



點空間型態 距離分析

空間分析 2019.04.22
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實作 F Function

Step 1: Read file `school.shp`, convert to `ppp`.

Step 2: Generating Random Points. `rpoint()`

Step 3: Calculate nearest distance. `nncross()`

Step 4: Calculate $F(d)$: `ecdf()`

Step 5: Monte Carlo Significance Test: for-loop

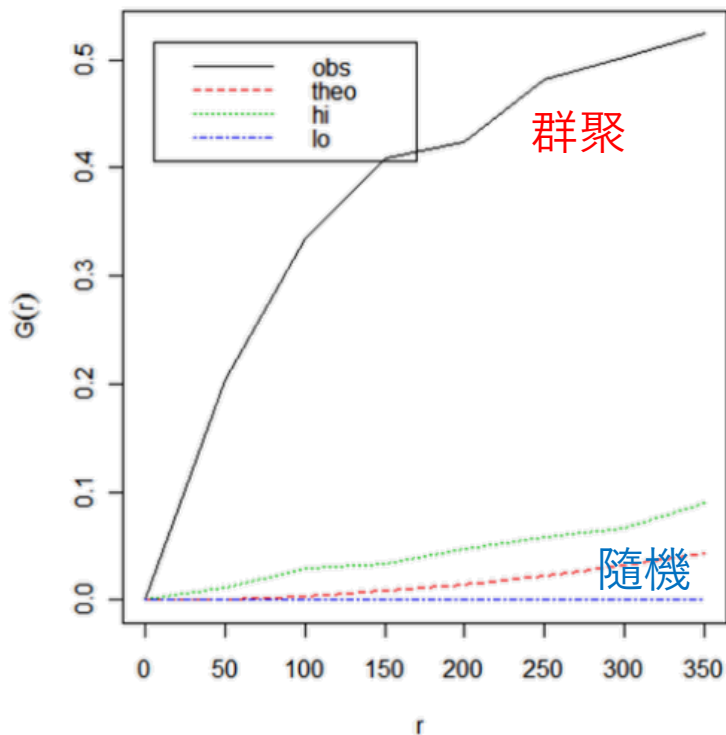
Step 6: plotting the CDF curve: `plot()`

Final: comparing with the result of
`envelope (school.ppp, fun=Fest)`

G(d) & F(d)

G(d)

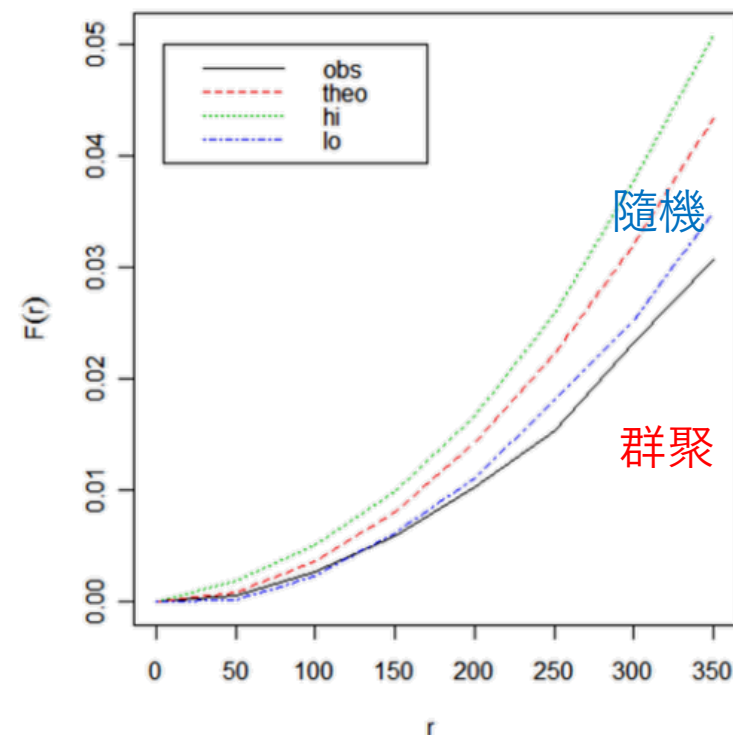
事件點→事件點
從事件點出發找最近的事件點



```
nnd=nndist(pts.ppp)  
G = ecdf(nnd)
```

F(d)

隨機點→事件點
從隨機點出發找最近的事件點



```
nnd=nncross(Random.ppp, pts.ppp)  
F = ecdf(nnd)
```

MonteCarlo: pts.ppp→隨機模擬

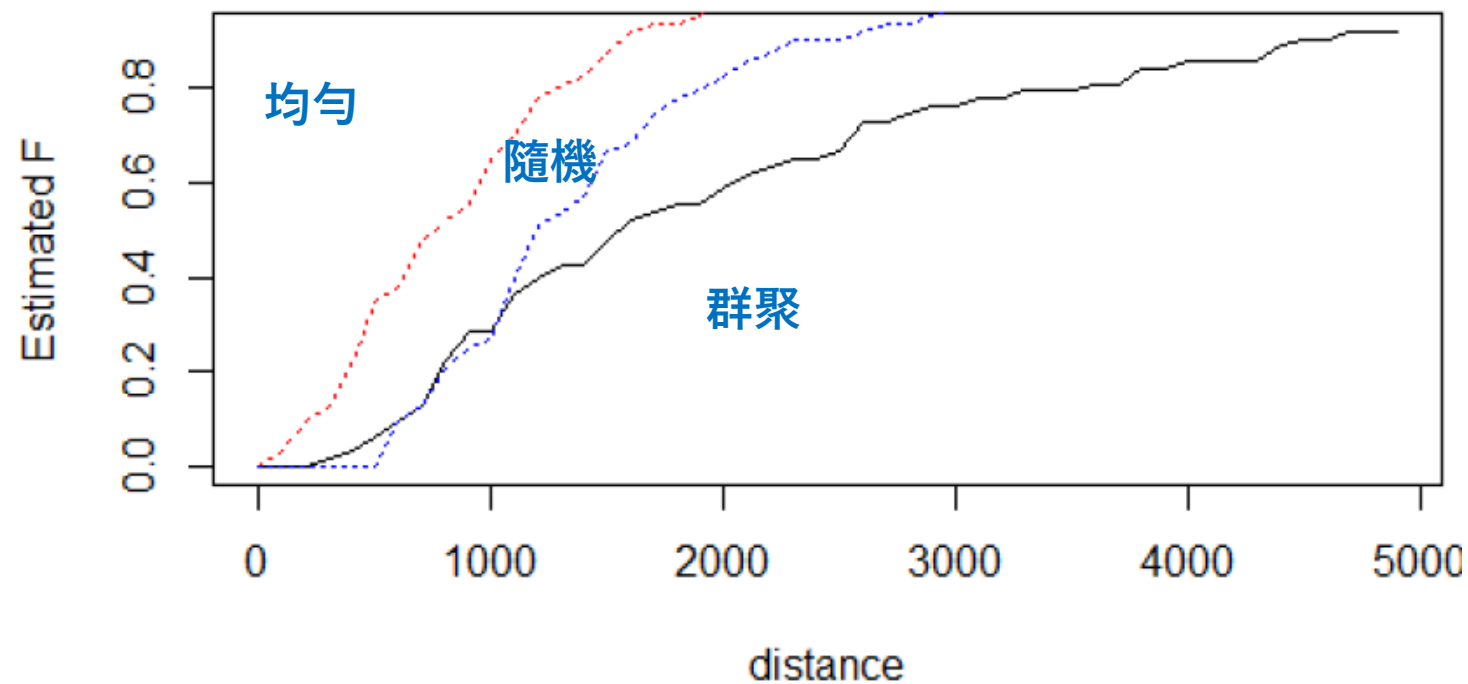
G = **Gest**(pts.ppp)

F = **Fest**(pts.ppp)

Univariate F function

隨機點 → 事件點

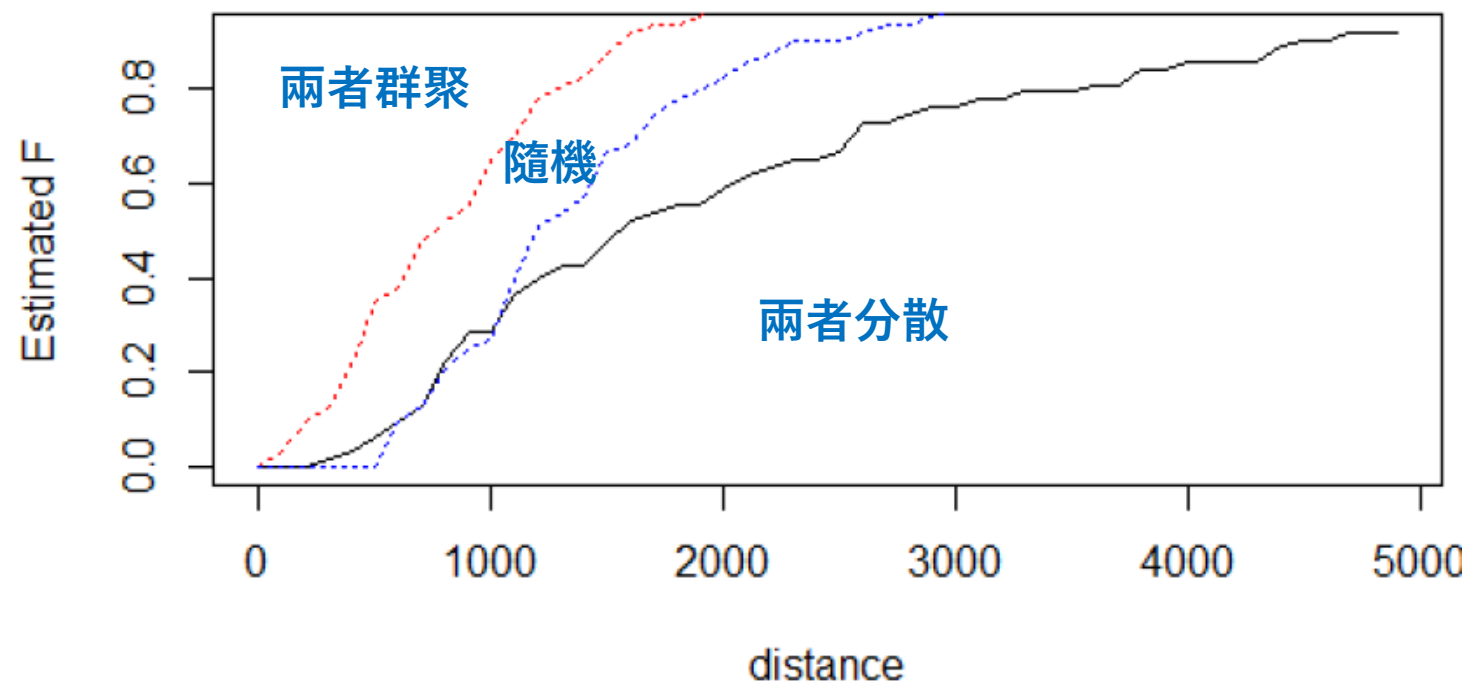
※ 事件是否群聚？



Bivariate F function

A事件點 → B事件點

※ A是否鄰近於B？



F(d)

- Step 1: Read file, convert to **ppp**.
- Step 2: Generating Random Points. **rpoint()**
- Step 3: Calculate nearest distance. **nncross()**
- Step 4: Calculate F(d): **ecdf()**
- Step 5: **Monte Carlo Significance Test**: for-loop
- Step 6: plotting the CDF curve: **plot()**

```
nnd=nncross(Random.ppp, pts.ppp)
F = ecdf(nnd)
```

```
Monte Carlo Significance Test
Repeat "Random2.ppp"
nnd=nncross(Random.ppp, Random2.ppp)
F = ecdf(nnd)
```

K(d)

計算K(d)

1. 每個點產生距離d的環域
2. 計算環域中不含自己的點
3. 加總計算的數值，除以點個數
4. 除以點密度（點個數／面積）

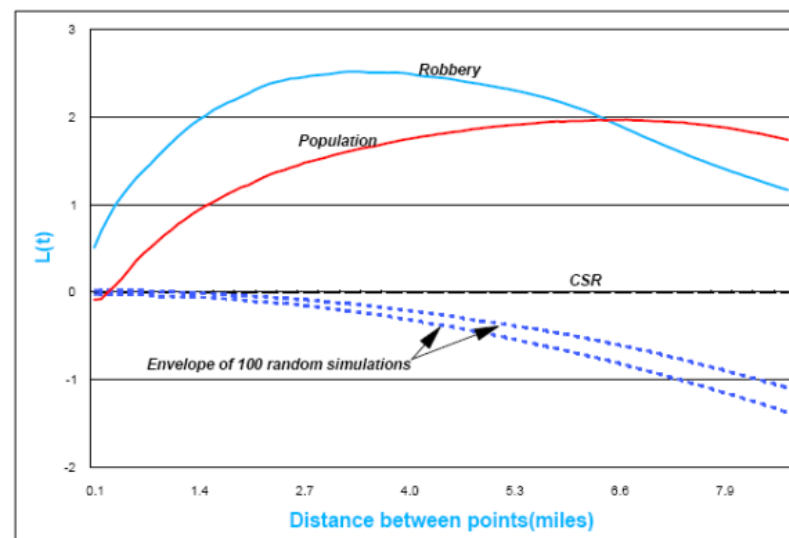
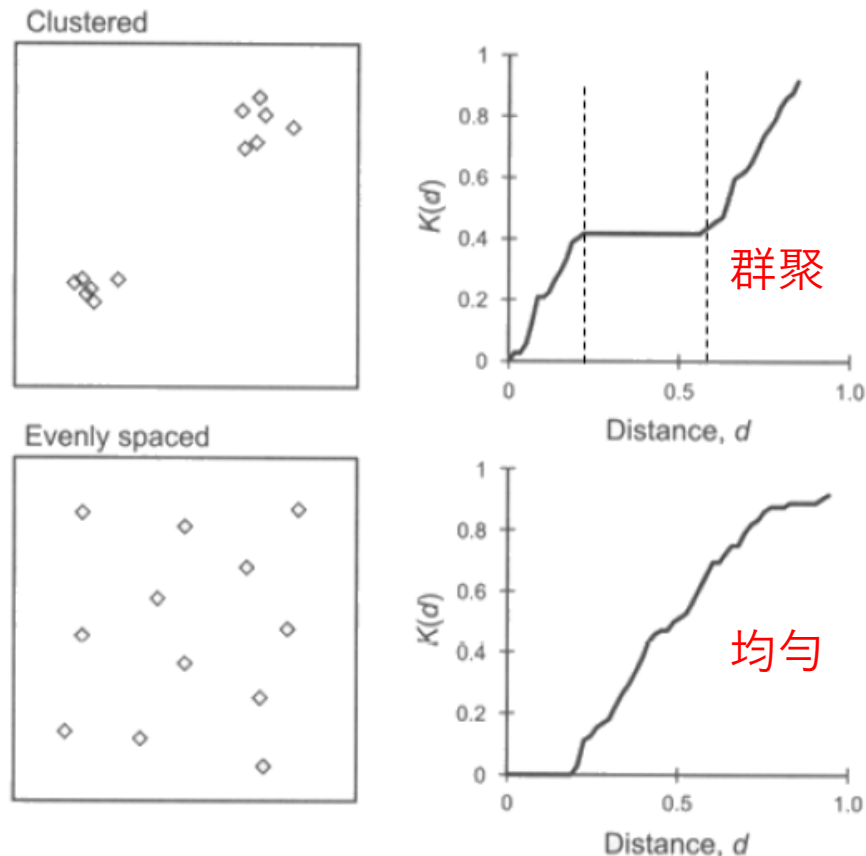
$K = \text{Kest}(\text{pts.ppp})$

L(d)

$$L(d) = \sqrt{\frac{K(d)}{\pi}} - d$$

在完全隨機分布(CSR)下, $L(d)=0$

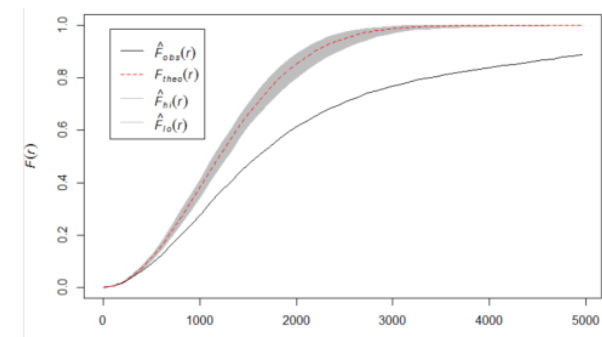
$L = \text{Lest}(\text{pts.ppp})$
 $L\$iso - L\r



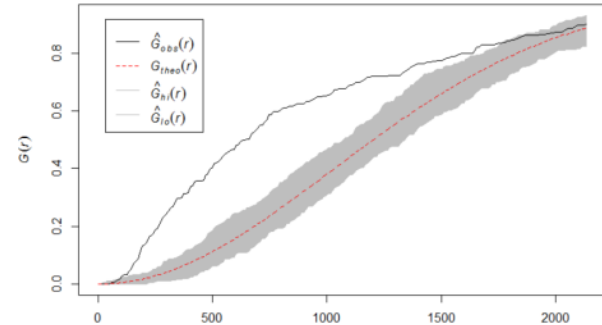
Confidence Envelope

F(d)	CI=envelope(SH.ppp, Fest , nsim=99 , nranks=1)
G(d)	CI=envelope(SH.ppp, Gest , nsim=99, nranks=1)
K(d)	CI=envelope(SH.ppp, Kest , nsim=99, nranks=1)
L(d)	CI=envelope(SH.ppp, Lest , nsim=99, nranks=1) plot(CI) plot(CI,.-r~r)

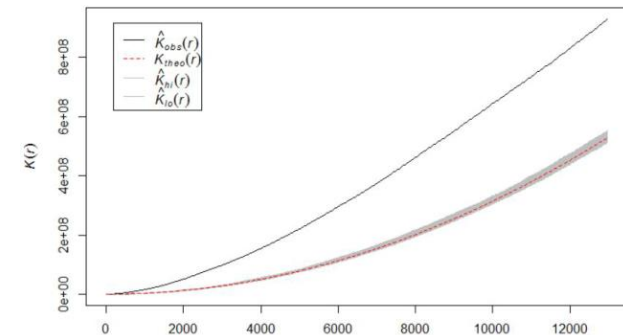
模擬99次 取前後1個



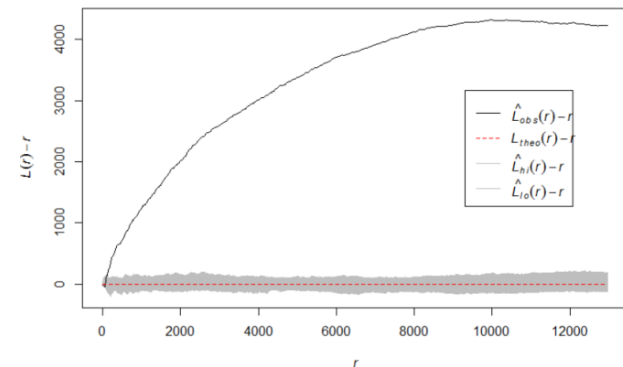
F



G



K



L