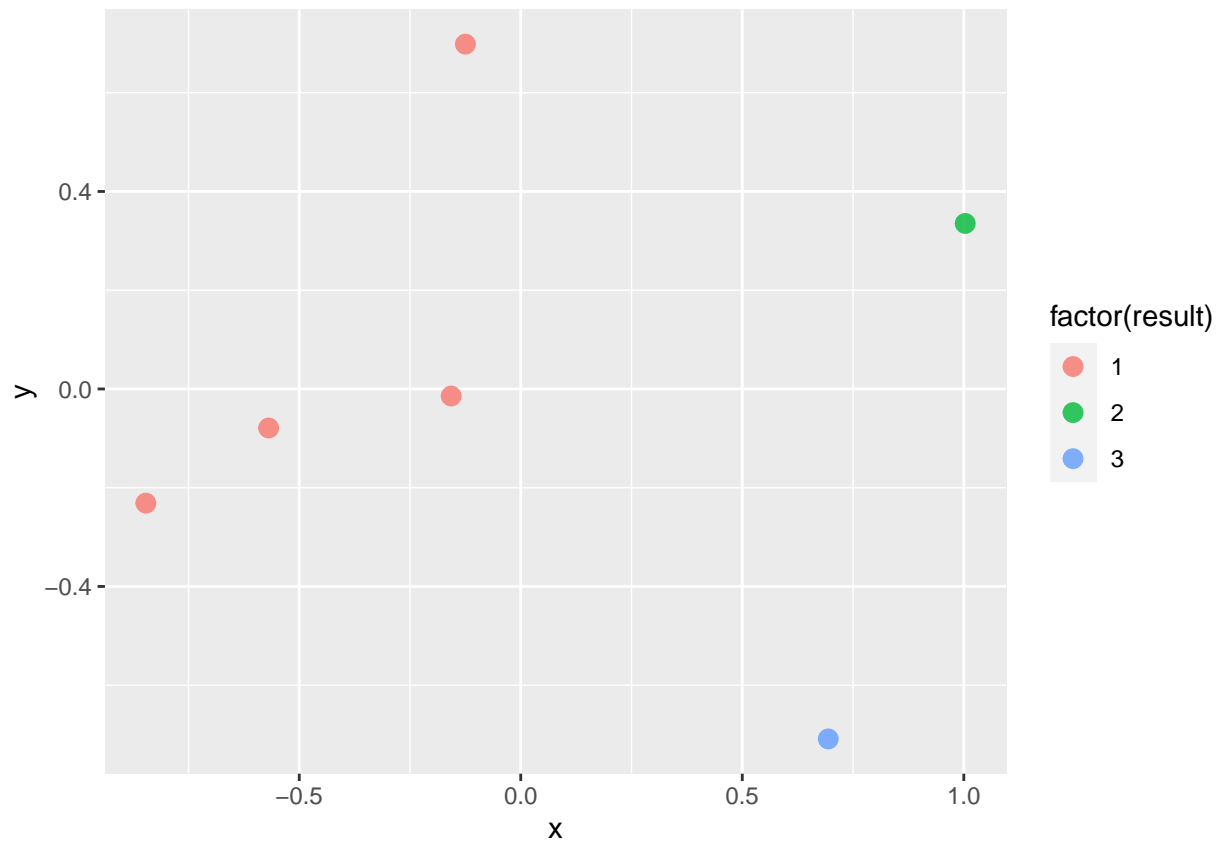
从热图来看，大致可以分成 3 类

1 最短距离法聚类

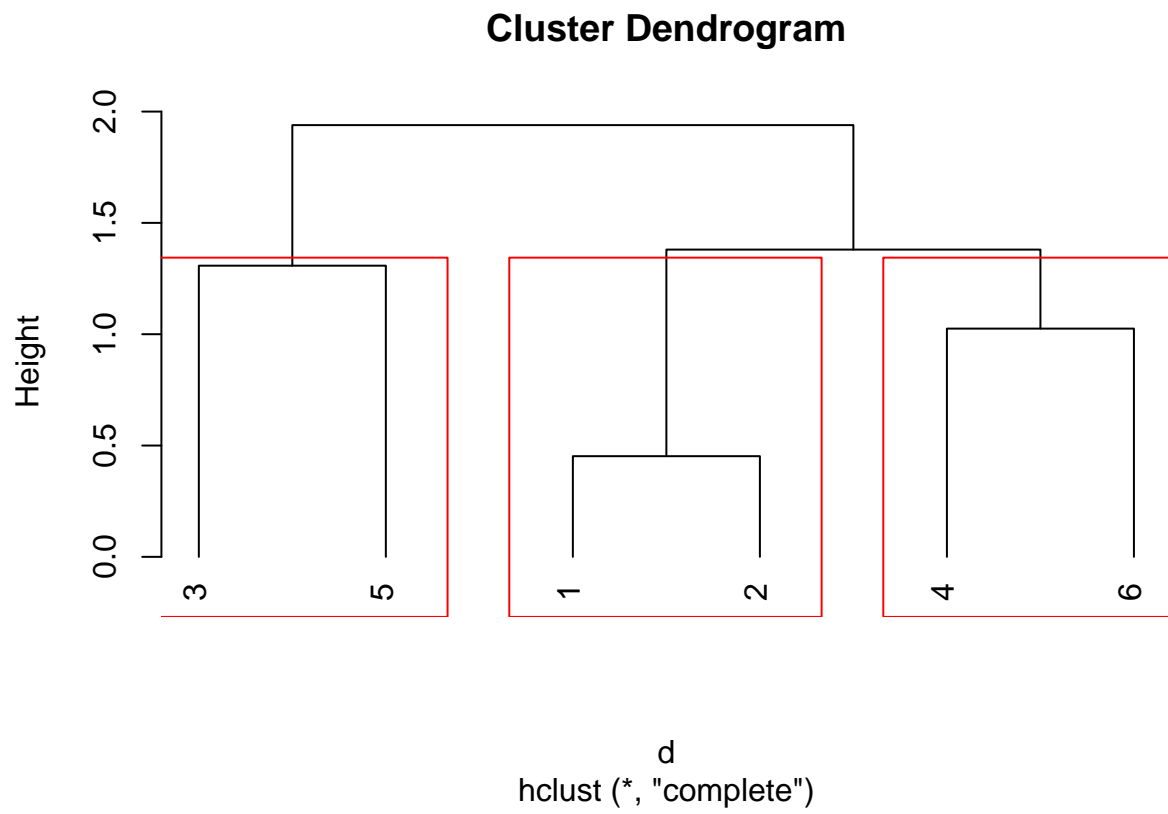
```
model1=hclust(d,method='single')
result=cutree(model1,k=3)
plot(model1,cex=1,hang=-1);re1<-rect.hclust(model1, k=3, border="red")
```

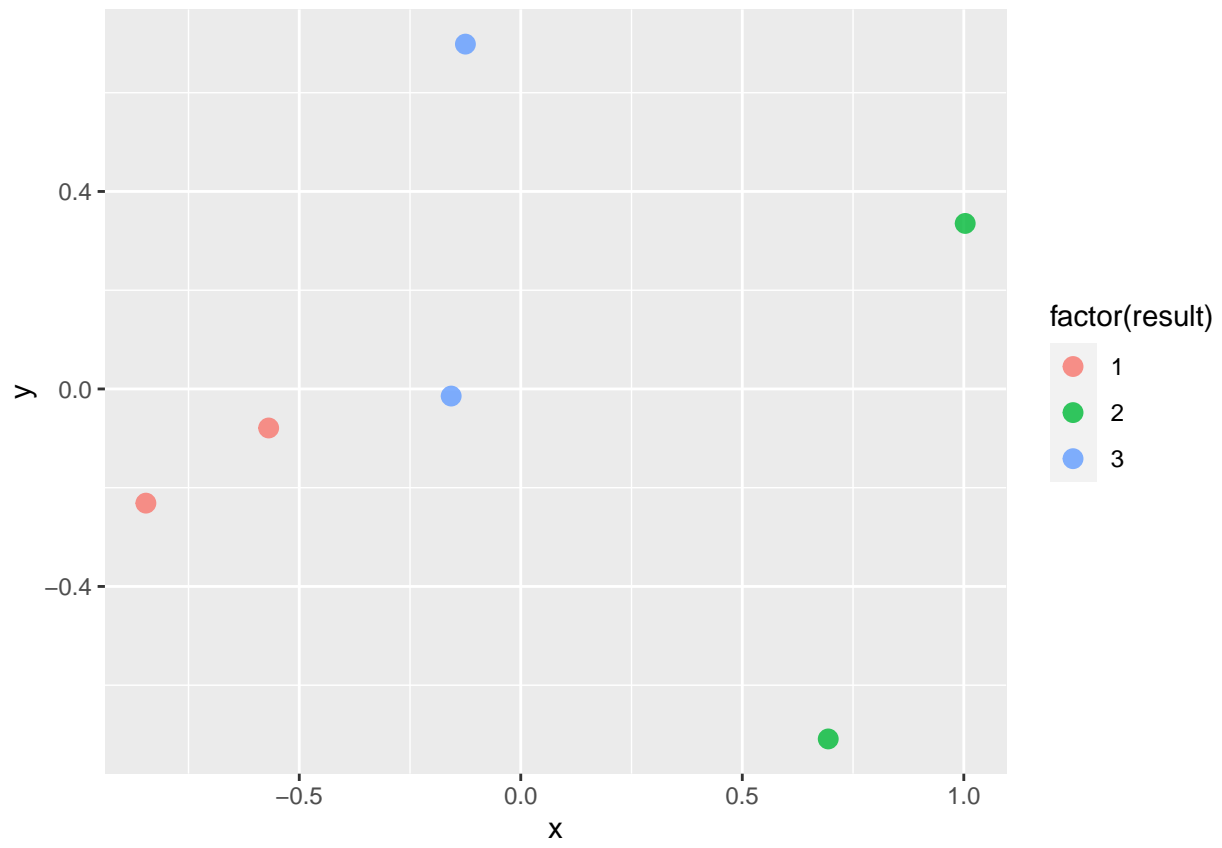


```
mds=cmdscale(d,k=2,eig=T)
x = mds$points[,1]
y = mds$points[,2]
p=ggplot(data.frame(x,y),aes(x,y))
p+geom_point(size=3,alpha=0.8,
             aes(colour=factor(result)))
```

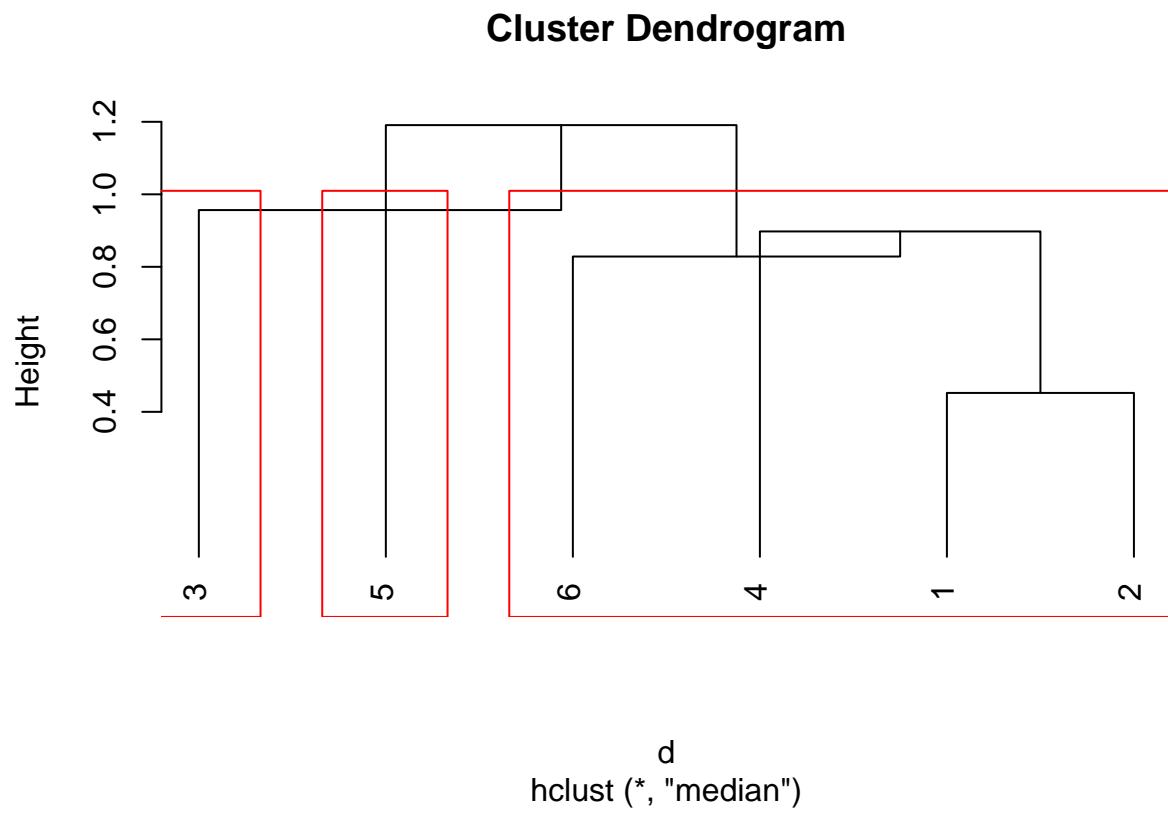


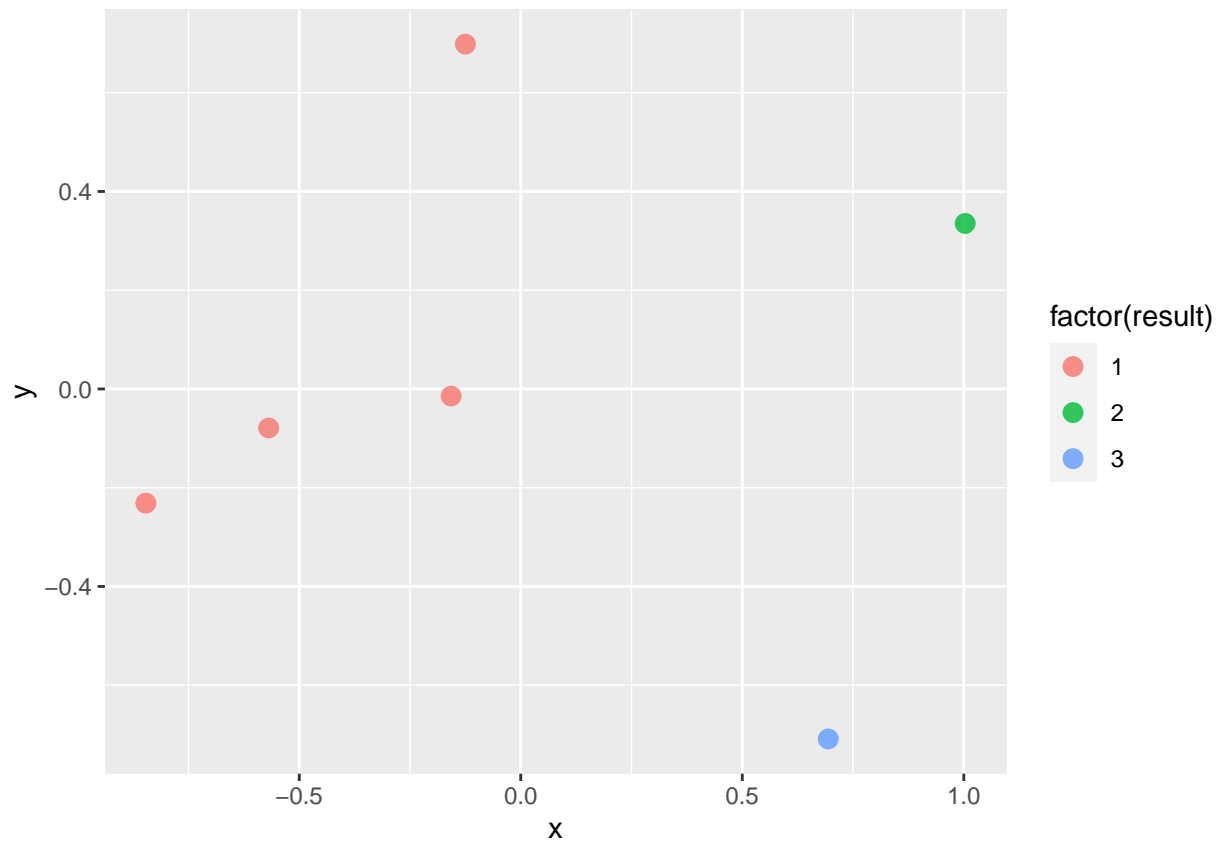
2 最长距离法聚类



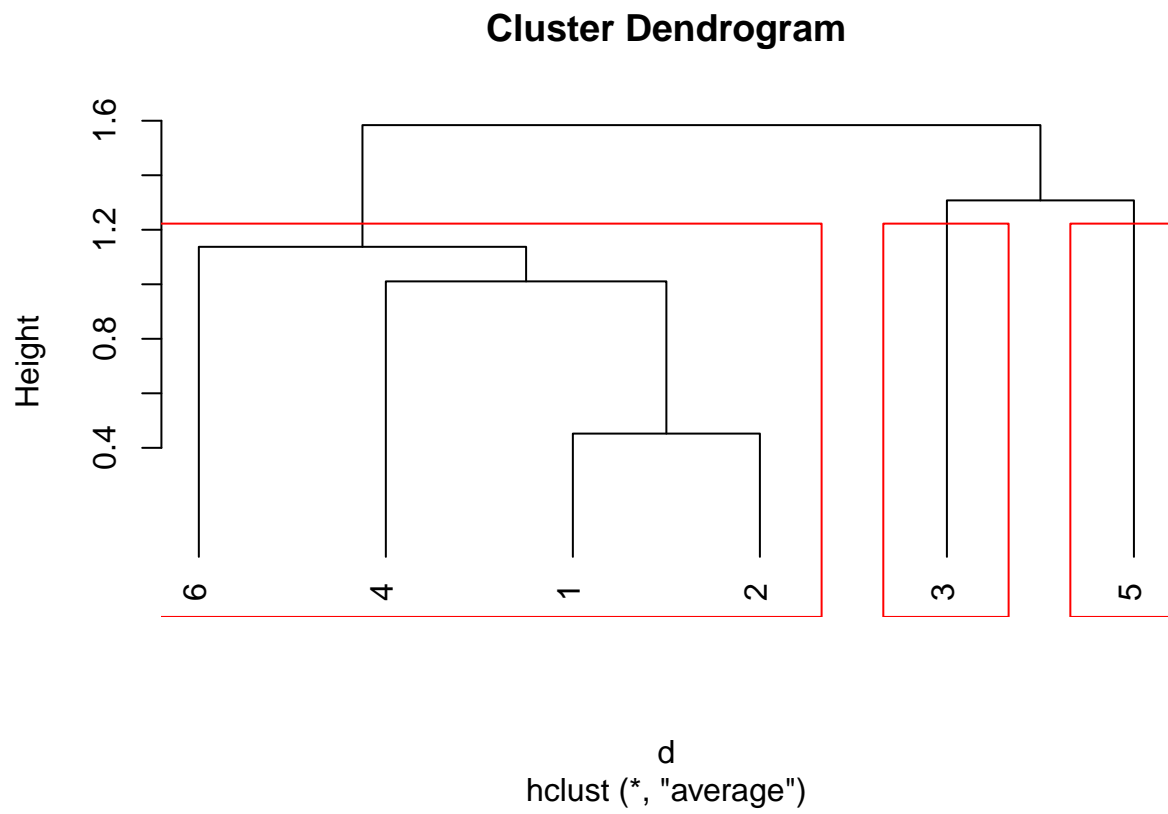


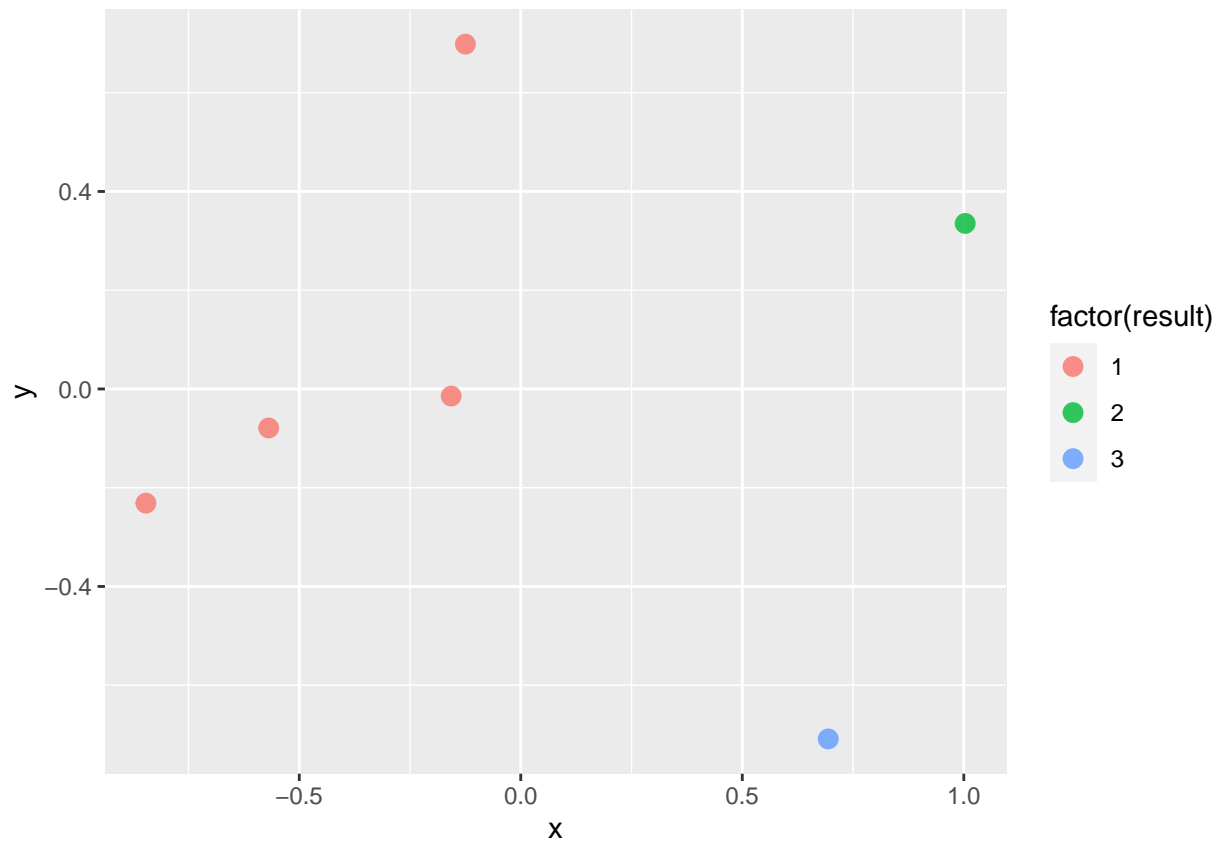
3 中间距离法聚类



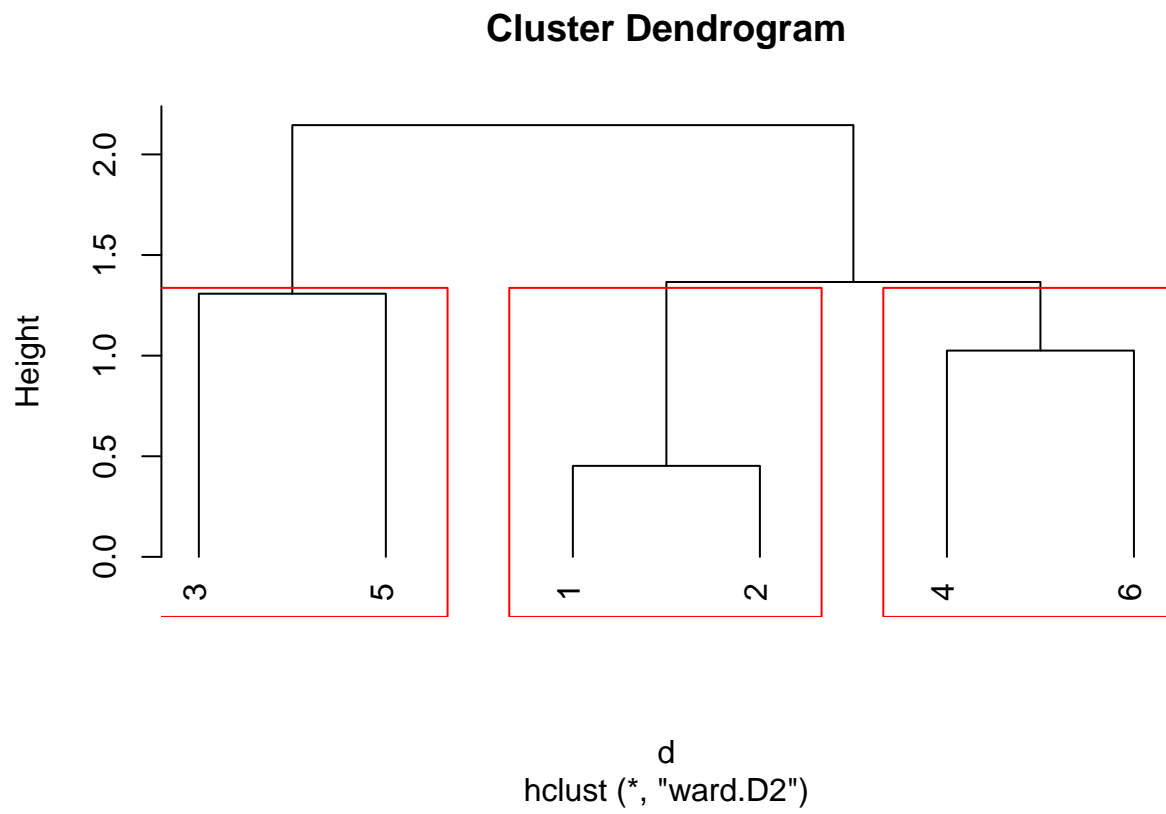


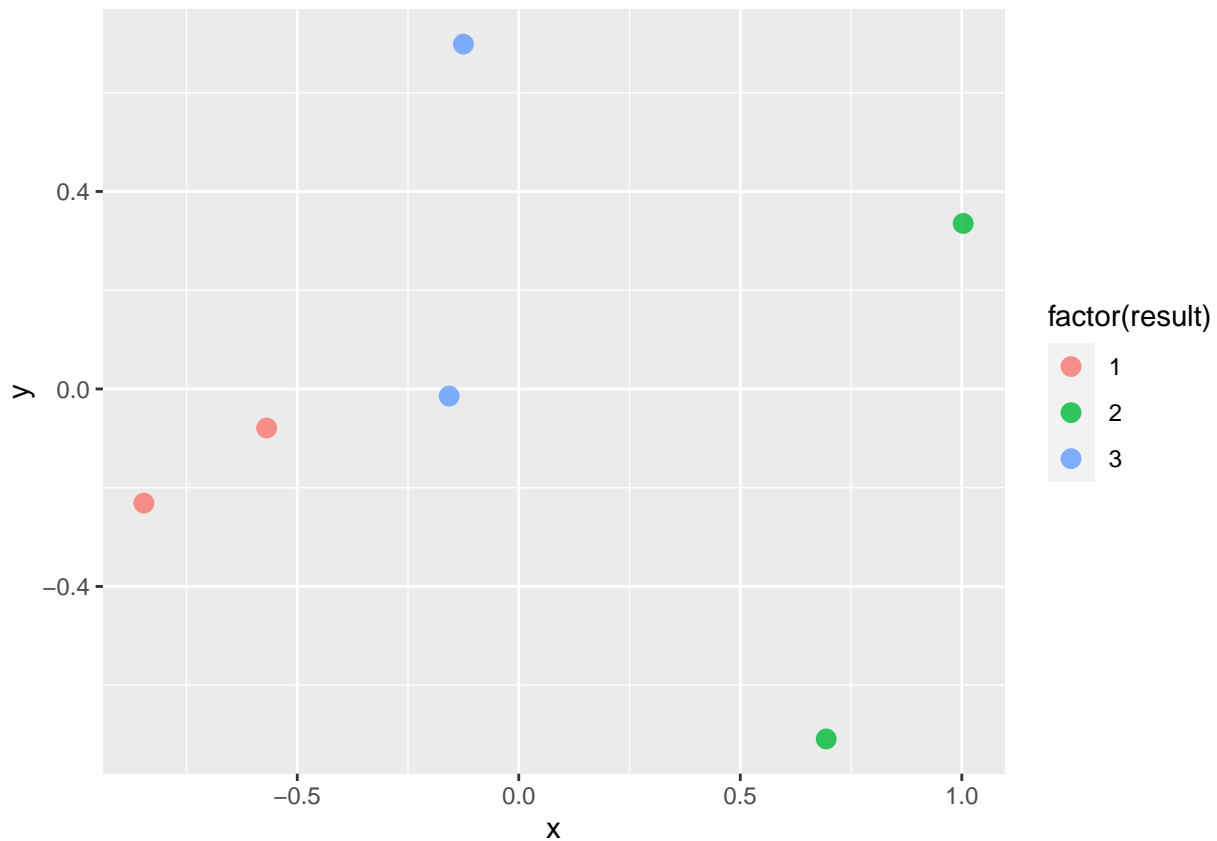
4 类平均法





5 离差重心法



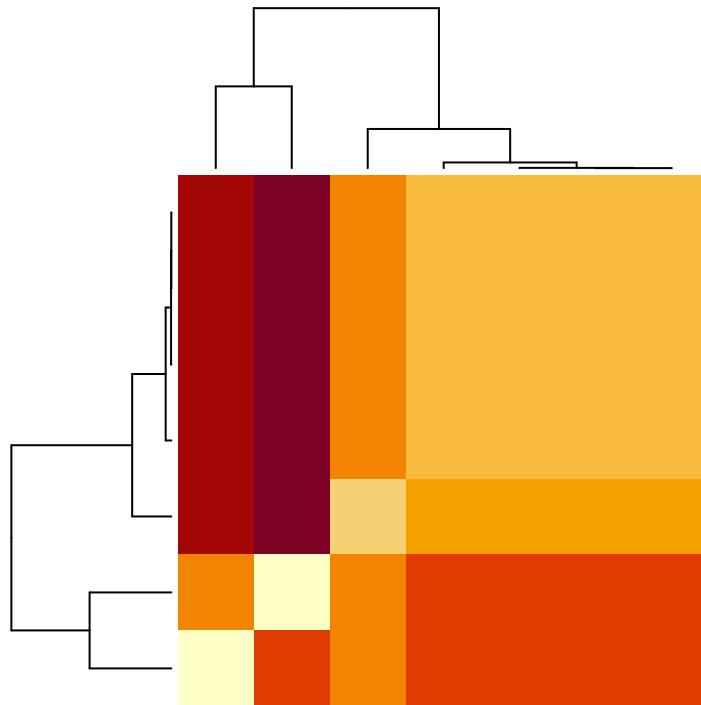


由以上结果可以看出离差重心法与最长聚类法结果类似，最短距离法、中间距离法、类距离法结果类似

2 1. 7 个微量元素分类

```
data_0 <- read.csv("6-10.csv",encoding = "UTF-8",na.strings=c("", " ", "NA"),header=T,row.names = 1)
X<-t(data_0)
# 极差标准化
center<-sweep(X, 2, apply(X, 2, mean))# 按列中心化
R<-apply(X, 2, max)-apply(X, 2, min)# 计算列极差
X_star<-sweep(center, 2, R, "/")# 极差标准化, 均值为 0, 极差为 1

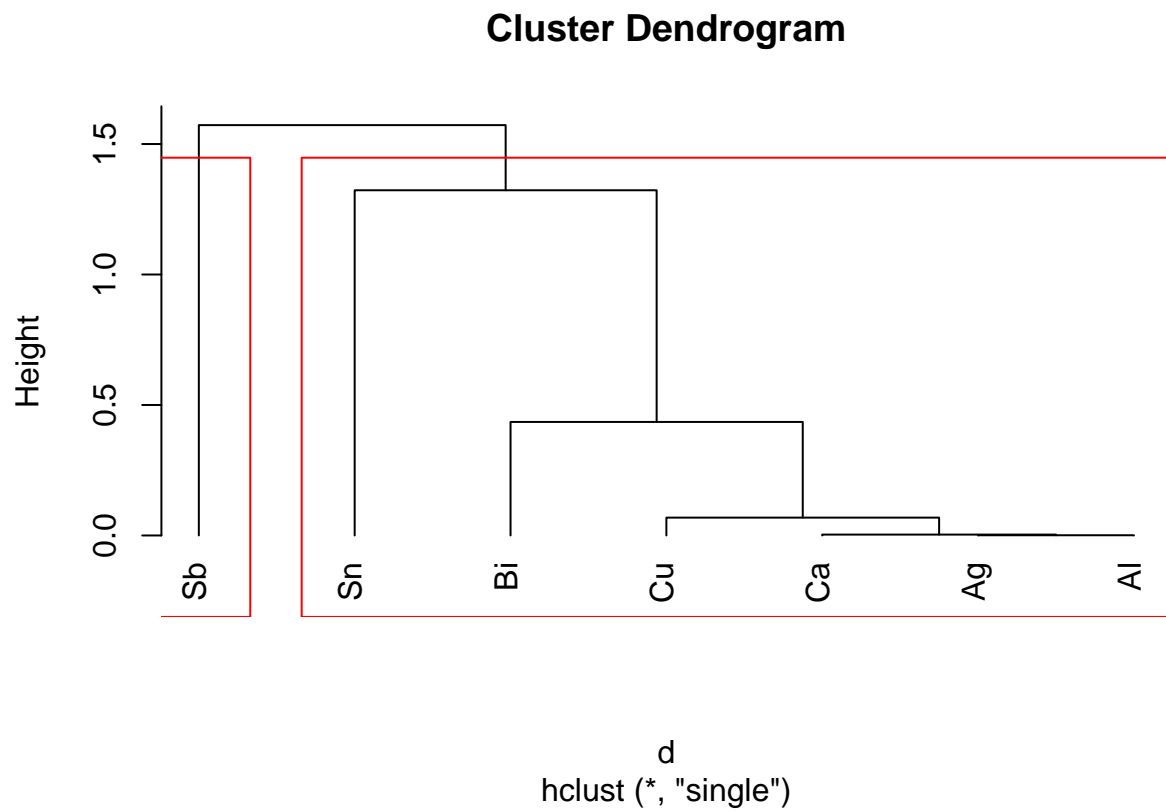
d<-dist(X_star,method = "euclidean")
heatmap(as.matrix(d),labRow = F, labCol = F)
```



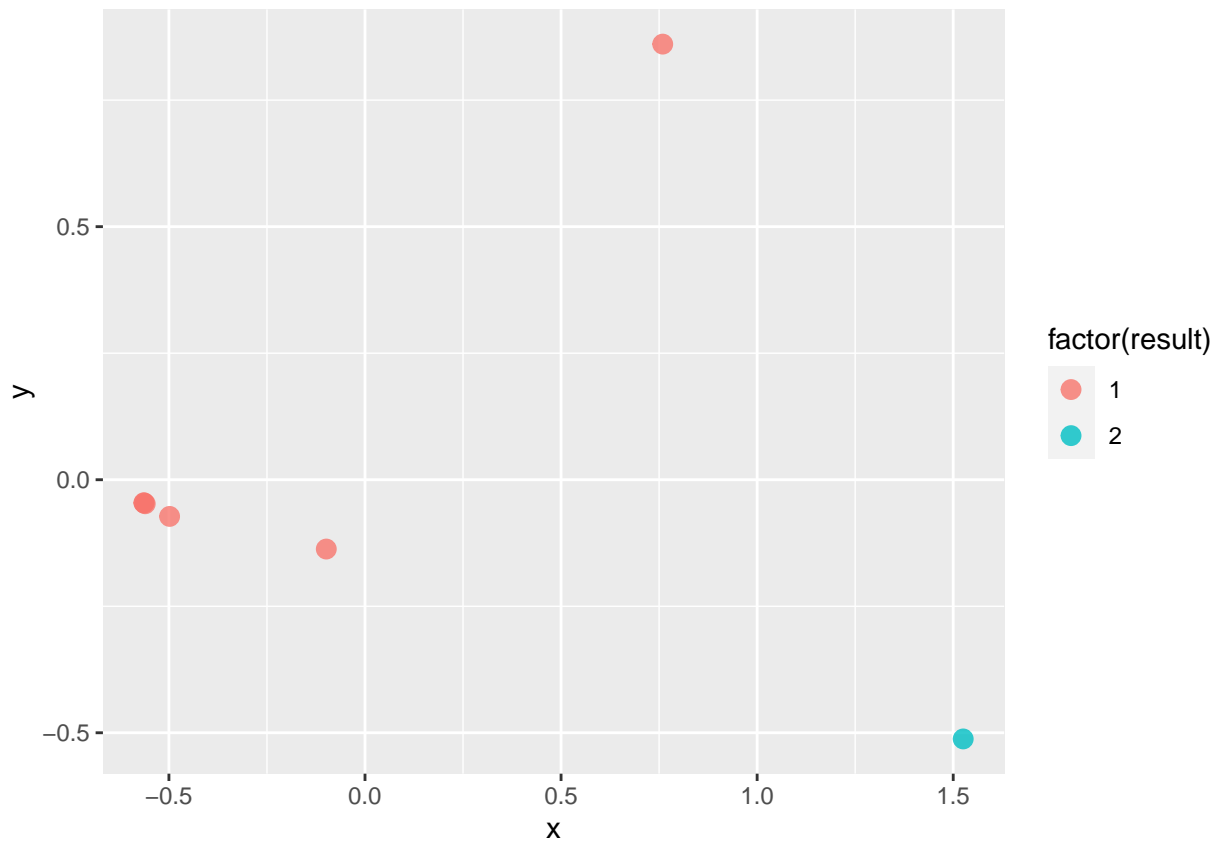
从热图来看，大致可以分成 2 类

1 最短距离法聚类

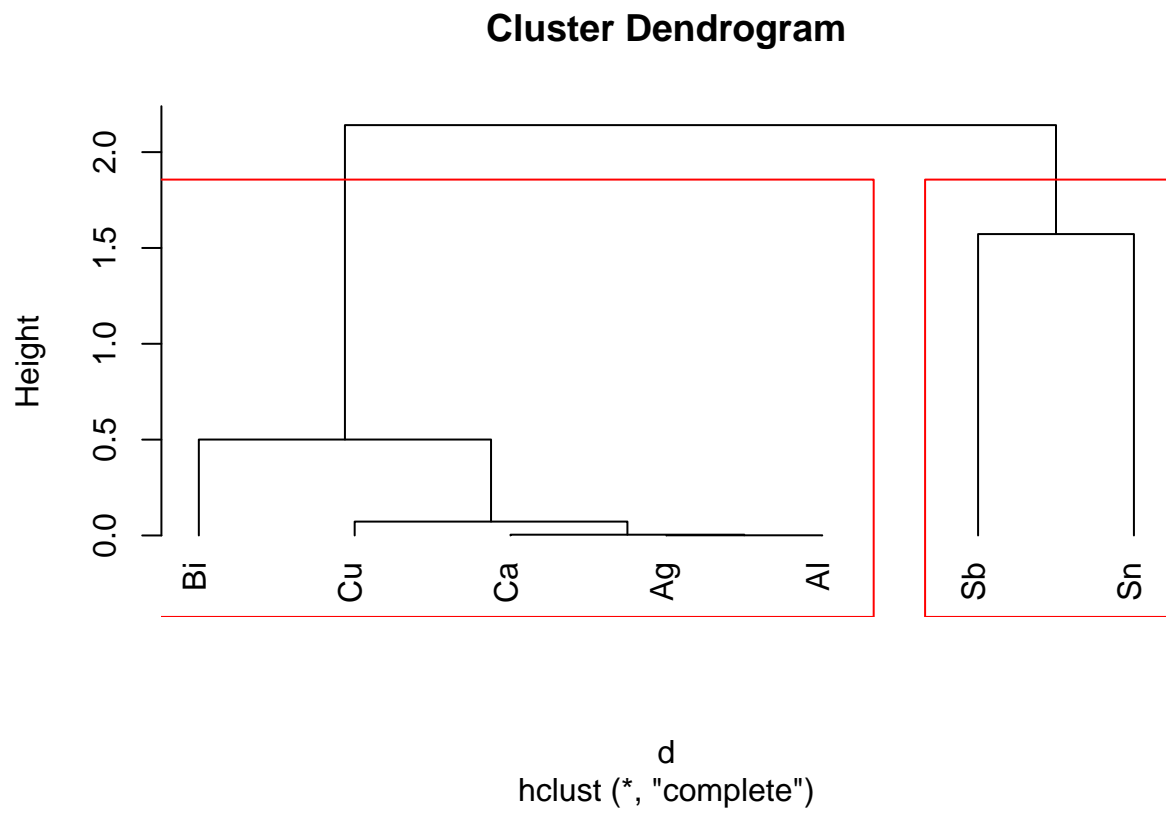
```
model1=hclust(d,method='single')
result=cutree(model1,k=2)
plot(model1,cex=1,hang=-1);re1<-rect.hclust(model1, k=2, border="red")
```

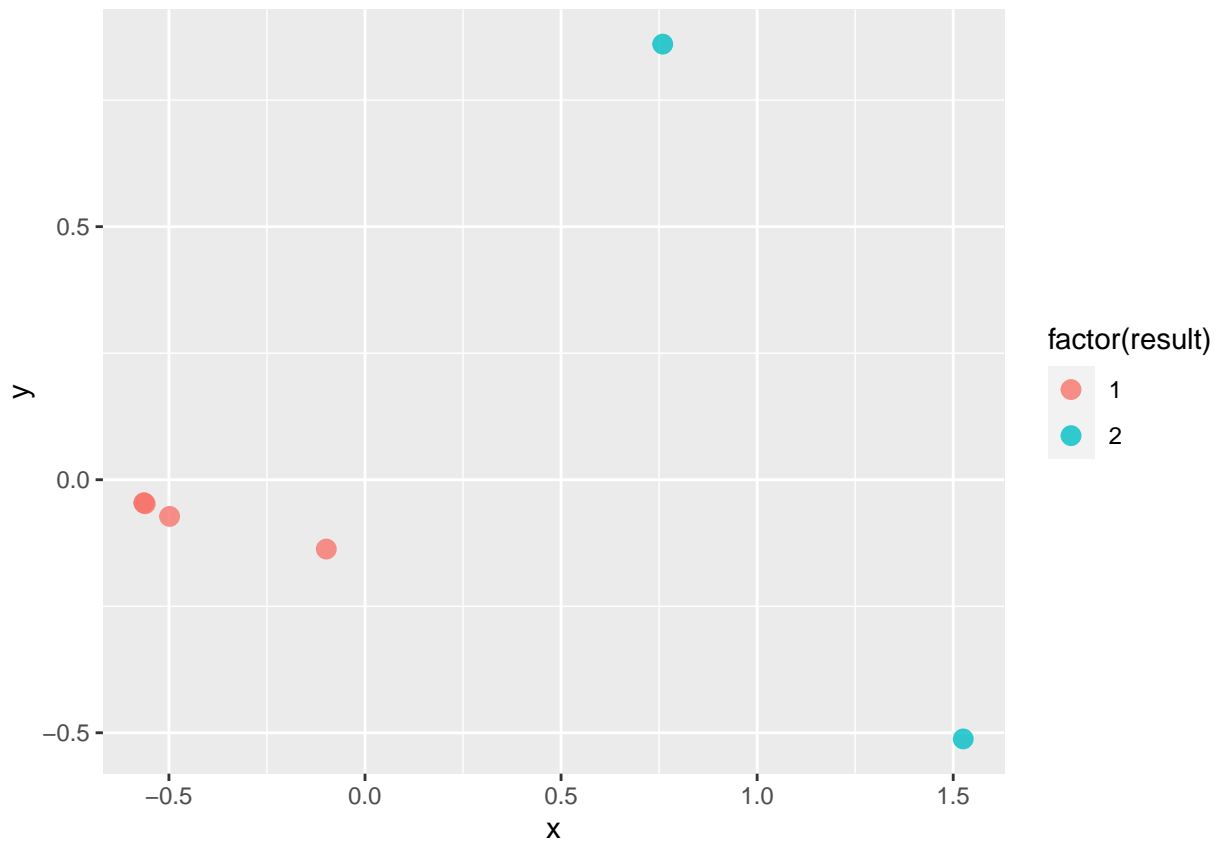


```
mds=cmdscale(d,k=2,eig=T)
x = mds$points[,1]
y = mds$points[,2]
p=ggplot(data.frame(x,y),aes(x,y))
p+geom_point(size=3,alpha=0.8,
             aes(colour=factor(result)))
```

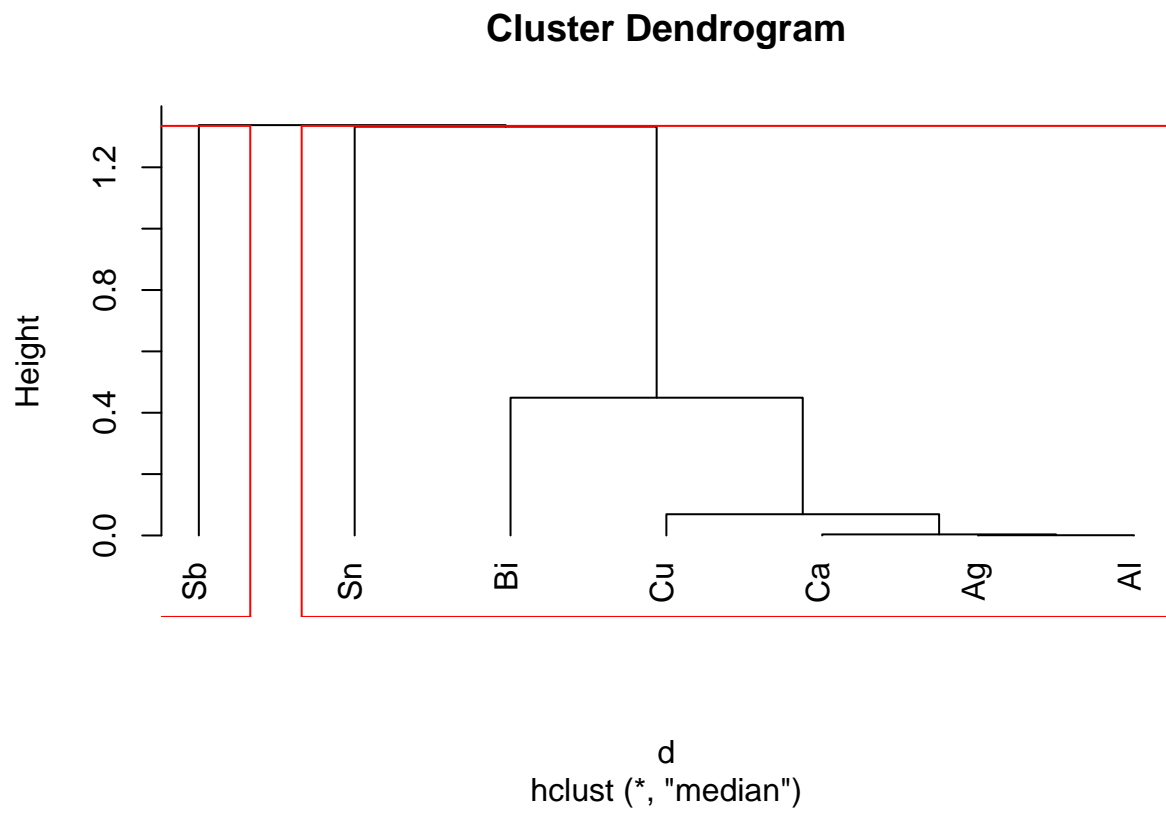


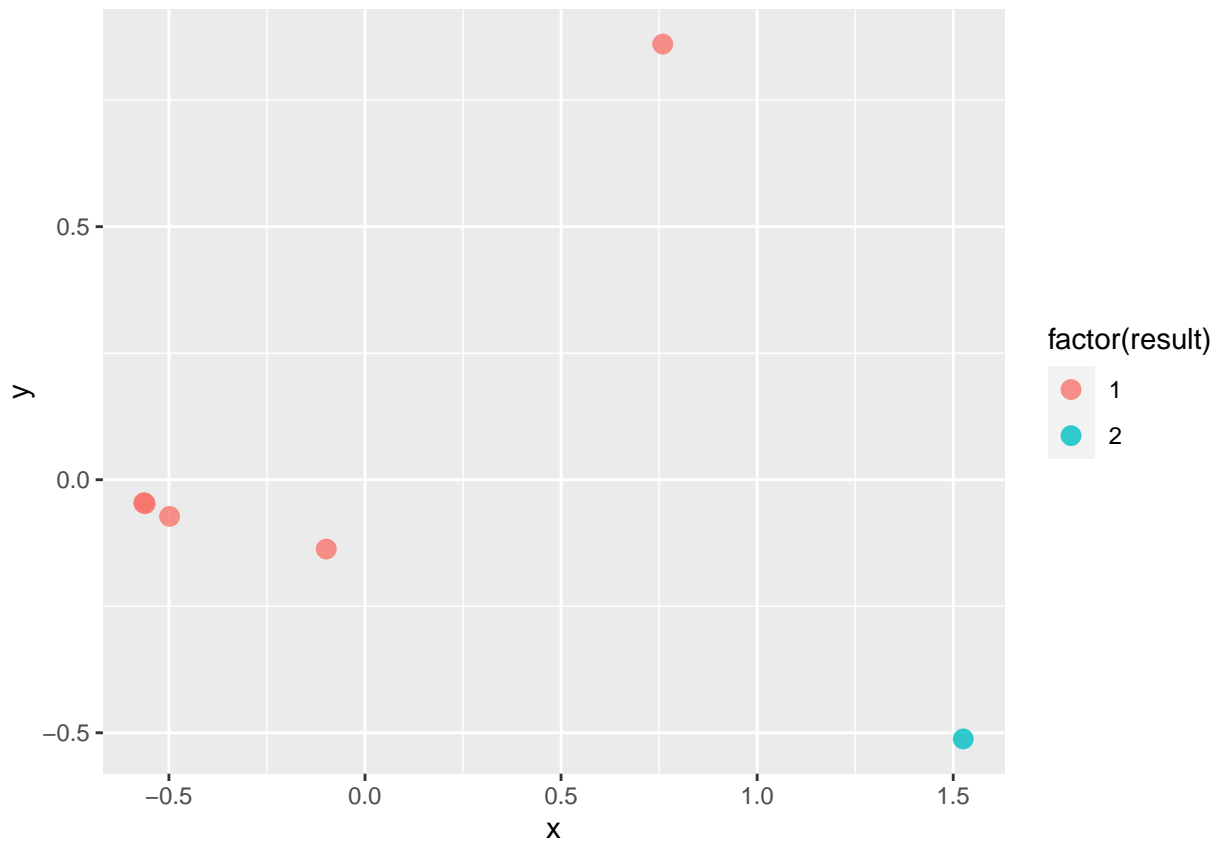
2 最长距离法聚类



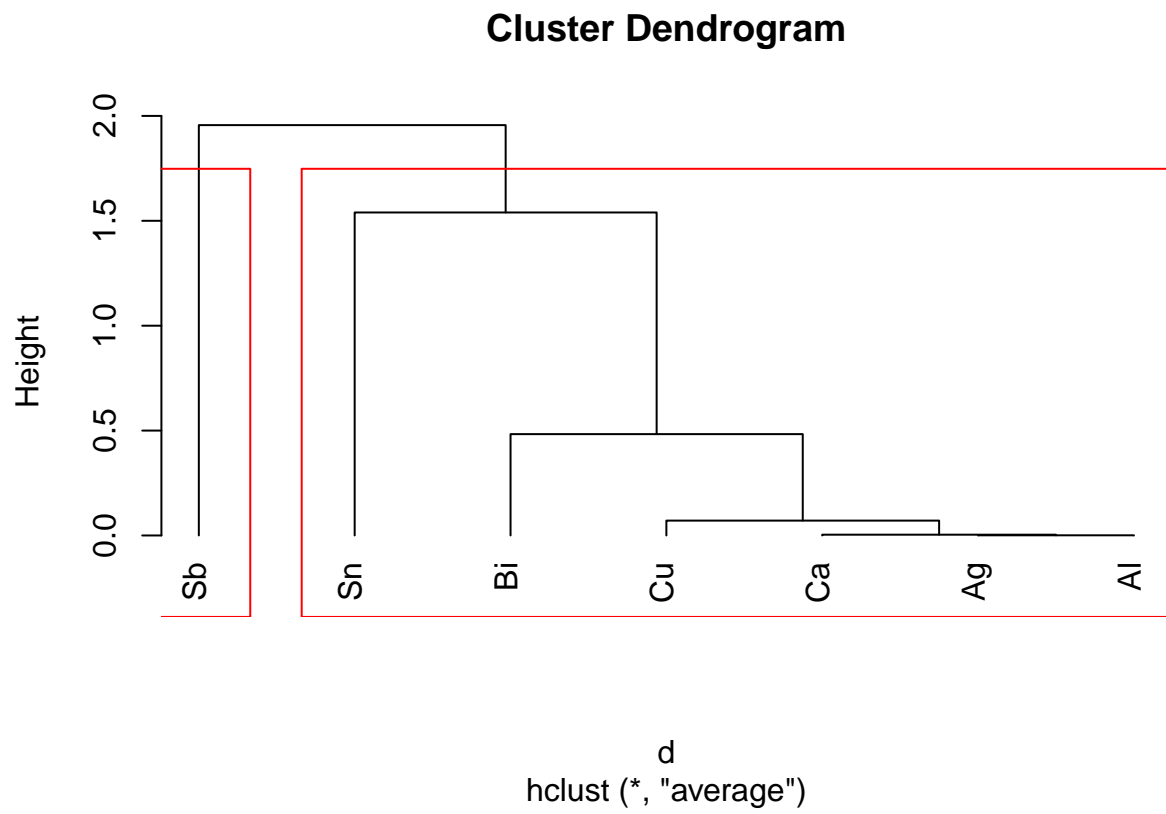


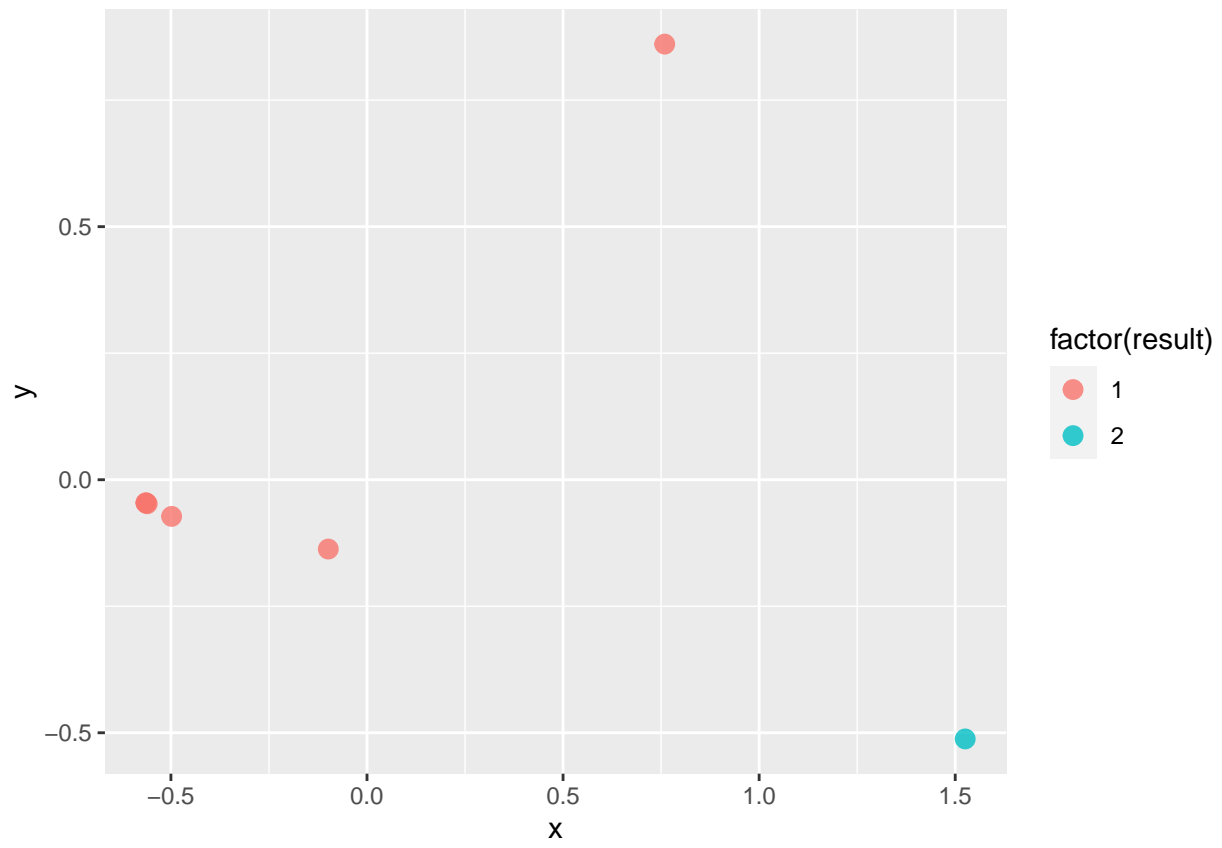
3 中间距离法聚类



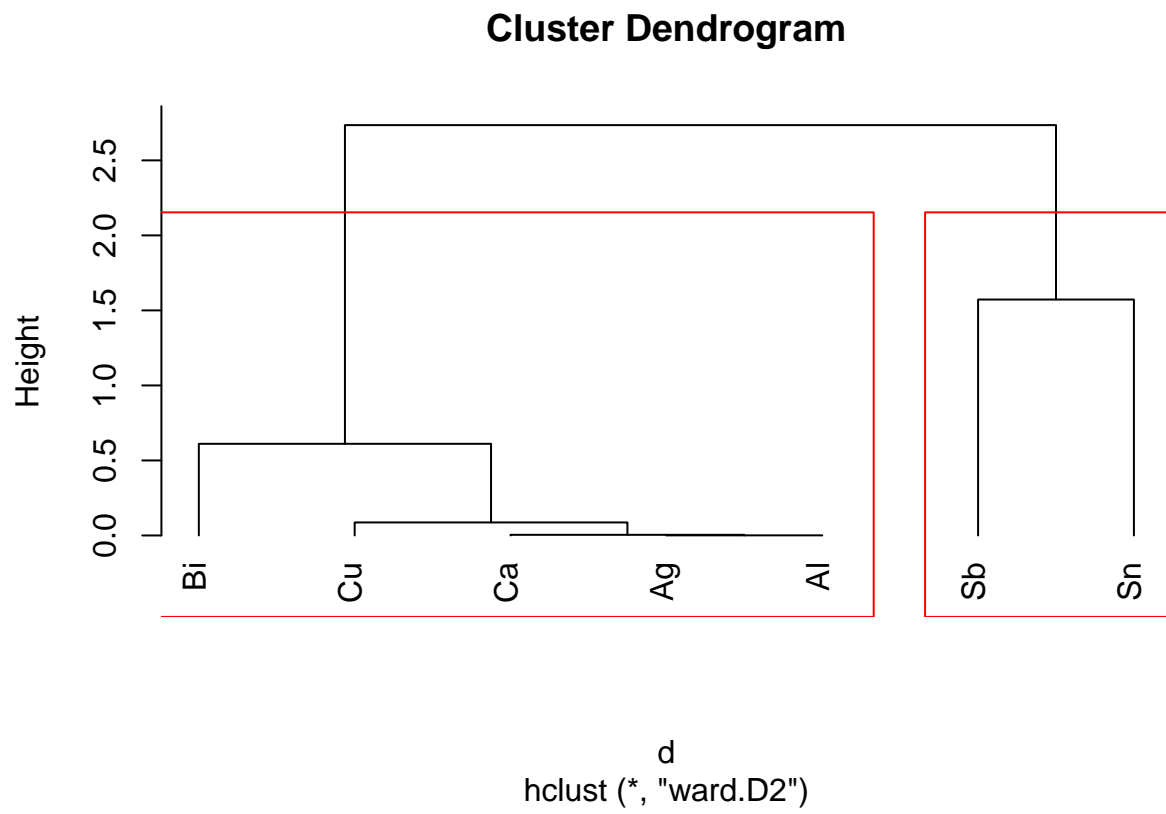


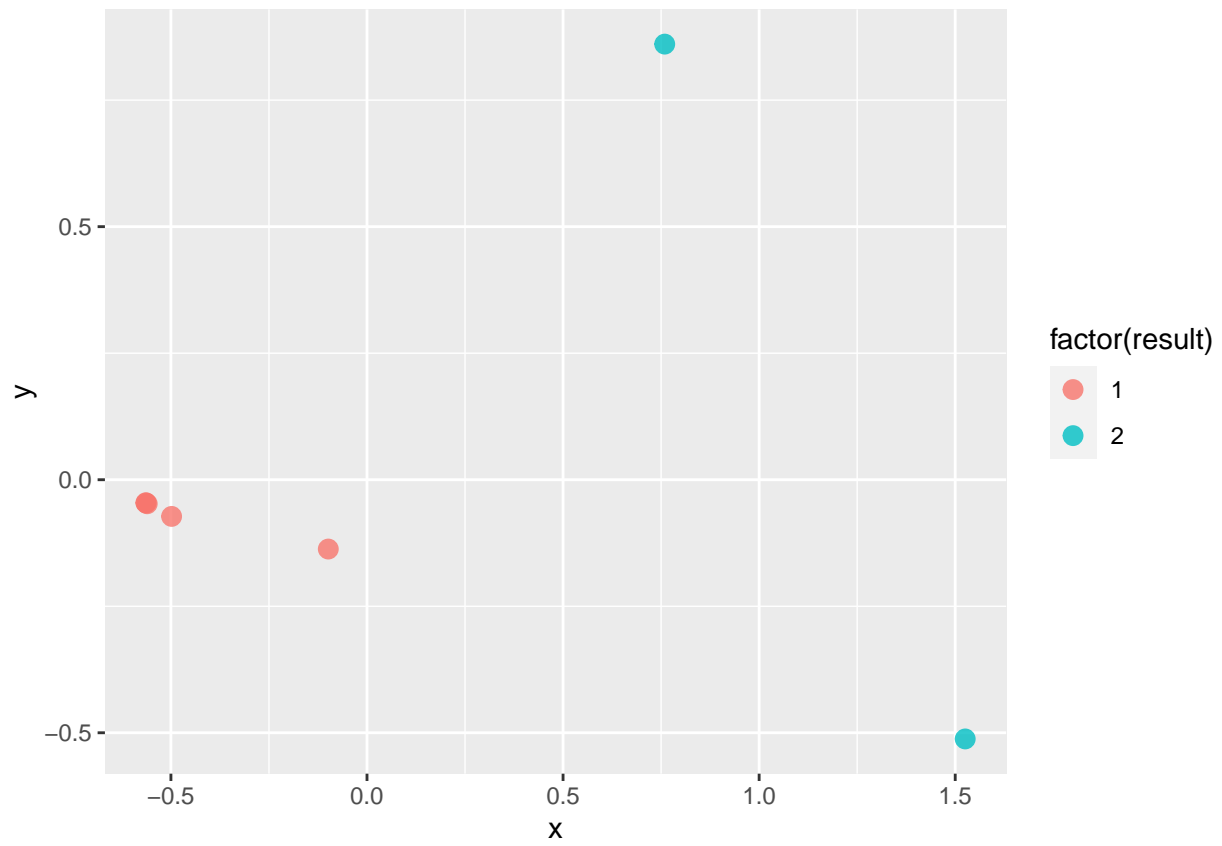
4 类平均法





5 离差重心法





由结果，离差重心和最长距离结果类似，其余类似。