

Workshop 7 R GeoDa

Anastasia Bernat

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Load data

```
library(rgeoda)
library(geodaData)
library(sf)
```

```
## Linking to GEOS 3.5.1, GDAL 2.2.2, PROJ 4.9.2
```

```
guerry_sf <- geodaData::guerry # classic social science foundational study by Andre-Michel Guerry on cr
summary(guerry_sf)
```

```
##      CODE_DE      COUNT      AVE_ID_      dept
## Length:85      Min.    :1.000      Min.    : 49      Min.    : 1.00
## Class :character 1st Qu.:1.000      1st Qu.: 8612      1st Qu.:24.00
## Mode  :character Median :1.000      Median :16732      Median :45.00
##                      Mean  :1.059      Mean  :17701      Mean  :45.08
##                      3rd Qu.:1.000      3rd Qu.:26842      3rd Qu.:66.00
##                      Max.   :4.000      Max.   :36521      Max.   :89.00
##      Region      Dprtmnt      Crm_prs      Crm_prp
## Length:85      Length:85      Min.    : 5883      Min.    : 1368
## Class :character Class :character 1st Qu.:14790      1st Qu.: 5990
## Mode  :character Mode  :character Median :18785      Median : 7624
##                      Mean  :19961      Mean  : 7881
##                      3rd Qu.:26221      3rd Qu.: 9190
##                      Max.   :37014      Max.   :20235
##      Litercy      Donatns      Infants      Suicids
## Min.    :12.00      Min.    : 1246      Min.    : 2660      Min.    : 3460
## 1st Qu.:25.00      1st Qu.: 3446      1st Qu.:14281      1st Qu.: 15400
## Median :38.00      Median : 4964      Median :17044      Median : 26198
## Mean    :39.14      Mean    : 6723      Mean    :18983      Mean    : 36517
## 3rd Qu.:52.00      3rd Qu.: 9242      3rd Qu.:21981      3rd Qu.: 45180
## Max.    :74.00      Max.    :27830      Max.    :62486      Max.    :163241
##      MainCty      Wealth      Commerc      Clergy
## Min.    :1      Min.    : 1.00      Min.    : 1.00      Min.    : 2.00
## 1st Qu.:2      1st Qu.:22.00      1st Qu.:21.00      1st Qu.:23.00
## Median :2      Median :44.00      Median :42.00      Median :44.00
## Mean    :2      Mean    :43.58      Mean    :42.33      Mean    :43.93
## 3rd Qu.:2      3rd Qu.:65.00      3rd Qu.:63.00      3rd Qu.:65.00
## Max.    :3      Max.    :86.00      Max.    :86.00      Max.    :86.00
##      Crm_prn      Infntcd      Dntn_cl      Lottery
## Min.    : 1.00      Min.    : 1      Min.    : 1.00      Min.    : 1.00
## 1st Qu.:22.00      1st Qu.:23      1st Qu.:22.00      1st Qu.:22.00
## Median :43.00      Median :44      Median :43.00      Median :43.00
## Mean    :43.06      Mean    :44      Mean    :43.02      Mean    :43.04
## 3rd Qu.:64.00      3rd Qu.:65      3rd Qu.:64.00      3rd Qu.:64.00
## Max.    :86.00      Max.    :86      Max.    :86.00      Max.    :86.00
##      Desertn      Instrct      Prsttts      Distanc
```

```
## Min. : 1.00 Min. : 1.00 Min. : 0.0 Min. : 0.0
## 1st Qu.:23.00 1st Qu.:23.00 1st Qu.: 6.0 1st Qu.:119.7
## Median :44.00 Median :42.00 Median : 34.0 Median :199.2
## Mean :43.91 Mean :43.34 Mean : 143.5 Mean :204.1
## 3rd Qu.:65.00 3rd Qu.:65.00 3rd Qu.: 117.0 3rd Qu.:283.8
## Max. :86.00 Max. :86.00 Max. :4744.0 Max. :403.4
## Area Pop1831 geometry
## Min. : 762 Min. :129.1 MULTIPOLYGON :85
## 1st Qu.: 5361 1st Qu.:283.8 epsg:27572 : 0
## Median : 6040 Median :346.3 +proj=lcc ...: 0
## Mean : 6117 Mean :380.8
## 3rd Qu.: 6815 3rd Qu.:445.2
## Max. :10000 Max. :989.9
```

```
names(guerry_sf)
```

```
## [1] "CODE_DE" "COUNT" "AVE_ID_" "dept" "Region" "Dprtmnt"
## [7] "Crm_prs" "Crm_prp" "Litercy" "Donatns" "Infants" "Suicids"
## [13] "MainCty" "Wealth" "Commerc" "Clergy" "Crm_prn" "Infntcd"
## [19] "Dntn_cl" "Lottery" "Desertn" "Instrct" "Prsttts" "Distanc"
## [25] "Area" "Pop1831" "geometry"
```

```
str(guerry_sf)
```

```
## Classes 'sf' and 'data.frame': 85 obs. of 27 variables:
## $ CODE_DE : chr "01" "02" "03" "04" ...
## $ COUNT : num 1 1 1 1 1 1 1 1 1 1 ...
## $ AVE_ID_ : num 49 812 1418 1603 1802 ...
## $ dept : num 1 2 3 4 5 7 8 9 10 11 ...
## $ Region : chr "E" "N" "C" "E" ...
## $ Dprtmnt : chr "Ain" "Aisne" "Allier" "Basses-Alpes" ...
## $ Crm_prs : num 28870 26226 26747 12935 17488 ...
## $ Crm_prp : num 15890 5521 7925 7289 8174 ...
## $ Litercy : num 37 51 13 46 69 27 67 18 59 34 ...
## $ Donatns : num 5098 8901 10973 2733 6962 ...
## $ Infants : num 33120 14572 17044 23018 23076 ...
## $ Suicids : num 35039 12831 114121 14238 16171 ...
## $ MainCty : num 2 2 2 1 1 1 2 1 2 2 ...
## $ Wealth : num 73 22 61 76 83 84 33 72 14 17 ...
## $ Commerc : num 58 10 66 49 65 1 4 60 3 35 ...
## $ Clergy : num 11 82 68 5 10 28 50 39 42 15 ...
## $ Crm_prn : num 71 4 46 70 22 76 53 74 77 80 ...
## $ Infntcd : num 60 82 42 12 23 47 85 28 54 35 ...
## $ Dntn_cl : num 69 36 76 37 64 67 49 63 9 27 ...
## $ Lottery : num 41 38 66 80 79 70 31 75 28 50 ...
## $ Desertn : num 55 82 16 32 35 19 62 22 86 63 ...
## $ Instrct : num 46 24 85 29 7 62 9 77 15 48 ...
## $ Prsttts : num 13 327 34 2 1 1 83 3 207 1 ...
## $ Distanc : num 218.4 65.9 161.9 351.4 320.3 ...
## $ Area : num 5762 7369 7340 6925 5549 ...
## $ Pop1831 : num 346 513 298 156 129 ...
## $ geometry:sfc_MULTIPOLYGON of length 85; first list element: List of 1
## ..$ :List of 1
## .. ..$ : num [1:498, 1:2] 801150 800669 800688 800780 800589 ...
## ..- attr(*, "class")= chr "XY" "MULTIPOLYGON" "sfg"
```

```
## - attr(*, "sf_column")= chr "geometry"
## - attr(*, "agr")= Factor w/ 3 levels "constant","aggregate",...: NA NA NA NA NA NA NA NA NA NA ...
## ..- attr(*, "names")= chr "CODE_DE" "COUNT" "AVE_ID_" "dept" ...
```

```
dim(guerry_sf)
```

```
## [1] 85 27
```

```
head(guerry_sf)
```

```
## Simple feature collection with 6 features and 26 fields
## geometry type: MULTIPOLYGON
## dimension: XY
## bbox: xmin: 595532 ymin: 1858801 xmax: 975716 ymax: 2564568
## epsg (SRID): 27572
## proj4string: +proj=lcc +lat_1=46.8 +lat_0=46.8 +lon_0=0 +k_0=0.99987742 +x_0=600000 +y_0=2200000
## CODE_DE COUNT AVE_ID_ dept Region Dprtmnt Crm_prs Crm_prp Litercy
## 1 01 1 49 1 E Ain 28870 15890 37
## 2 02 1 812 2 N Aisne 26226 5521 51
## 3 03 1 1418 3 C Allier 26747 7925 13
## 4 04 1 1603 4 E Basses-Alpes 12935 7289 46
## 5 05 1 1802 5 E Hautes-Alpes 17488 8174 69
## 6 07 1 2249 7 S Ardeche 9474 10263 27
## Donatns Infants Suicids MainCty Wealth Commerc Clergy Crm_prn Infntcd
## 1 5098 33120 35039 2 73 58 11 71 60
## 2 8901 14572 12831 2 22 10 82 4 82
## 3 10973 17044 114121 2 61 66 68 46 42
## 4 2733 23018 14238 1 76 49 5 70 12
## 5 6962 23076 16171 1 83 65 10 22 23
## 6 3188 42117 52547 1 84 1 28 76 47
## Dntn_cl Lottery Desertn Instrct Prsttts Distanc Area Pop1831
## 1 69 41 55 46 13 218.372 5762 346.03
## 2 36 38 82 24 327 65.945 7369 513.00
## 3 76 66 16 85 34 161.927 7340 298.26
## 4 37 80 32 29 2 351.399 6925 155.90
## 5 64 79 35 7 1 320.280 5549 129.10
## 6 67 70 19 62 1 279.413 5529 340.73
## geometry
## 1 MULTIPOLYGON (((801150 2092...
## 2 MULTIPOLYGON (((729326 2521...
## 3 MULTIPOLYGON (((710830 2137...
## 4 MULTIPOLYGON (((882701 1920...
## 5 MULTIPOLYGON (((886504 1922...
## 6 MULTIPOLYGON (((747008 1925...
```

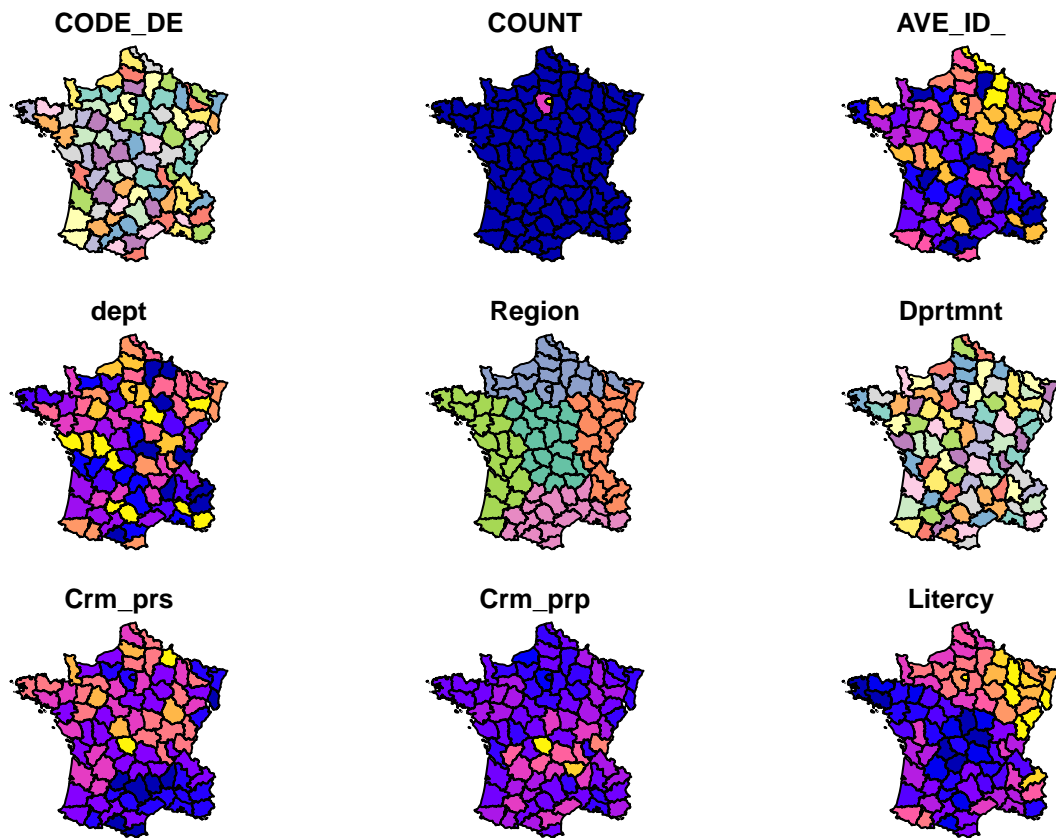
```
st_crs(guerry_sf)
```

```
## Coordinate Reference System:
## EPSG: 27572
## proj4string: "+proj=lcc +lat_1=46.8 +lat_0=46.8 +lon_0=0 +k_0=0.99987742 +x_0=600000 +y_0=2200000"
```

Plot Data

```
plot(guerry_sf)
```

```
## Warning: plotting the first 9 out of 26 attributes; use max.plot = 26 to  
## plot all
```



Metadata

?guerry