Solution lab session week 16

Exercise 1

1

Write a program that find the closest point between a point `x` and a set of points `s`. Use `apply` to return the pairs of closest points from a set of points `v` and `s`. Show your result connecting the pairs of points with a segment (use the in-built function `segments`).

The function `findclosest` returns a vector containing the position of the closet point with `x` in `s`.

```
findclosest <- function(x,s){

  n <- length(s[1,])
  mindistance <- sqrt((x[1]-s[1,2])^2+(x[2]-s[2,1])^2)
  xmin <- s[1,1]
  ymin <- s[2,1]

  for (i in 2:n){
      distance = sqrt((x[1]-s[1,i])^2+(x[2]-s[2,i])^2)
      if (distance < mindistance){
        mindistance <- distance
        xmin <- s[1,i]
        ymin <- s[2,i]
        }
      }
 return(c(xmin,ymin))
}
```

Use the `apply` function upon two matrices containing random positions over the unit squarre.

```
s<-matrix(runif(20),2,10)
v<-matrix(runif(10),2,5)

l<-apply(v,2,findclosest,s = s)
```

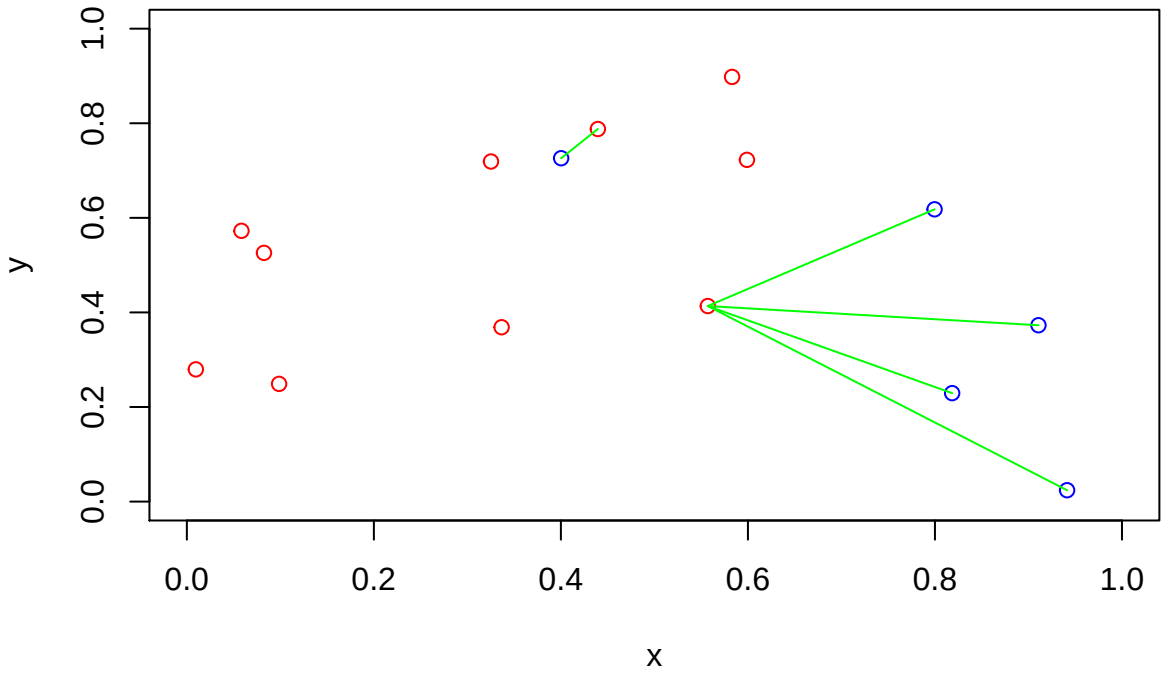
`l` is now a matrice size 2x5. We plot the two sets of points relying the pairs of closest points with a segment.

```
plot(s[1,],s[2,],col='red',xlim=c(0,1),ylim=c(0,1),xlab='x',ylab='y')
points(v[1,],v[2,],col='blue')

for(i in 1:length(v[1,])){

  segments(v[1,i],v[2,i],l[1,i],l[2,i],col='green')

  }
```


y
x
0.0
0.2
0.4
0.6
0.8
1.0