Example

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Load Libraries and Functions

```
library(pracma)
library(igraph)
```

```
##
## Attaching package: 'igraph'
```

```
## The following objects are masked from 'package:stats':
##
##     decompose, spectrum
```

```
## The following object is masked from 'package:base':
##
##     union
```

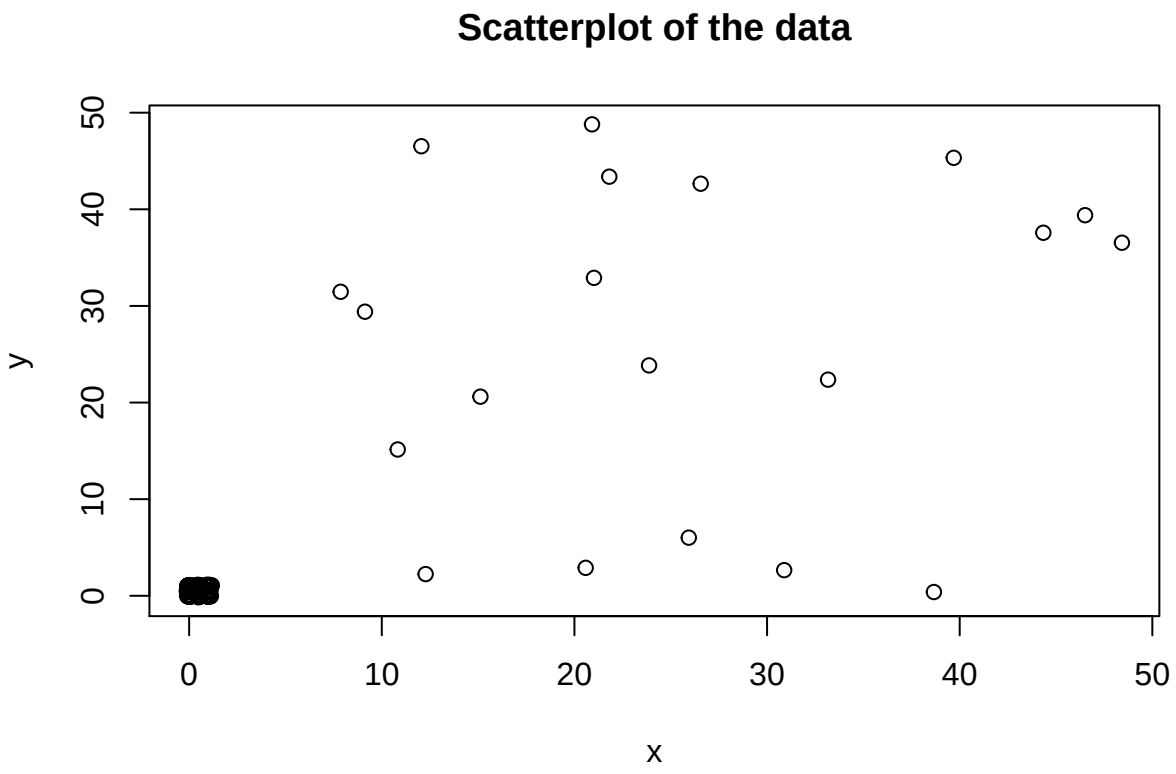
```
source('functions.R')
```

Generate the data as follows.

```
k=9
p=2
x=seq(0,1,length.out = 3)
y=x
z=outer(x,y)
M=matrix(0,9,2)
for(i in 1:3){
  for(j in 1:3){
    M[3*(i-1)+j,]=c(x[i],y[j])
  }
}
X=data_generate(600,M,rep(1/k,k),0.05,0.05)
ground_truth=X$label
X=X$data
X=rbind(X,rand(20,2)*50)
```

Plotting the data.

```
plot(X,xlab='x',ylab='y',main='Scatterplot of the data')
```

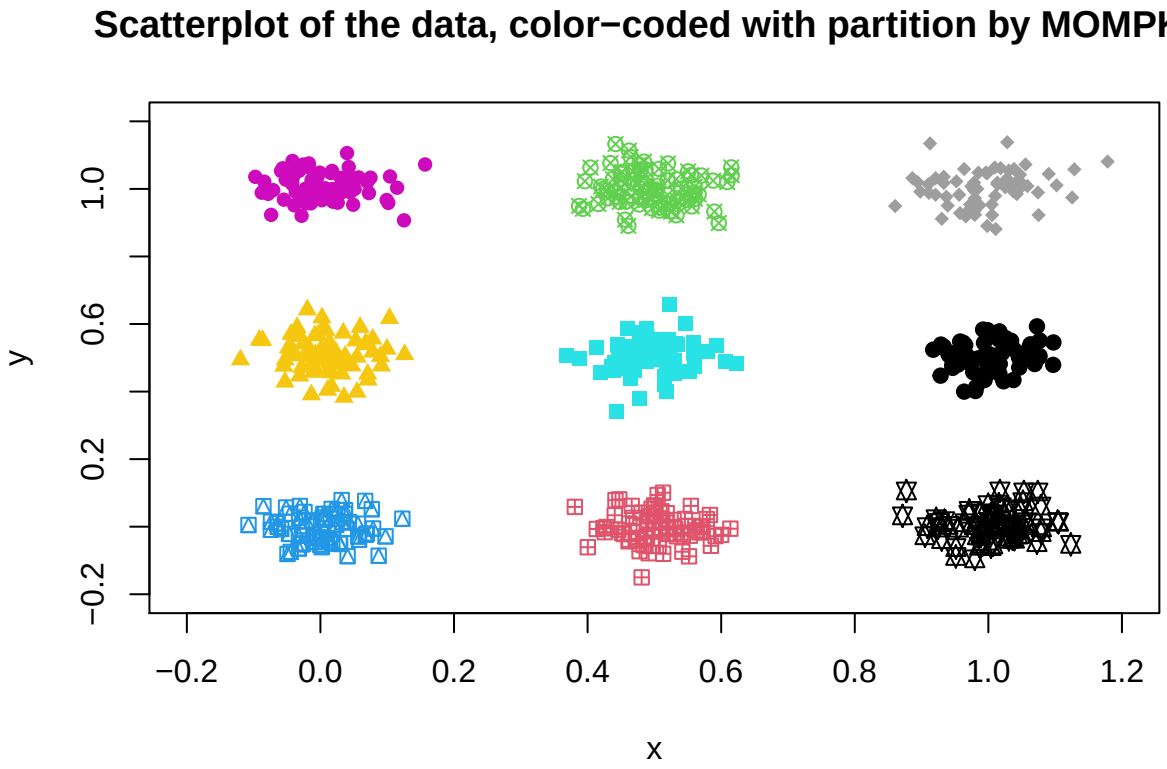


MOMPKM

```
l1=MOMPKM(X,k=9,L=41,eta=1.02,alpha=1,verbose=T,tmax=200)
```

```
## Iteration no. 50
## Iteration no. 100
## Iteration no. 150
## Iteration no. 200
```

```
plot(X,col=l1$label, pch = l1$label + 10 ,
     xlim =c(-0.2,1.2),ylim=c(-0.2,1.2),
     xlab='x',ylab='y',main='Scatterplot of the data, color-coded with partition by MOMPKM')
```



Compare the ground truth and the obtained partition through ARI.

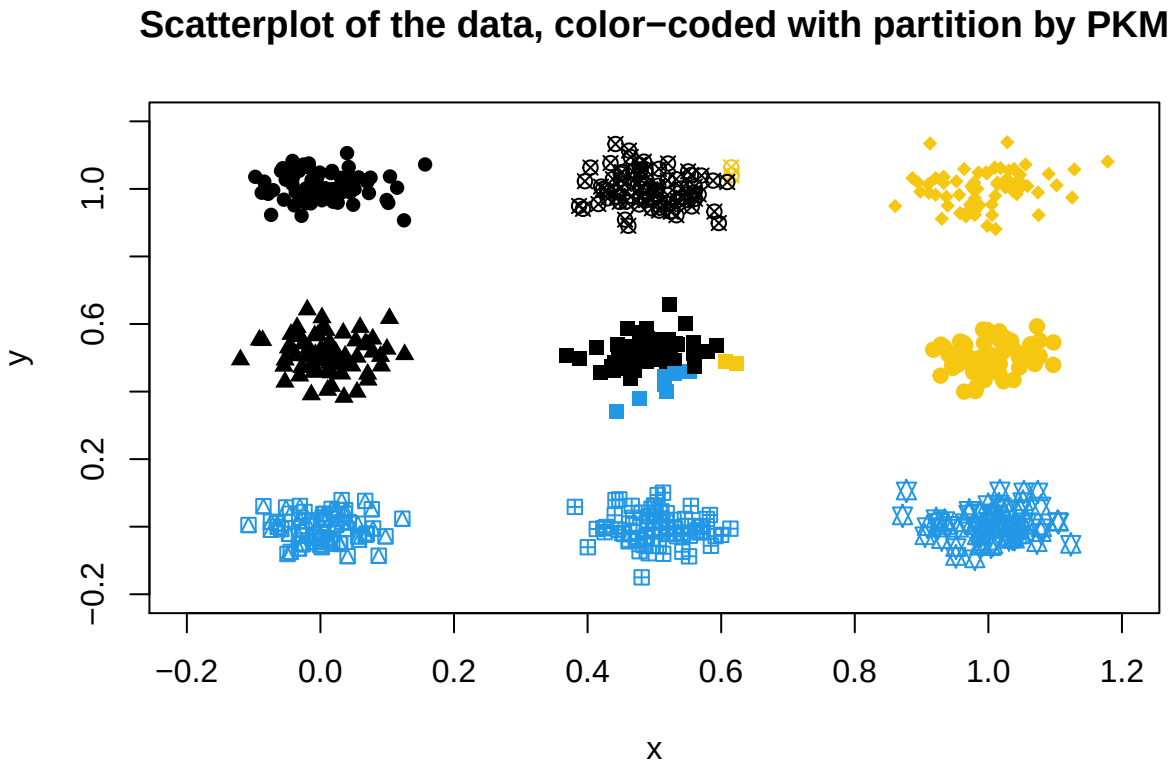
```
compare(ground_truth,l1$label[1:600],'adjusted.rand')
```

```
## [1] 1
```

Results in perfect clusterng!

PKM

```
l2=power.k.means(X,k=9)
plot(X,col=l2$label, pch = l1$label + 10,
     xlim =c(-0.2,1.2),ylim=c(-0.2,1.2),
     xlab='x',ylab='y',main='Scatterplot of the data, color-coded with partition by PKM')
```



Compare the ground truth and the obtained partition through ARI.

```
compare(ground_truth,l2$label[1:600],'adjusted.rand')
```

```
## [1] 0.3459555
```

Imperfect clustering even in this simple setting!