

點型態分析 描述統計

空間分析 2021.04.12
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Lab 4

描述疾病擴散(`point_event.shp`)的時空趨勢

Task 1: Exploring **temporal** trends in different time-scales

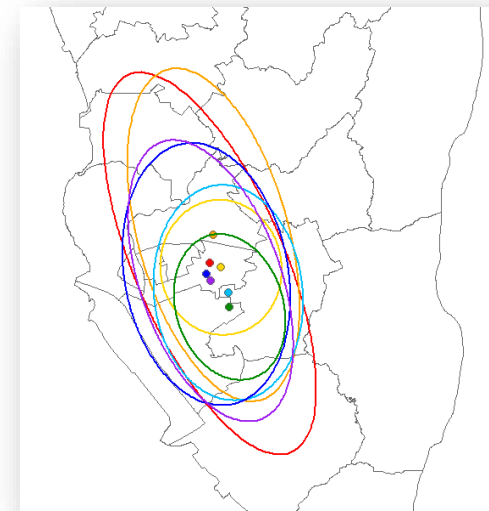
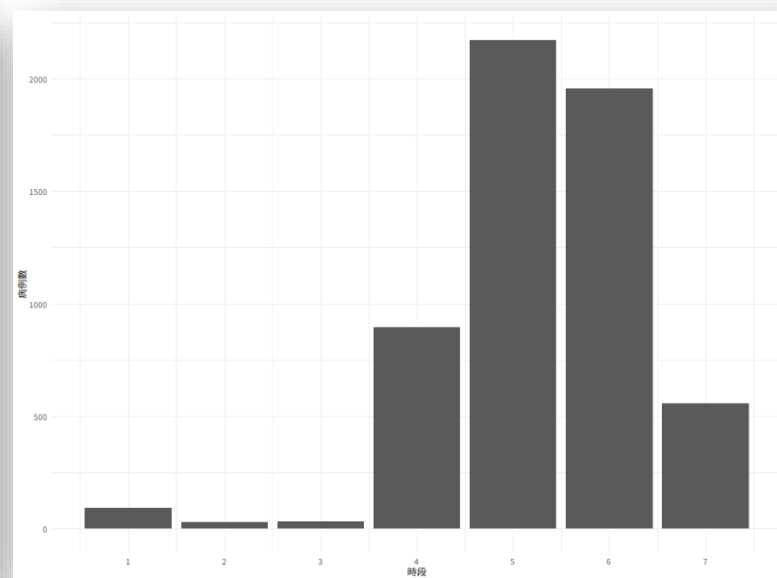
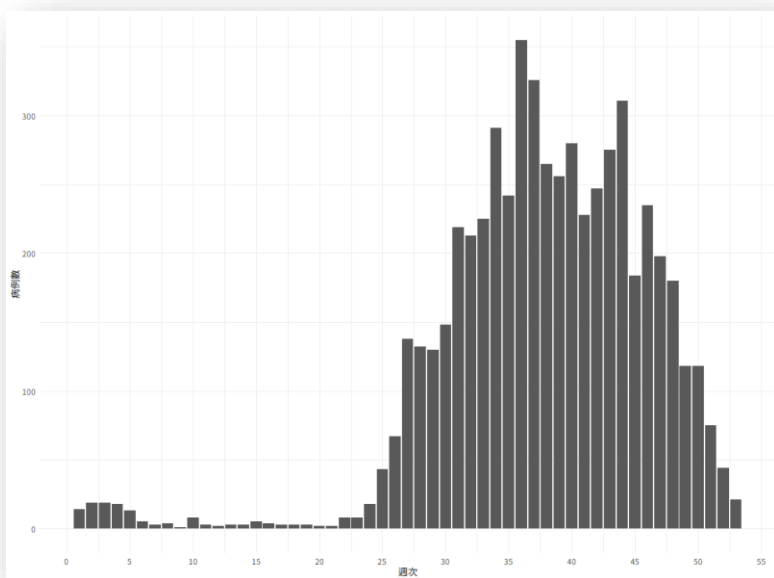
By Week & By Period

Task 2: Exploring **spatial** trends in different periods

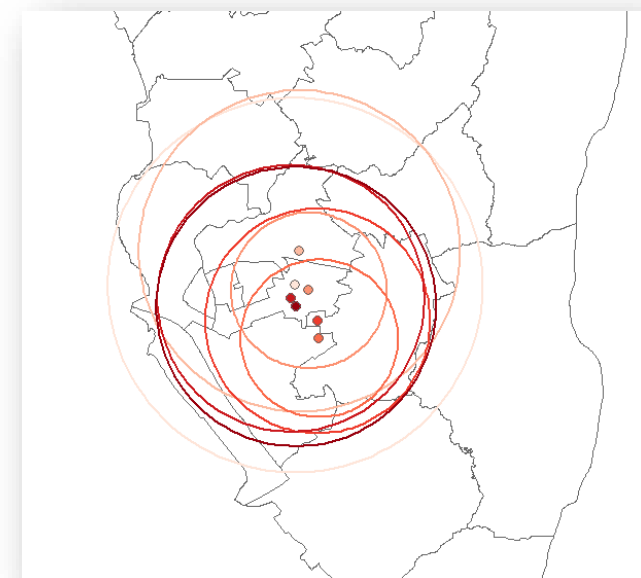
擷取**高雄地區**的登革熱病例分佈

請搭配`Popn_TWN2.shp`來擷取高雄的位置

- 建立period欄位記錄1~7，後續會比較方便



- 各period請用看得出1~7的顏色來畫圖
如：漸層顏色、彩虹順序顏色



中心趨勢 centrality

data: 2-column (X,Y)

library: aspace

- 1. mean center **mean_centre()** `mean_centre(points=data, weighted = T, weights = z)`
 ※易受離群值影響 `+ weighted`
- 2. median center **median_centre()** `median_centre(points=data)`
 ※到所有點距離和最小→最佳可到達點位
- 3. central feature **CF()** `CF(points=data)`
 ※從原始點來選取中心

離散趨勢 dispersion

- 1. standard distance **calc_sdd()** `calc_sdd(points=data)` `+ weighted`
- 2. SD ellipse **calc_sde()** `calc_sde(points=data)` `+ weighted`

sf → coords

st_coordinates()

TS=st_read("Taipei_School.shp")

TS.coord=st_coordinates(TS) ★

TS.coord=data.frame(TS.coord)

> TS.coord

	X	Y
1	308286.4	2771496
2	306854.9	2771689
3	305347.2	2771329
4	305712.0	2772151
5	306729.6	2772821

> mean_centre(points=TS.coord)

id CENTRE.x CENTRE.y

1 1 304632.8 2772258

> mean_centre(points=TS.coord,

weighted = T, weights = TS\$student)

id CENTRE.x CENTRE.y

1 1 304862.2 2771937

> median_centre(points=TS.coord)

id median.x median.y

1 1 304312.3 2771767

> CF(points=TS.coord)

id CF.x CF.y

1 1 304493.1 2771479

> TS.SDD=calc_sdd(points=TS.coord) ; TS.SDD (列出sddatt)

id calccentre weighted CENTRE.x CENTRE.y SDD.radius SDD.area

1 1 TRUE FALSE 304632.8 2772258 5844.228 107301108

> TS.SDE=calc_sde(points=TS.coord) ; TS.SDE (列出sdeloc)

id x y

1 1 306495.4 2765518

2 1 306612.6 2765553

3 1 306728.1 2765594

.

.

※ 如何把只有座標的點位資料(如csv匯入)變成sf格式？

> TS.data

ID	type	student	name	x	y
1	private	710	松山國小	308286.4	2771496
2	public	1277	西松國小	306854.9	2771689
3	public	2317	敦化國小	305347.2	2771329
4	public	1575	民生國小	305712.0	2772151
5	private	1393	民權國小	306729.6	2772821

TS.sf = **st_as_sf** (TS.data, coords=c("x","y")) ★

st_crs(TS.sf) = st_crs(TW_sf) 或 st_crs(4326) #設定座標系統

- 單一點位

```
pts = st_point(c(100,200))
pts = st_sfc(pts)
pts = st_sf(pts)
st_crs(pts)=st_crs(TS_sf)
```

- 課堂R code參考

```
MC = mean_centre(id=1, points=School_df[,1:2])
MC_sfg = st_point(c(MC[,2], MC[,3]))
MC_sfc = st_sfc(MC_sfg)
MC_sf = st_sf(MC_sfc)
st_crs(MC_sf) = st_crs(schools_sf)
```

- 用**st_as_sf**改寫

```
MC.data = data.frame(x= MC[,2], y= MC[,3]) #建立
MC.sf = st_as_sf (MC.data, coords=c("x","y"))
st_crs(MC.sf) = st_crs(school_sf)
```

黃色部分可以改寫成：MC_sf = c(MC[,2], MC[,3]) %>% st_point %>% st_sfc %>% st_sf

Center plot

```
TS=st_read("Taipei_School.shp")
TS.coord=st_coordinates(TS)
TS.coord=data.frame(TS.coord) #CF才強制要求dataframe格式
Mean=mean_centre(points=TS.coord)
Median=median_centre(points=TS.coord)
```

Plot: convert to sf

```
way 1. 1A. Mean = data.frame(x= Mean[,2], y= Mean[,3])
Mean.sf = st_as_sf (Mean, coords=c("x","y"))
st_crs(Mean.sf) = st_crs(TS)
```

```
1B. Median.sf=Median[,2:3]%>%as.numeric%>%
      st_point%>%st_sfc%>%st_sf
st_crs(Median.sf) = st_crs(TS)
```

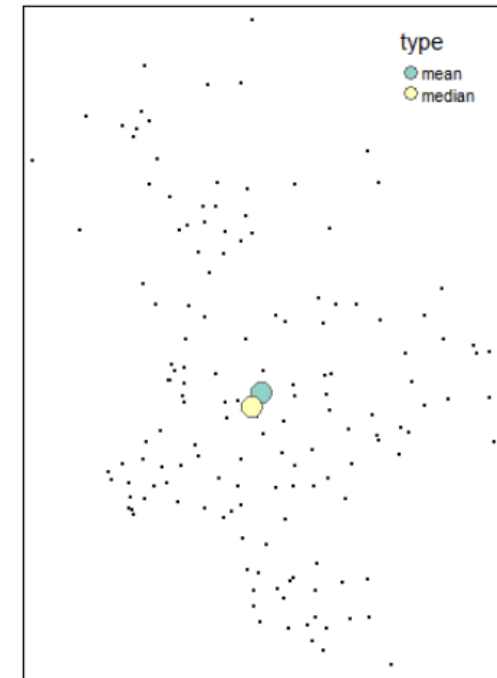
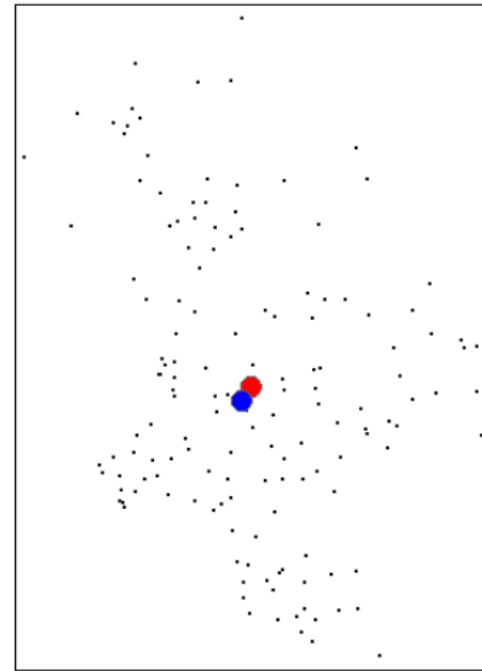
```
qtm(TS)+
  qtm(Mean.sf,symbols.size=1,symbols.col='red')+
  qtm(Median.sf,symbols.size=1,symbols.col='blue')
```

```
way 2. center=data.frame(x= c(Mean[,2],Median[,2]),y=c(Mean[,3],Median[,3]),type=c("mean","median"))
center.sf = st_as_sf (center, coords=c("x","y"))
st_crs(center.sf) = st_crs(TS)
```

```
qtm(TS)+qtm(center.sf,symbols.size=1,symbols.col='type')
```

或

```
qtm(TS)+tm_shape(center.sf)+tm_dots("type",palette=c(mean='red', median='orange'),size=1)
```



```
> center
      x      y  type
1 304632.8 2772258 mean
2 304312.3 2771767 median
```

SDD plot

```
TS.SDD = calc_sdd(points=TS.coord) → sddatt(記錄屬性) & sddloc(記錄圓360個位置)
```

中心點

```
TS.CENTRE=c(TS.SDD$CENTRE.x, TS.SDD$CENTRE.y)  
TS.CENTRE.sf=TS.CENTRE%>%st_point%>%st_sfc%>%st_sf  
st_crs(TS.CENTRE.sf)=st_crs(TS)
```

way 0:
buffer自己畫

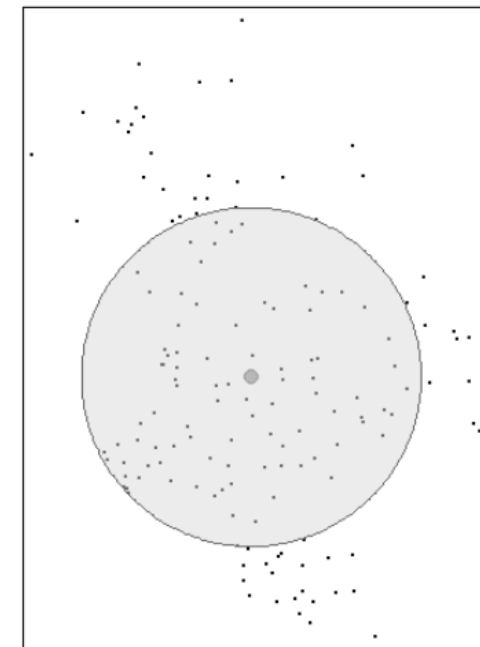
```
rad = TS.SDD$SDD.radius  
TS.SD = st_buffer(TS.CENTRE.sf, rad)
```

way 1:
另存shapefile

```
shp = convert.to.shapefile(sddloc, sddatt,"id",5) #5:polygons  
write.shapefile(shp, "SDD_Shape", arctgis=T)  
SDD_Shape_sf=st_read("SDD_Shape.shp")  
st_crs(SDD_Shape_sf)=st_crs(TS)
```

way 2:
圓上點 → 多邊形

```
SDD.data = data.frame(x= sddloc$x, y= sddloc$y)  
SDD.pt.sf= st_as_sf(SDD.data , coords=c("x","y"))  
st_crs(SDD.pt.sf)=st_crs(TS)  
SDD.poly = st_cast(st_combine(SDD.pt.sf),"POLYGON")  
SDD.sf = st_sf(SDD.poly)
```



POINT $\xrightarrow{\text{st_combine}}$ MULTIPOINT $\xrightarrow{\text{st_cast}}$ POLYGON

繪圖

```
qtm(TS)+qtm(TS.CENTRE.sf,symbols.size=.5)+tm_shape(.....)+tm_polygons(alpha=.5)
```

↑
TS.SD / SDD_Shape_sf / SDD.sf

SDE plot

TS.SDE = calc_sde(points=TS.coord) → **sdeatt**(記錄屬性) & **sdeloc**(記錄橢圓360個位置)

中心點

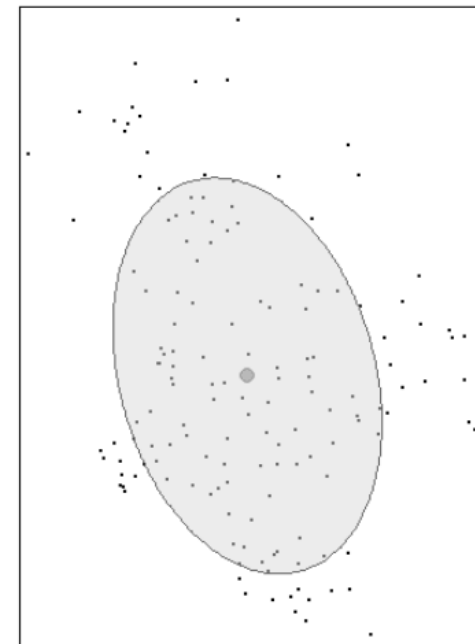
```
TS.CENTRE=c(sdeatt$CENTRE.x, sdeatt$CENTRE.y)  
TS.CENTRE.sf=TS.CENTRE%>%st_point%>%st_sfc%>%st_sf  
st_crs(TS.CENTRE.sf)=st_crs(TS)
```

way 1:
另存shapefile

```
shp = convert.to.shapefile(sdeloc, sdeatt,"id",5) #5:polygons  
write.shapefile(shp, "SDE_Shape", arctgis=T)  
SDE_Shape_sf=st_read("SDE_Shape.shp")  
st_crs(SDE_Shape_sf)=st_crs(TS)
```

way 2:
橢圓上點 → 多邊形

```
SDE.data = data.frame(x= sdeloc$x, y= sdeloc$y)  
SDE.pt.sf= st_as_sf(SDE.data , coords=c("x","y"))  
st_crs(SDE.pt.sf)=st_crs(TS)  
SDE.poly = st_cast(st_combine(SDE.pt.sf),"POLYGON")  
SDE.sf = st_sf(SDE.poly)
```



繪圖

```
qtm(TS)+qtm(TS.CENTRE.sf,symbols.size=.5)+tm_shape(.....)+tm_polygons(alpha=.5)
```

↑
SDE_Shape_sf / SDE.sf