

# Open data 4 Open cities (Point pattern session)

## Guideline

In this session, using R package `spatstat` we together try to get insight into the following topics:

1. class `linnet`
2. class `lpp`
3. class `linim`
4. Kernel estimate of intensity on a linear network
5. What is bandwidth and how to find a right value for it
6. Voronoi tessellation

Before moving to the topics, let open Rstudio and review what we need to install/call in advance.

If you have not installed the necessary packages for this session, then please run the following codes in Console

```
?install.packages
```

```
## starting httpd help server ...
```

```
## done
```

```
install.packages("spatstat.utils")
```

```
install.packages("spatstat")
```

```
install.packages("maptools")
```

If all installed, then please run the following codes in Console

```
library(spatstat.utils)
```

```
library(spatstat)
```

```
library(maptools)
```

## classes we need to know about

Run:

```
?linnet
```

```
?lpp
```

```
?linim
```

## Open data - Accident

```
setwd("C:/Open4City")
```

```
L=rgdal::readOGR("StreetNetwork.shp")
```

```
## OGR data source with driver: ESRI Shapefile
```

```
## Source: "StreetNetwork.shp", layer: "StreetNetwork"
```

```
## with 2413 features
```

```
## It has 26 fields
```

```
## Integer64 fields read as strings: FROMLEFT TOLEFT FROMRIGHT TORIGHT VERSION IMPORTANCI ID_NM_VIAL J
```

```
pinj=rgdal::readOGR("Acc_Jan_16_OnlyInjured.shp")
```

```

## OGR data source with driver: ESRI Shapefile
## Source: "Acc_Jan_16_OnlyInjured.shp", layer: "Acc_Jan_16_OnlyInjured"
## with 472 features
## It has 17 fields
## Integer64 fields read as strings: OBJECTID

pinj = as.ppp(pinj)
pinj=unmark(pinj)
L=as.linnet(L)
summary(L)

## Linear network with 4964 vertices and 5978 lines
## Total length 212456.2 units
## Maximum vertex degree: 5
## [Sparse matrix representation]
## Network is connected
## Numerical tolerance: 1.923538e-06 units
## Enclosing window: rectangle = [833772, 836724.1] x [1180516.2, 1187680.8]
## units

pinj=as.lpp(pinj,L=L)
pinj

## Point pattern on linear network
## 472 points
## Linear network with 4964 vertices and 5978 lines
## Enclosing window: rectangle = [833772, 836724.1] x [1180516.2, 1187680.8]
## units

connected(domain(pinj), what="components")

## [[1]]
## Linear network with 4964 vertices and 5978 lines
## Enclosing window: rectangle = [833772, 836724.1] x [1180516.2, 1187680.8]
## units

par(mai=c(0,0,0,0))
plot(pinj,main="",col=2,pch=20)

```

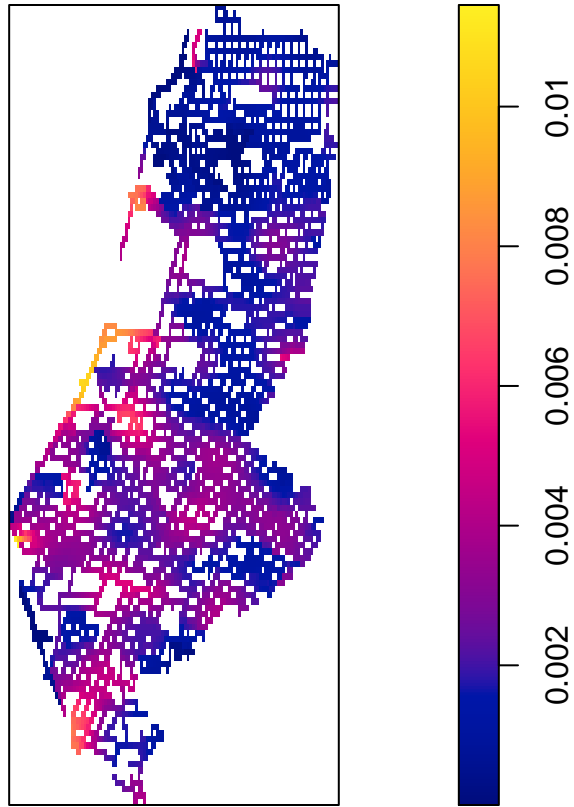


```
pairdist.lpp(pinj)
```

```
system.time(d <- density.lpp(pinj,sigma = 250))
```

```
##      user  system elapsed  
## 558.45  129.27  688.04
```

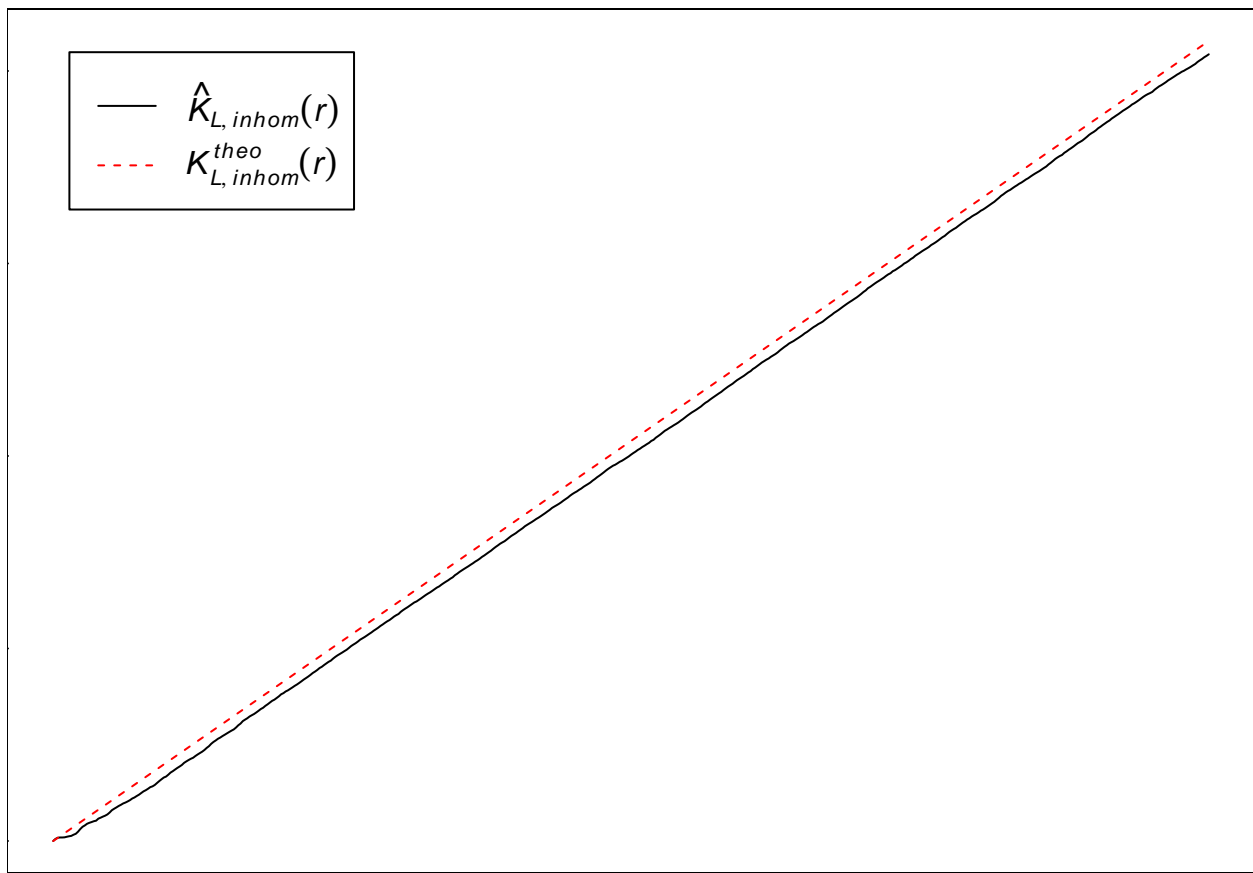
```
par(mai=c(0,0,0,0))  
plot(d,main="")
```



```
plot(d,style="width",main="")
```



```
plot(linearKinhom(pinj,d,normpower = 2),main="")
```



```
Tess=lineardirichlet(pinj)
par(mai=c(0,0,0,0))
plot(Tess,main="")
```

