

# Spatial Analysis and Mapping Workshop

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## Preliminaries

This workshop will involve a large collection of R packages and will provide a basic run through for accessing spatial data, spatial plotting and integrating with the 'ggplot' packages. Last we will perform some simple spatial statistics.

## From CRAN

### Required

```
install.packages("sp")
install.packages("rgeos")
install.packages("maptools")
install.packages("spdep")
install.packages("ggplot2")
install.packages("devtools")
install.packages("plyr")
```

### Recommended

```
install.packages("rgdal")
```

## US Census Packages

In this workshop we will use a series of different packages, including the US Census suite of software. The most recent versions are available [https://r-forge.r-project.org/R/?group\\_id=2022](https://r-forge.r-project.org/R/?group_id=2022). We will need only three of the packages:

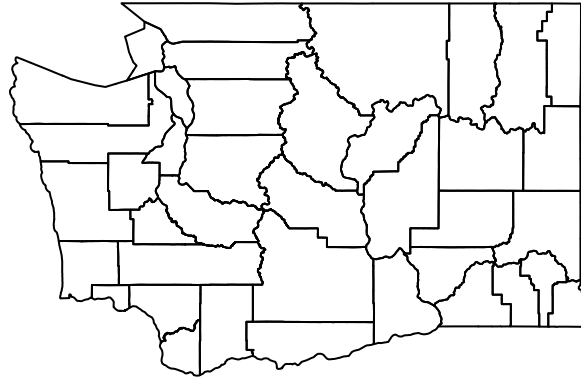
```
install.packages("UScensus2010", repos = "http://R-Forge.R-project.org")
install.packages("UScensus2010county", repos = "http://R-Forge.R-project.org")
install.packages("UScensus2010tract", repos = "http://R-Forge.R-project.org")
install.packages("UScensus2010cdp", repos = "http://R-Forge.R-project.org")
```

### Load the US Census packages

```
library(UScensus2010)
library(UScensus2010county)
data(washington.county10)
```

## Plot Washington Counties

```
plot(washington.county10)
```



## Zillow Neighborhoods

We are going to use some data from <http://zillow.com> which will allow us to work with the neighborhoods of Seattle! You can download the neighborhoods directly at <http://www.zillow.com/howto/api/neighborhood-boundaries.htm>.

### Package requirements

This function requires 'rgdal', if you were not able to instal 'rgdal' the data file is provided on the github repository as 'seattle\_nb.rda'.

```
require(rgdal)
```

### Function for downloading Zillow Neighborhoods

```
readZillow_NB <- function(address, state, city = NULL) {
  fileName <- paste(address, "ZillowNeighborhoods-", state,
    ".zip", sep = "") ##full address of zip file
  zipFile <- paste("ZillowNeighborhoods-", state, ".zip", sep = "")
  zipdir <- tempfile() ### Create temp file
  dir.create(zipdir) ### Create a folder in the temp file
  download.file(fileName, destfile = paste(zipdir, zipFile,
    sep = "/"))
  unzip(paste(zipdir, zipFile, sep = "/"), exdir = zipdir)
  files <- list.files(zipdir)
  sp_temp <- rgdal::readOGR(dsn = zipdir, layer = strsplit(files[grep("shp",
    paste(files, "0", sep = ""))], "\\.[1]]")[1])
  if (!is.null(city)) {
    sp_temp_city <- sp_temp[sp_temp$CITY == city, ]
    return(sp_temp_city)
  }
  sp_temp
}
```

## Zillow Logo

Zillow requires that you add their logo to any plot using their data. Below is a quick script for doing such a task. This requires the package 'caTools'.

```
install.packages("caTools")
install.packages("RCurl")
```

```
library(caTools)
```

```
zillowurl <- "http://www.zillowstatic.com/vstatic/70a941d/static/logos/Zillow_Logo_HoodsProvided_RightA"
zillow_logo <- read.gif(zillowurl, flip = TRUE)
```

```
## Plot the logo!
```

```
image(zillow_logo$image, col = zillow_logo$col, breaks = (0:length(zillow_logo$col)) -
      0.5, asp = 0.15, useRaster = TRUE, axes = FALSE)
```



## Seattle Neighborhoods

```
base_address <- "http://www.zillow.com/static/shp/"
state <- "WA"
city <- "Seattle"
seattle_nb <- readZillow_NB(base_address, state, city)
```

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

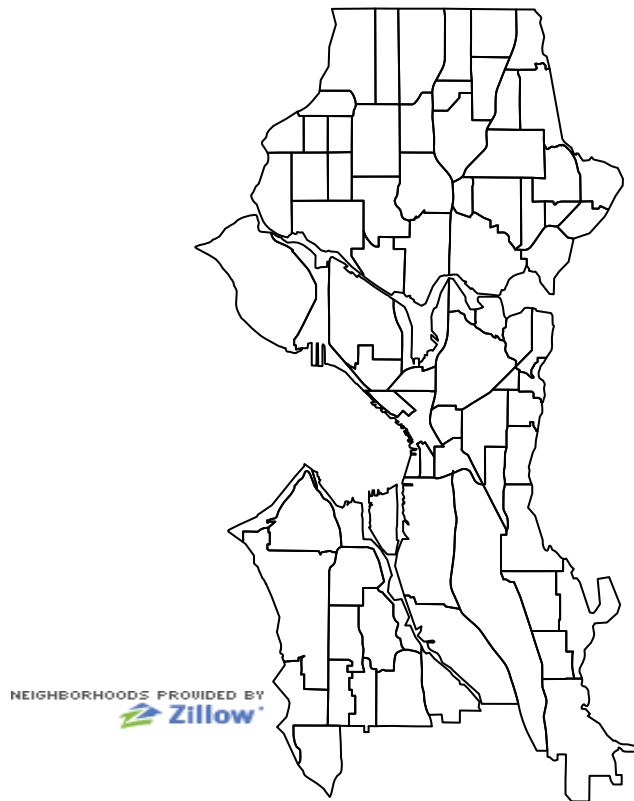
```
## Source: "/var/folders/y5/f2xwbx9d46z7m05mmqwr27_r0000gn/T//RtmpSOHfHJ/file13967184126b3", layer: "Zi"
```

```
## with 299 features
```

```
## It has 5 fields
```

## Plot Seattle Neighborhoods

```
par(mfrow = c(1, 1), mar = c(0, 0, 0, 0) + 0.1)
plot(seattle_nb)
par(fig = c(0.25, 3.3, 0.4, 2.5)/10, new = TRUE)
image(zillow_logo$image, col = zillow_logo$col, breaks = (0:length(zillow_logo$col)) -
      0.5, asp = 0.15, useRaster = TRUE, axes = FALSE)
```



## Plot the US using ggplot

```
library(UScensus2010)
library(ggplot2)
library(dplyr)
library(plyr)
data(states)
cont_states <- states[!(states$acronym %in% c("HI", "AK")), ]
cont_states@data$id <- rownames(cont_states@data)
states.points = fortify(cont_states, region = "id")
states.df = join(states.points, cont_states@data, by = "id")

ggplot() + geom_polygon(data = states.df, aes(x = long, y = lat,
  group = group, fill = pop1970 - pop1960), color = "black",
  size = 0.25) + coord_map()
```

