toronto vs. IL

SB

Wednesday, February 04, 2015

graphing IL from Toronto example

may 7, 2017

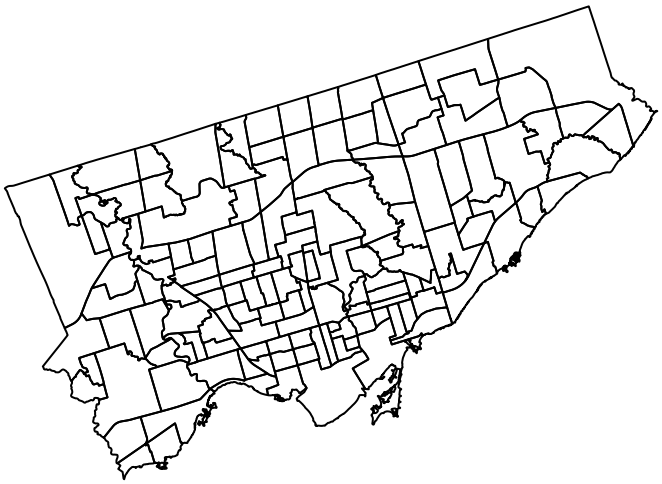
modify the toronto example to use the Israeli data ## load setup code, simulate thesis state

```
library(RColorBrewer)
library(maptools)
library(ggmap)
library(rgeos)
library(censusFunctions)

setwd("/Volumes/Bmac/febThesis/index")
ilmap <- importData("savedGoogleMap")
# Read the neighborhood shapefile data and plot
setwd("~/scratch/toronto_neighbourhoods")
shpfile <- "NEIGHBORHOODS_WGS84_2.shp"
sh <- rgdal::readOGR(shpfile)
```

```
## OGR data source with driver: ESRI Shapefile
## Source: "NEIGHBORHOODS_WGS84_2.shp", layer: "NEIGHBORHOODS_WGS84_2"
## with 140 features
## It has 2 fields
```

```
plot(sh)
```



```
# Add demographic data
# The neighbourhood ID is a string - change it to a integer
sh@data$AREA_S_CD <- as.numeric(sh@data$AREA_S_CD)

# Read in the demographic data and merge on Neighbourhood Id
```

```r
demo <- read.csv(file="WB-Demographics.csv", header=T)
sh2 <- merge(sh, demo, by.x='AREA_S_CD', by.y='Neighbourhood.Id')
```

now, what does this col=cols line do?

```r
# Set the palette
# creates 128 shades between white and red
p <- colorRampPalette(c("white", "red"))(128)
palette(p)

# Scale the total population to the palette
pop <- sh2@data$Total.Population
cols <- (pop - min(pop))/diff(range(pop))*127+1
# what is this cols variable?
# View(cols) #don't call view in ess, only Rstudio'
pop  # city-section populations range from 7k to 50k
```

```
##   [1] 11655 27715 14640 14685 24690 27390 21135 10140 19225 16710 14110
##  [12] 38070  9450  9950 16615 21245 25640 17955 15595 12530 15850 13100
##  [23] 28345 24775 15700 22165 13735 13095 14015 11565 11200 12195 10925
##  [34] 12475 31395 14075  9815 16805 17180 43365 26550 34100 25445 17050
##  [45] 21725 13535 14610 10640 18315  9115 10485 18500  9175  9635 10925
##  [56] 11340 29180  9855 10580 15050  7790 17650 13150 24360 14945 34635
##  [67] 23050 21000  6490 21300 21750 13100 17825 13505 20635 21075 27020
##  [78] 22830  9550 30280 21990 22080 18805 44915 26910 15435 11900 10010
##  [89] 27870 21860 12015 34650  7920 19345 22060 45025 15005 45905 32790
## [100] 12050 15980 28590  7765 10485 20840 10905 13735 34620  8705  7655
## [111] 21345 53350  7825 17675 23185 22270  8715 26735 18170 15075 17785
## [122]  9630 45085 11450 10195 10435 25010 14540 10580 26550 17585 16310
## [133] 12055 11705 16425 27160 16145 13985 17010 14295
```

```r
cols[1]
```

```
## [1] 14.99819
```

```r
range(cols)
```

```
## [1]   1 128
```

```
## pop[12]
## # what column names are there?
## names(sh2@data)
## ```
## What is the population of the 12th area?
## ```{r pop1}
## #ggmap(ilmap)
## pop[12]
## ```
## What is the name of that area?
## ```{r nme}
## sh2@data$AREA_NAME[12]
## ```
## Does this area have any aliases?
## ```{r rco}
## sh2@data$Neighbourhood[12]
```

Can you say any of that with inline code?

The population of region Islington-City Centre West (14) aka Islington-City Centre West was 38070 in 1998. By 2010 it had fallen to 13100. This paragraph is interesting because, blah.

```
chngDir("index")
polygon <- sf::st_read("../includes/ISR_adm/ISR_adm1.shp")
```

```
## Reading layer `ISR_adm1' from data source `/Volumes/Bmac/proposal/includes/ISR_adm/ISR_adm1.shp' usi
## converted into: MULTIPOLYGON
## Simple feature collection with 7 features and 9 fields
## geometry type:  MULTIPOLYGON
## dimension:      XY
## bbox:           xmin: 34.26801 ymin: 29.49708 xmax: 35.90094 ymax: 33.36403
## epsg (SRID):    4326
## proj4string:    +proj=longlat +datum=WGS84 +no_defs
```

```
points <- fortify(polygon)
ilpoints <- fortify(polygon, region = "NAME_1")
levels(polygon$NAME_1)
```

```
## [1] "Golan"     "HaDarom"   "Haifa"     "HaMerkaz"  "HaZafon"   "Jerusalem"
## [7] "Tel Aviv"
```

```
avgage <- c(10, 11, 15, 20.3, 31, 11, 4)
avgage[3]
```

```
## [1] 15
```

```
# fake data, range 0-40
frame_il <- data.frame( region = levels(polygon$NAME_1), age = as.numeric(unlist(avgage)), stringsAsFac
colnames(frame_il)
```

```
## [1] "region" "age"
```

```
frame_il[[2]]
```

```
## [1] 10.0 11.0 15.0 20.3 31.0 11.0  4.0
```

```
typeof(frame_il[[2]])
```

```
## [1] "double"
```

```
# make palette with 40 levels
pal <-  colorRampPalette(brewer.pal(11, "Spectral"))(40)
# no place will be dark red, my data only goes to 31
palette(rev(p))
## scale
age <- frame_il$age
# this gives an error, age is still not numeric
range(age)
```

```
## [1]  4 31
```

```
age
```

```
## [1] 10.0 11.0 15.0 20.3 31.0 11.0  4.0
```

```
colours <- (age - min(age)) / diff(range(age)) * 40
colours
```

```
## [1]  8.888889 10.370370 16.296296 24.148148 40.000000 10.370370  0.000000
```

```
## merge - currently I only have the region names, need the shape-polygons
## can these be merged?
ilpoints$NAME_1
```

```
## [1] Golan     HaDarom   Haifa     HaMerkaz  HaZafon   Jerusalem Tel Aviv
## Levels: Golan HaDarom Haifa HaMerkaz HaZafon Jerusalem Tel Aviv
```

```
## is the same as?
frame_il$region <- as.factor(frame_il$region)

frame_ils <- merge(frame_il, ilpoints,
                   by.x = 'region',
                   by.y = 'NAME_1')

## try other package
install_github("arilamstein/choroplethr")
```

```
## Skipping install of 'choroplethr' from a github remote, the SHA1 (41c81975) has not changed since las
##   Use `force = TRUE` to force installation
```

```
install_github("choroplethrAdmin1", "arilamstein")
```

```
## Warning: Username parameter is deprecated. Please use arilamstein/
## choroplethrAdmin1
```

```
## Skipping install of 'choroplethrAdmin1' from a github remote, the SHA1 (62d6168a) has not changed sin
##   Use `force = TRUE` to force installation
```

```
library(choroplethr)
library(choroplethrAdmin1)
## help page http://www.arilamstein.com/open-source/choroplethr/creating-administrative-level-1-maps/
?df_japan_census
head(df_japan_census)
```

```
##    region pop_2010 percent_pop_change_2005_2010 pop_density_km2_2010
## 23  aichi  7411000                          2.2                1434.8
## 5   akita  1086000                         -5.2                  93.3
## 2  aomori  1373000                         -4.4                 142.4
## 12  chiba  6216000                          2.6                1205.5
## 38  ehime  1431000                         -2.5                 252.1
## 18  fukui   806000                         -1.9                 192.4
##      value
## 23 7411000
## 5  1086000
## 2  1373000
## 12 6216000
## 38 1431000
## 18  806000
```

```
## is the country available?
#get_admin1_regions("japan")
#get_admin1_regions("china")
get_admin1_regions("israel")
```

```
##      country            region
## 1469  israel   central district
```

```
## 1470  israel     haifa district
## 1471  israel jerusalem district
## 1472  israel  northern district
## 1473  israel  southern district
## 1474  israel  tel aviv district
```

those are the regions available to map,

Only has 6 regions, seems to lack Golan and Krayot Haifa regions I need. ## what region do i still need to add?

```
admin1_map("japan")
```

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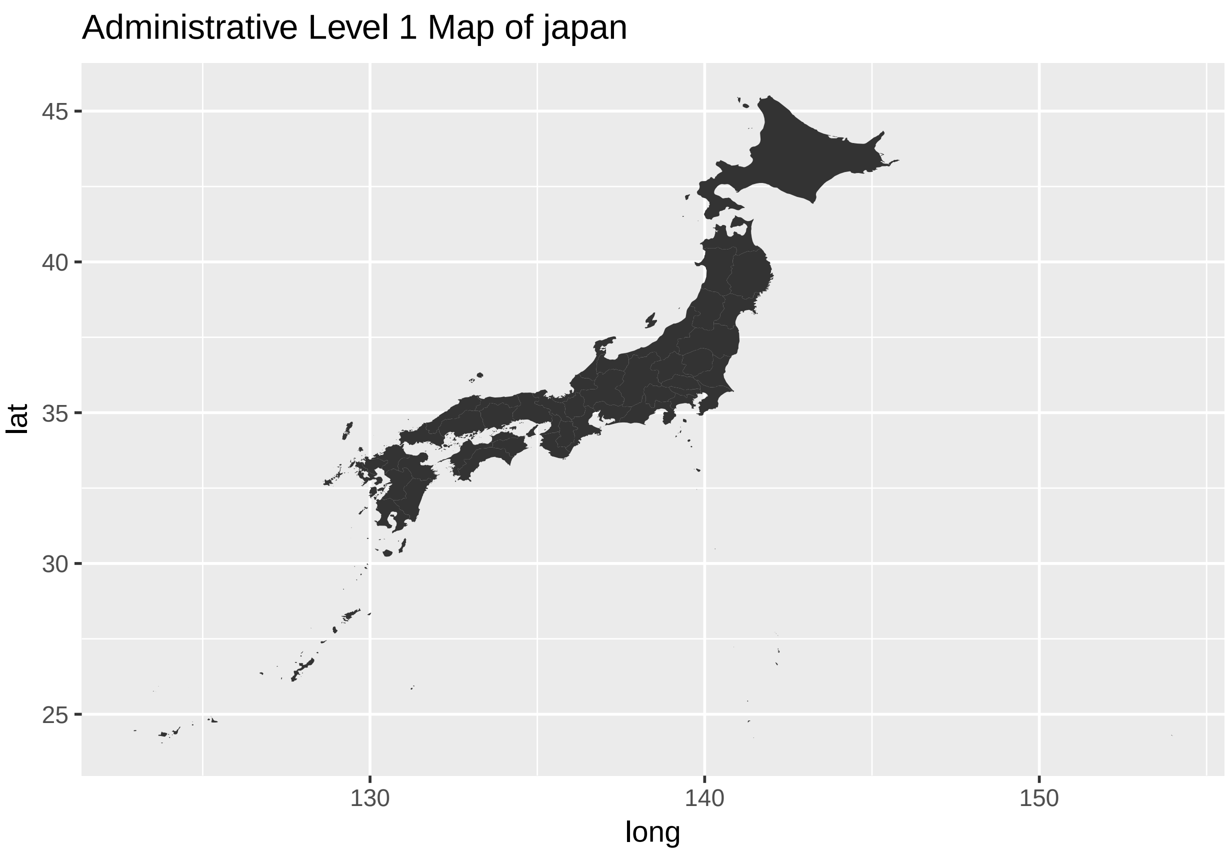


```
admin1_map("china")
```

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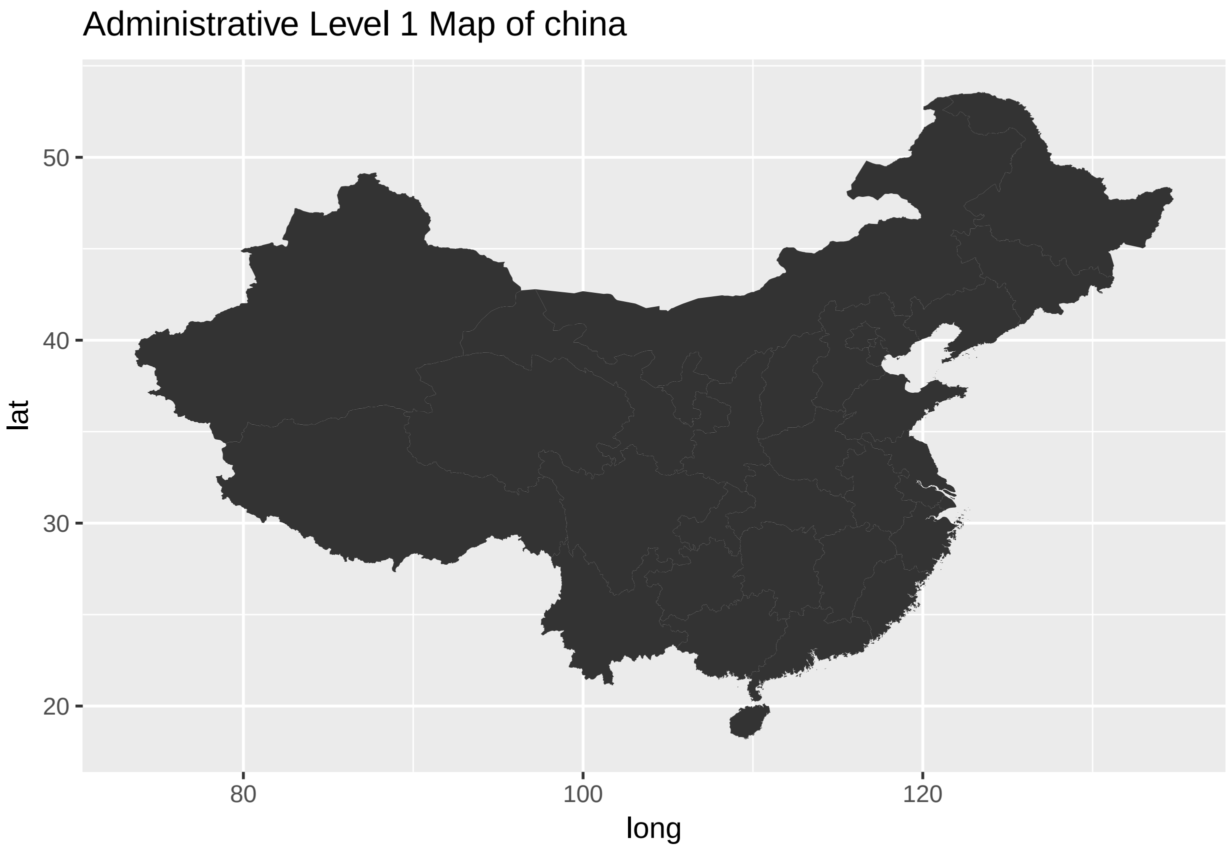


```r
admin1_map("israel")
```

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```

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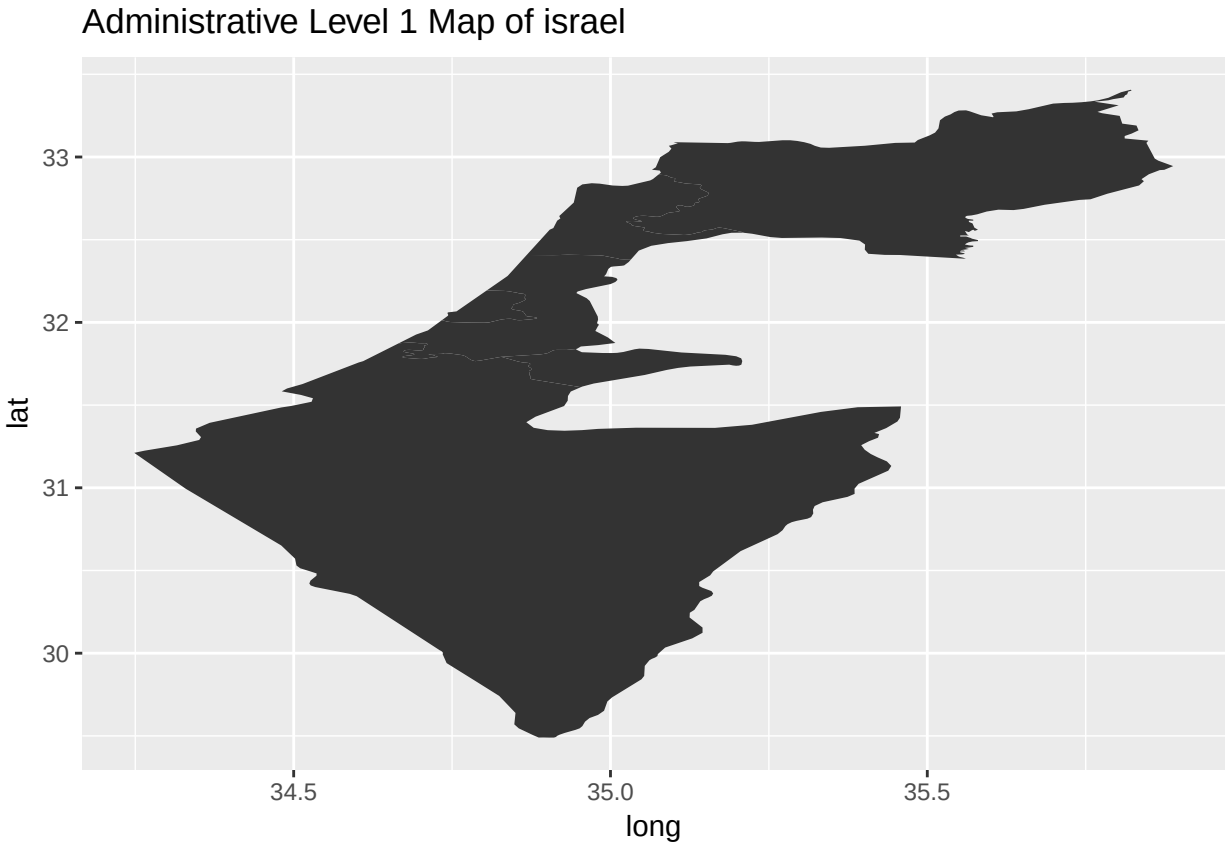


```
# grab two columns
#japs <-read.table(text = "", ...)
## japs <- data.frame(region = character(),
##                    value  = numeric(),
##                     stringsAsFactors = FALSE)
df_japan_census$value <- df_japan_census$pop_2010
## plot
admin1_choropleth(country.name = "japan",
                  df = df_japan_census,
                  title = "2010 Japan Population Estimates",
                  num_colors = 1)
```

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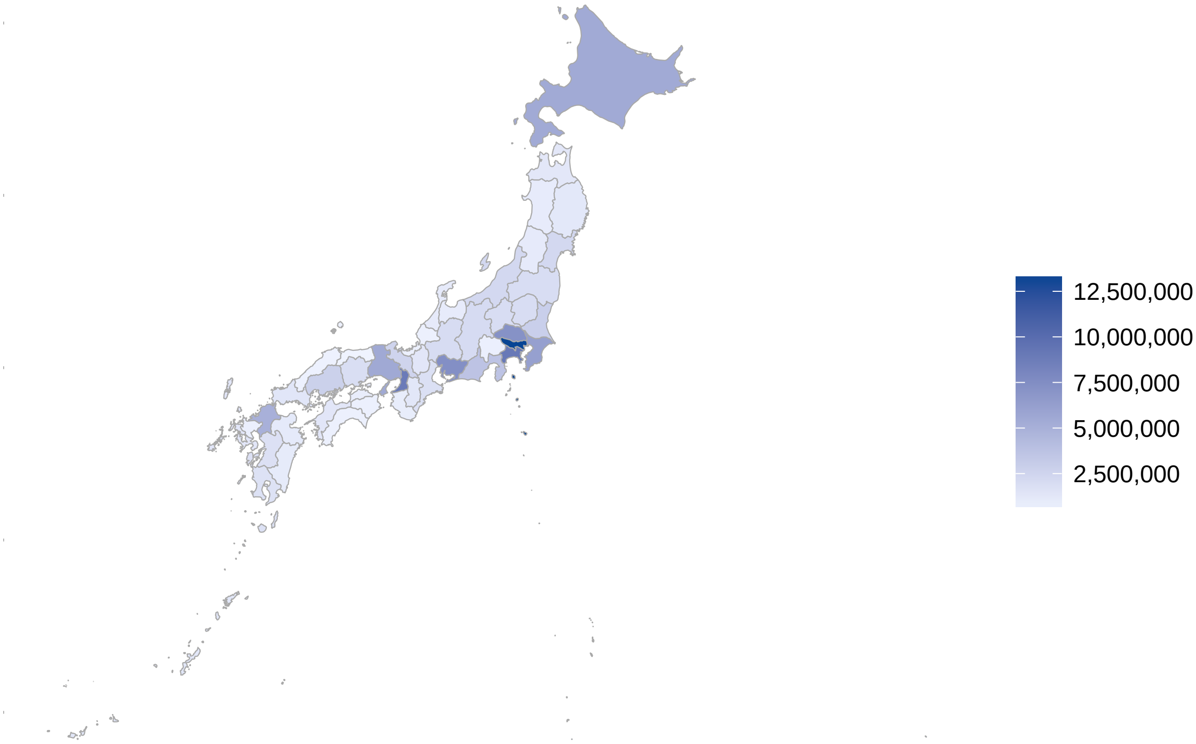
2010 Japan Population Estimates



zoom in on a region

```
kansai = c("mie", "nara", "wakayama", "kyoto", "osaka", "hyogo", "shiga")
admin1_choropleth(country.name = "japan",
                  df           = df_japan_census,
                  title        = "2010 Japan Population Estimates - Kansai Region",
                  legend       = "Population",
                  num_colors   = 1,
                  zoom         = kansai)
```

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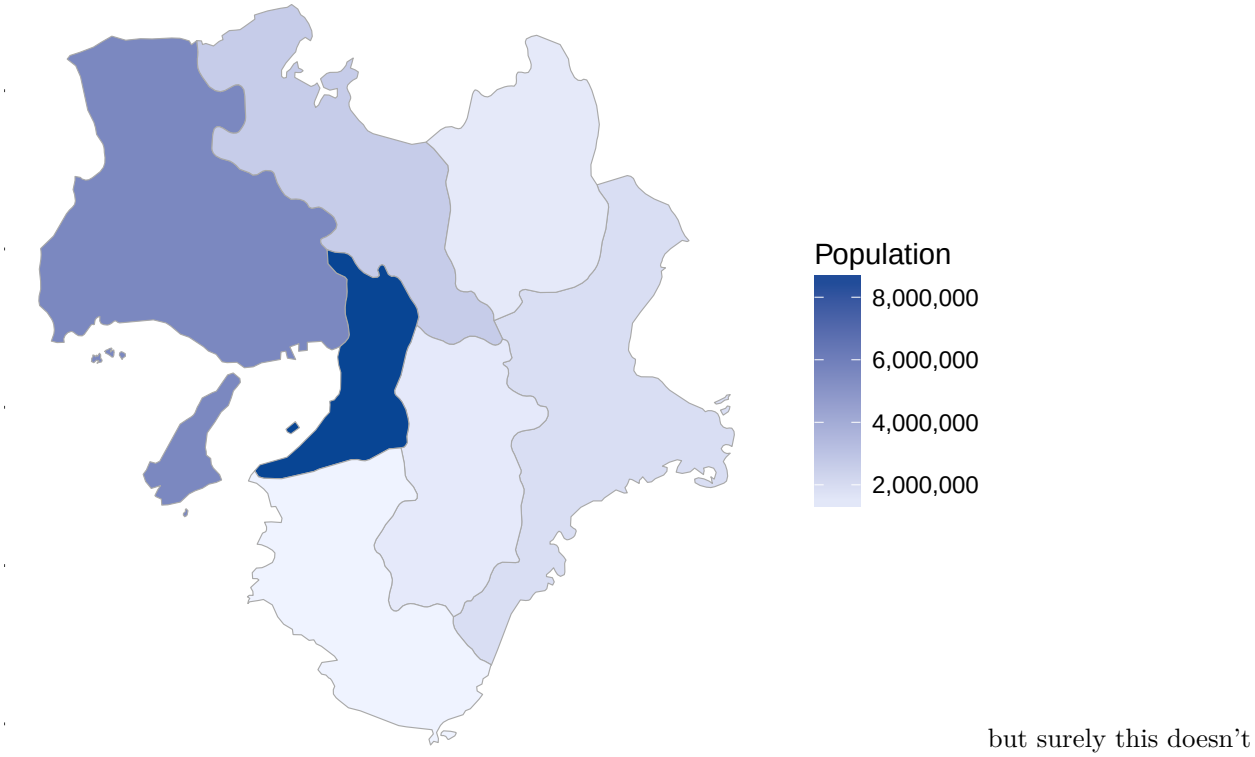


but surely this doesn't work for israel?

```
?df_israel
```

```
## No documentation for 'df_israel' in specified packages and libraries:
## you could try '??df_israel'
```

```
#plot(frame_ils, col <- colours )

# Scale the total population to the palette
pop <- sh2@data$Total.Population
cols <- (pop - min(pop))/diff(range(pop))*127+1

## stuff
demo
```

```
##                         Neighbourhood Neighbourhood.Id Total.Area
## 1               West Humber-Clairville                1      30.09
## 2   Mount Olive-Silverstone-Jamestown                2       4.60
## 3        Thistletown-Beaumond Heights                3       3.40
## 4                     Rexdale-Kipling                4       2.50
## 5                    Elms-Old Rexdale                5       2.90
## 6       Kingsview Village-The Westway                6       5.10
## 7    Willowridge-Martingrove-Richview                7       5.50
## 8            Humber Heights-Westmount                8       2.80
## 9            Edenbridge-Humber Valley                9       5.50
## 10                 Princess-Rosethorn               10       5.20
## 11     Eringate-Centennial-West Deane               11       8.60
## 12                     Markland Wood               12       2.90
```

```
## 13                Etobicoke West Mall             13       1.70
## 14         Islington-City Centre West             14      16.40
## 15                    Kingsway South             15       2.60
## 16                Stonegate-Queensway            16       7.90
## 17                             Mimico            17       6.90
## 18                       New Toronto             18       3.50
## 19                       Long Branch             19       2.30
## 20                         Alderwood             20       5.00
## 21                      Humber Summit            21       7.90
## 22                         Humbermede            22       4.40
## 23               Pelmo Park-Humberlea            23       4.20
## 24                         Black Creek           24       3.40
## 25             Glenfield-Jane Heights            25       5.20
## 26               Downsview-Roding-CFB            26      14.90
## 27             York University Heights           27      13.20
## 28                               Rustic          28       2.10
## 29                          Maple Leaf           29       2.50
## 30                 Brookhaven-Amesbury          30       3.50
## 31                  Yorkdale-Glen Park          31       5.90
## 32                 Englemount-Lawrence          32       3.60
## 33                        Clanton Park          33       4.20
## 34                     Bathurst Manor           34       4.80
## 35                 Westminster-Branson          35       3.70
## 36                    Newtonbrook West          36       4.70
## 37                     Willowdale West          37       2.90
## 38                    Lansing-Westgate          38       5.40
## 39                Bedford Park-Nortown          39       5.50
## 40                St.Andrew-Windfields          40       7.30
## 41  Bridle Path-Sunnybrook-York Mills           41       8.80
## 42                   Banbury-Don Mills          42      10.00
## 43                    Victoria Village          43       4.70
## 44                     Flemingdon Park          44       2.50
## 45                   Parkwoods-Donalda          45       7.50
## 46                       Pleasant View          46       3.00
## 47                  Don Valley Village          47       4.10
## 48                   Hillcrest Village          48       5.30
## 49               Bayview Woods-Steeles          49       4.10
## 50                    Newtonbrook East          50       4.10
## 51                     Willowdale East          51       5.00
## 52                     Bayview Village          52       5.20
## 53                           Henry Farm         53       2.60
## 54                  O'Connor-Parkview           54       4.90
## 55                   Thorncliffe Park          55       3.10
## 56                  Leaside-Bennington         56       4.80
## 57                     Broadview North          57       1.70
## 58                       Old East York          58       2.30
## 59                  Danforth-East York          59       2.20
## 60                    Woodbine-Lumsden          60       1.20
## 61                       Taylor-Massey          61       1.10
## 62                   East End-Danforth          62       2.60
## 63                         The Beaches          63       3.60
## 64                   Woodbine Corridor          64       1.60
## 65                   Greenwood-Coxwell          65       1.70
## 66                             Danforth         66       1.10
```

```
## 67           Playter Estates-Danforth              67       0.90
## 68                     North Riverdale              68       1.80
## 69                         Blake-Jones              69       0.90
## 70                     South Riverdale              70       9.60
## 71    Cabbagetown-South St.James Town               71       1.40
## 72                         Regent Park              72       0.60
## 73                           Moss Park              73       1.40
## 74                 North St.James Town              74       0.40
## 75               Church-Yonge Corridor              75       1.40
## 76                 Bay Street Corridor              76       1.80
## 77  Waterfront Communities-The Island               77       7.60
## 78                 Kensington-Chinatown             78       1.50
## 79                           University             79       1.40
## 80             Palmerston-Little Italy              80       1.40
## 81                   Trinity-Bellwoods              81       1.70
## 82                             Niagara              82       3.10
## 83                     Dufferin Grove               83       1.40
## 84                     Little Portugal              84       1.20
## 85                     South Parkdale               85       2.30
## 86                       Roncesvalles               86       1.50
## 87                   High Park-Swansea              87       5.30
## 88                     High Park North              88       1.90
## 89       Runnymede-Bloor West Village               89       1.60
## 90                       Junction Area              90       2.60
## 91                  Weston-Pellam Park              91       1.50
## 92              Corso Italia-Davenport              92       1.90
## 93  Dovercourt-Wallace Emerson-Juncti               93       3.70
## 94                             Wychwood             94       1.70
## 95                                Annex             95       2.80
## 96                           Casa Loma              96       1.90
## 97                       Yonge-St.Clair             97       1.20
## 98                  Rosedale-Moore Park             98       4.60
## 99                  Mount Pleasant East             99       3.10
## 100                      Yonge-Eglinton            100       1.60
## 101                   Forest Hill South            101       2.50
## 102                   Forest Hill North            102       1.60
## 103                 Lawrence Park South            103       3.20
## 104                 Mount Pleasant West            104       1.30
## 105                 Lawrence Park North            105       2.30
## 106                  Humewood-Cedarvale            106       1.90
## 107                     Oakwood Village            107       2.20
## 108                Briar Hill-Belgravia            108       1.80
## 109                  Caledonia-Fairbank            109       1.50
## 110           Keelesdale-Eglinton West             110       1.70
## 111                  Rockcliffe-Smythe             111       5.10
## 112            Beechborough-Greenbrook             112       1.80
## 113                             Weston             113       2.60
## 114                 Lambton Baby Point             114       1.70
## 115                       Mount Dennis             115       2.10
## 116                             Steeles            116       4.60
## 117                          L'Amoreaux            117       7.10
## 118             Tam O'Shanter-Sullivan              118       5.50
## 119                   Wexford/Maryvale              119      10.20
## 120                Clairlea-Birchmount              120       7.40
```

```
## 121                          Oakridge              121       1.80
## 122              Birchcliffe-Cliffside              122       6.00
## 123                         Cliffcrest              123       7.10
## 124                       Kennedy Park              124       3.60
## 125                            Ionview              125       2.00
## 126                       Dorset Park              126       6.00
## 127                            Bendale              127       7.40
## 128      Agincourt South-Malvern West              128       7.90
## 129                    Agincourt North              129       7.30
## 130                           Milliken              130       9.40
## 131                              Rouge              131      37.60
## 132                            Malvern              132       8.90
## 133            Centennial Scarborough              133       5.40
## 134                     Highland Creek              134       5.10
## 135                       Morningside              135       5.60
## 136                          West Hill              136       9.60
## 137                             Woburn              137      12.20
## 138                      Eglinton East              138       3.20
## 139                Scarborough Village              139       3.10
## 140                          Guildwood              140       3.80
##     Total.Population Pop...Males Pop...Females Pop.0...4.years
## 1              34100       17095         17000            1865
## 2              32790       16015         16765            2575
## 3              10140        4920          5225             575
## 4              10485        5035          5455             495
## 5               9550        4615          4935             670
## 6              21725       10310         11415            1515
## 7              21345       10190         11145            1110
## 8              10580        4740          5840             495
## 9              14945        7075          7865             570
## 10             11200        5470          5730             405
## 11             18805        8985          9835             830
## 12             10435        4860          5585             335
## 13             10925        5100          5830             585
## 14             38070       18035         20055            1935
## 15              9175        4330          4845             465
## 16             24690       11935         12745            1395
## 17             26550       12925         13625            1275
## 18             10905        5300          5600             565
## 19              9630        4745          4890             480
## 20             11900        5765          6130             610
## 21             12530        6180          6340             720
## 22             15850        7700          8150            1125
## 23              8705        4200          4505             475
## 24             22060       10260         11795            1805
## 25             31395       14755         16635            2110
## 26             34650       16700         17965            2220
## 27             27715       13580         14125            1645
## 28              9950        4475          5480             765
## 29             10195        4935          5260             555
## 30             17785        8315          9470            1315
## 31             14685        6750          7940             640
## 32             22080        9675         12415            1675
## 33             14610        6750          7865             950
```

```
## 34   15435   7380   8050   850
## 35   25445   11700   13755   1245
## 36   23050   10890   12165   1045
## 37   15005   7085   7920   670
## 38   14640   6950   7695   845
## 39   23185   10720   12470   1465
## 40   17955   8610   9345   690
## 41   8715   4180   4530   285
## 42   26910   12485   14430   1180
## 43   17180   7960   9230   1030
## 44   22165   10615   11555   1555
## 45   34620   16380   18230   2040
## 46   16145   7775   8360   740
## 47   26735   12670   14060   1505
## 48   17650   8240   9430   555
## 49   13535   6260   7275   420
## 50   16425   7805   8620   585
## 51   45025   21365   23690   2010
## 52   17675   8245   9420   665
## 53   11340   5405   5935   780
## 54   18315   8705   9610   1080
## 55   19225   9275   9965   2050
## 56   17010   8170   8855   980
## 57   11565   5440   6120   665
## 58   9115   4435   4690   460
## 59   16710   7985   8725   1085
## 60   7825   3745   4080   420
## 61   15595   7665   7920   1195
## 62   20840   9985   10865   1320
## 63   21135   10040   11100   1265
## 64   11705   5640   6070   890
## 65   14075   6885   7195   975
## 66   9450   4605   4845   635
## 67   7655   3760   3890   355
## 68   12195   5965   6220   670
## 69   7765   3815   3945   520
## 70   25640   12885   12775   1510
## 71   12050   6670   5385   355
## 72   10010   5370   4635   620
## 73   16310   9460   6850   590
## 74   17825   9260   8575   920
## 75   28345   15685   12660   590
## 76   19345   9315   10030   795
## 77   43365   21735   21630   1290
## 78   18500   9125   9365   570
## 79   7790   3810   3985   185
## 80   13735   6830   6920   475
## 81   16805   8310   8485   705
## 82   21000   10320   10685   725
## 83   11450   5685   5760   510
## 84   12055   5910   6150   450
## 85   21245   10810   10435   980
## 86   15050   7430   7620   970
## 87   21750   10030   11720   1235
```

```
## 88             21300       10100         11190            1100
## 89              9635        4565          5065             735
## 90             14015        6820          7210             775
## 91             12015        6015          5990             660
## 92             13735        6710          7035             705
## 93             34635       17225         17415            1670
## 94             13985        6460          7525             730
## 95             29180       13745         15415             865
## 96             10485        4885          5600             375
## 97             11655        5235          6420             395
## 98             20635        9410         11220             690
## 99             15980        7415          8565            1110
## 100            10580        5045          5530             620
## 101            10925        4980          5950             365
## 102            12475        5585          6895             695
## 103            15075        7170          7895             780
## 104            28590       12895         15700             855
## 105            14540        6915          7625            1205
## 106            14110        6440          7670             785
## 107            21075       10005         11070            1125
## 108            14295        6590          7720             695
## 109             9855        4825          5025             555
## 110            10640        5225          5410             555
## 111            22270       10750         11520            1290
## 112             6490        2990          3500             455
## 113            18170        8545          9625            1270
## 114             7920        3695          4220             585
## 115            13150        6210          6935             805
## 116            25010       12010         13010             950
## 117            44915       21085         23840            2230
## 118            27390       12840         14555            1460
## 119            27020       13015         14005            1430
## 120            24775       12095         12670            1520
## 121            13505        6590          6915            1055
## 122            21860       10455         11390            1060
## 123            15700        7645          8060             775
## 124            17050        8190          8875             975
## 125            13095        6205          6885             795
## 126            24360       11520         12840            1690
## 127            27870       13455         14405            1525
## 128            21990       10630         11350            1080
## 129            30280       14445         15845            1320
## 130            27160       13055         14115            1265
## 131            45905       22275         23635            2670
## 132            45085       21560         23530            2925
## 133            13100        6355          6740             625
## 134            13100        6435          6660             445
## 135            17585        8445          9140            1080
## 136            26550       12560         14000            1575
## 137            53350       26005         27330            3485
## 138            22830       10580         12240            1555
## 139            16615        7825          8790            1200
## 140             9815        4550          5270             370
##     Pop.5...9.years Pop.10...14.years Pop.15..19.years Pop.20...24.years
```

## 1	1950	2155	2550	2855
## 2	2535	2555	2620	2400
## 3	580	670	675	675
## 4	520	570	665	650
## 5	720	720	725	655
## 6	1470	1480	1460	1435
## 7	1070	1195	1320	1355
## 8	495	485	615	530
## 9	755	855	900	960
## 10	610	735	950	800
## 11	845	1085	1370	1180
## 12	475	545	590	575
## 13	565	630	720	705
## 14	1590	1640	2015	2315
## 15	630	635	530	485
## 16	1235	1265	1295	1190
## 17	875	820	975	1360
## 18	460	455	615	775
## 19	420	425	480	650
## 20	495	555	650	685
## 21	730	855	880	860
## 22	1030	1005	1100	1160
## 23	470	530	620	515
## 24	1720	1585	1675	1705
## 25	2135	2290	2445	2105
## 26	1905	1915	2050	2185
## 27	1385	1380	1750	3280
## 28	730	750	670	635
## 29	495	565	560	580
## 30	1110	1130	1230	1215
## 31	690	815	835	845
## 32	1530	1550	1500	1320
## 33	760	870	880	835
## 34	710	750	885	925
## 35	1080	1210	1500	1685
## 36	820	990	1255	1775
## 37	505	495	565	1140
## 38	725	745	795	965
## 39	1620	1630	1695	1240
## 40	880	1155	1480	1290
## 41	480	645	765	595
## 42	1205	1325	1440	1280
## 43	835	870	920	980
## 44	1420	1480	1465	1620
## 45	1920	2140	2350	2360
## 46	705	825	950	1060
## 47	1365	1290	1580	1795
## 48	690	855	1175	1305
## 49	545	675	945	945
## 50	525	635	830	1360
## 51	1475	1520	2375	4095
## 52	620	765	955	1190
## 53	745	660	660	835
## 54	1050	1055	1165	1145

```
## 55    1675 1340 1120 1085
## 56    1250 1185 1150  880
## 57     490  430  495  640
## 58     470  435  440  475
## 59     795  720  750  795
## 60     345  310  360  405
## 61    1000  835  760 1000
## 62    1145 1070 1135 1095
## 63    1275 1145 1045 1080
## 64     595  550  525  590
## 65     595  590  655  835
## 66     505  400  445  565
## 67     420  365  355  375
## 68     630  595  610  610
## 69     400  440  440  505
## 70     980  945 1165 1560
## 71     240  275  335  755
## 72     660  755  770  850
## 73     370  330  480 1270
## 74     745  645  680 1720
## 75     270  245  835 3650
## 76     345  235  665 3075
## 77     560  560  815 3870
## 78     435  515  960 2680
## 79     165  125  320 1370
## 80     390  360  390 1370
## 81     525  495  545 1370
## 82     350  285  365 1400
## 83     415  370  410  845
## 84     405  375  425  805
## 85     785  800  910 1500
## 86     815  700  555  780
## 87    1100  935  870 1030
## 88     805  750  785 1330
## 89     600  490  495  470
## 90     625  615  785  900
## 91     655  715  825  815
## 92     620  625  840  950
## 93    1345 1430 1720 2635
## 94     610  540  650  870
## 95     695  635  870 3045
## 96     375  405  405  655
## 97     345  235  285  645
## 98     875  925 1065 1195
## 99     910  775  690  785
## 100    530  400  445  675
## 101    425  530  760  820
## 102    690  625  745  780
## 103   1045 1070 1170 1020
## 104    550  585  730 1965
## 105   1170  965  840  660
## 106    670  600  635 1095
## 107    985 1030 1080 1275
## 108    605  715  770  890
```

```
## 109             480             550             645             655
## 110             520             610             690             695
## 111            1230            1305            1455            1470
## 112             390             395             415             455
## 113             985             940            1100            1270
## 114             535             505             475             405
## 115             805             835             930             950
## 116             940            1120            1565            1925
## 117            2100            2375            3070            3125
## 118            1380            1370            1560            1765
## 119            1320            1530            1740            1710
## 120            1305            1420            1585            1575
## 121             930             885             850             810
## 122            1045            1110            1370            1200
## 123             840            1035            1125             985
## 124             925            1030            1140            1070
## 125             710             680             770             930
## 126            1460            1340            1505            1500
## 127            1460            1425            1655            2085
## 128             930            1150            1480            1630
## 129            1345            1560            2000            2165
## 130            1200            1330            1715            2020
## 131            2705            3150            3465            3475
## 132            3045            3250            3475            3485
## 133             680             840             975             940
## 134             585             710             930            1130
## 135             995            1045            1375            1460
## 136            1550            1820            2055            1870
## 137            3415            3400            3575            4005
## 138            1500            1500            1545            1535
## 139            1140            1150            1240            1220
## 140             440             485             565             510
##     Pop..25...29.years Pop.30...34.years Pop.35...39.years
## 1                 2755               2360               2175
## 2                 2335               2355               2530
## 3                  675                600                640
## 4                  645                600                645
## 5                  570                595                600
## 6                 1385               1285               1415
## 7                 1235               1105               1190
## 8                  520                560                585
## 9                  915                745                825
## 10                 430                370                460
## 11                 940                855                920
## 12                 490                385                455
## 13                 650                625                700
## 14                2935               3085               2835
## 15                 305                340                505
## 16                1270               1575               1865
## 17                2095               2565               2355
## 18                 755                810                860
## 19                 630                660                725
## 20                 680                835                780
## 21                 775                780                830
```

```
## 22          1120          1145          1100
## 23           480           495           570
## 24          1630          1405          1395
## 25          2050          1865          1905
## 26          2490          2655          2380
## 27          2815          2120          1800
## 28           630           575           600
## 29           640           665           670
## 30          1360          1255          1140
## 31           890           895           860
## 32          1315          1470          1450
## 33           890          1115          1150
## 34          1000          1120          1030
## 35          1765          1715          1720
## 36          1890          1660          1630
## 37          1345          1310          1080
## 38          1185          1290          1170
## 39           965          1180          1485
## 40           965           775           940
## 41           315           270           335
## 42          1420          1500          1705
## 43          1170          1210          1175
## 44          1675          1615          1595
## 45          2255          2325          2440
## 46          1090           855          1080
## 47          1805          1935          2200
## 48           955           745           950
## 49           760           490           625
## 50          1525          1250          1040
## 51          5120          4715          3705
## 52          1675          1415          1345
## 53           995          1010          1025
## 54          1080          1160          1175
## 55          1505          1600          1680
## 56           560           670          1075
## 57           920          1025          1050
## 58           500           600           660
## 59           955          1495          1500
## 60           470           640           645
## 61          1245          1295          1435
## 62          1330          1580          1875
## 63          1120          1460          1745
## 64           675           995          1230
## 65           980          1295          1420
## 66           640           780           825
## 67           600           630           590
## 68           795           905          1045
## 69           575           640           660
## 70          2085          2560          2650
## 71          1115          1130           985
## 72           845           830           775
## 73          1990          1975          1645
## 74          2295          1990          1530
## 75          5000          3795          2525
```

```
## 76          3695          2760          1535
## 77          9410          7865          4775
## 78          2610          1770          1250
## 79          1200           745           510
## 80          2275          1640          1135
## 81          2240          1835          1440
## 82          4120          4505          2800
## 83          1475          1335          1025
## 84          1485          1370          1105
## 85          2395          2400          2075
## 86          1290          1540          1515
## 87          1655          1895          1880
## 88          2380          2250          1975
## 89           470           730           910
## 90          1275          1390          1285
## 91           965           955           915
## 92          1155          1185          1015
## 93          3770          3495          3080
## 94          1010          1085           995
## 95          4190          2995          2085
## 96          1070           820           665
## 97          1355          1125           900
## 98          1405          1150          1125
## 99          1040          1250          1405
## 100         1080          1055           885
## 101          810           665           585
## 102          855           915           975
## 103          790           715           915
## 104         4755          4125          2765
## 105          525           820          1265
## 106         1435          1315          1195
## 107         1500          1630          1680
## 108         1075          1180          1115
## 109          765           785           680
## 110          725           760           720
## 111         1515          1500          1435
## 112          535           495           425
## 113         1420          1405          1255
## 114          435           505           590
## 115         1020           915           855
## 116         1905          1280          1350
## 117         3075          2380          2790
## 118         1665          1605          1850
## 119         1620          1570          1665
## 120         1730          1830          1780
## 121          955          1035          1010
## 122         1115          1180          1415
## 123          790           695           905
## 124         1095          1070          1140
## 125          975           950           890
## 126         1700          1740          1790
## 127         2030          1840          1905
## 128         1500          1275          1360
## 129         2145          1685          1715
```

```
## 130               2055              1500              1700
## 131               3265              2865              2810
## 132               3385              2930              3005
## 133                650               585               730
## 134               1020               710               585
## 135               1250              1035               990
## 136               1600              1460              1525
## 137               3825              3835              3805
## 138               1450              1485              1515
## 139               1035              1040              1045
## 140                395               395               515
##     Pop.40...44.years Pop.45...49.years Pop.50...54.years
## 1                2445              2545              2360
## 2                2500              2370              2050
## 3                 745               780               690
## 4                 745               825               865
## 5                 750               720               710
## 6                1490              1630              1430
## 7                1460              1570              1635
## 8                 670               800               750
## 9                1045              1225              1250
## 10                770              1045              1070
## 11               1355              1635              1660
## 12                700               860               910
## 13                795               920               870
## 14               2745              3020              2815
## 15                745               795               725
## 16               1990              2190              2120
## 17               2065              2345              2240
## 18                855               965               895
## 19                760               940               875
## 20                890              1055              1070
## 21                865               970               715
## 22               1190              1205              1080
## 23                665               750               700
## 24               1570              1540              1430
## 25               2185              2285              2175
## 26               2585              2795              2560
## 27               1820              1940              1750
## 28                670               695               605
## 29                800               805               725
## 30               1300              1420              1350
## 31               1050              1085              1030
## 32               1380              1370              1365
## 33               1155              1220              1055
## 34               1170              1220              1190
## 35               1800              1855              1970
## 36               1665              1965              1910
## 37               1010               980              1045
## 38               1175              1150              1035
## 39               1730              1890              1805
## 40               1425              1650              1475
## 41                565               810               765
## 42               2275              2305              1970
```

```
## 43   1310   1360   1220
## 44   1630   1705   1500
## 45   2650   2935   2615
## 46   1385   1365   1200
## 47   2295   2155   1790
## 48   1385   1475   1260
## 49    910   1075   1015
## 50   1085   1195   1240
## 51   3410   3400   3190
## 52   1335   1310   1240
## 53    920    865    710
## 54   1475   1595   1580
## 55   1540   1190    990
## 56   1525   1535   1465
## 57   1050    995    830
## 58    745    905    760
## 59   1440   1425   1245
## 60    670    735    700
## 61   1350   1235   1085
## 62   1875   1930   1695
## 63   1990   1990   1740
## 64   1125   1150    935
## 65   1200   1200   1125
## 66    725    740    705
## 67    680    640    600
## 68   1040   1235   1065
## 69    650    655    635
## 70   2365   2310   1940
## 71   1015   1250   1035
## 72    870    865    720
## 73   1475   1465   1340
## 74   1500   1495   1240
## 75   2175   2105   1830
## 76   1055    995    850
## 77   2940   2375   2185
## 78   1145   1230   1135
## 79    425    445    375
## 80   1045    815    735
## 81   1310   1305    985
## 82   1725   1275    980
## 83    920    775    785
## 84    935    840    750
## 85   1760   1545   1580
## 86   1460   1250   1055
## 87   1865   1705   1575
## 88   1755   1595   1475
## 89    875    845    755
## 90   1200   1195   1100
## 91    925   1020    935
## 92   1015   1135   1060
## 93   2650   2675   2425
## 94   1100   1000    875
## 95   1900   1860   1715
## 96    700    745    680
```

```
## 97                860                755                715
## 98               1420               1560               1605
## 99               1430               1355               1135
## 100               850                740                625
## 101               645                780                820
## 102              1020                960                950
## 103              1145               1280               1255
## 104              2125               1940               1640
## 105              1425               1245               1095
## 106              1105               1055                970
## 107              1700               1620               1525
## 108              1175               1290               1190
## 109               725                840                790
## 110               805                905                850
## 111              1555               1785               1680
## 112               480                535                470
## 113              1330               1440               1375
## 114               690                660                630
## 115               930               1150               1045
## 116              1905               2070               1895
## 117              3320               3870               3310
## 118              1965               2230               1925
## 119              1940               2340               2235
## 120              1955               2220               1925
## 121              1125               1060               1035
## 122              1615               2105               2085
## 123              1175               1410               1410
## 124              1325               1530               1370
## 125              1010               1130               1010
## 126              1755               2000               1935
## 127              1920               2080               1915
## 128              1605               1950               1770
## 129              2125               2655               2360
## 130              1820               2205               2130
## 131              3170               3705               3670
## 132              3100               3540               3095
## 133               910               1125               1155
## 134               715               1015               1085
## 135              1160               1345               1355
## 136              1935               2145               2090
## 137              3830               3945               3580
## 138              1675               1745               1635
## 139              1205               1280               1155
## 140               650                710                855
##     Pop.55...59.years Pop.60...64.years Pop.65...69.years
## 1                1975               1780               1345
## 2                1610               1360               1055
## 3                 565                515                420
## 4                 710                630                455
## 5                 545                475                350
## 6                1220               1095                845
## 7                1355               1220                925
## 8                 655                595                460
## 9                1140                955                720
```

```
## 10   925  710  505
## 11  1360 1155  885
## 12   830  700  590
## 13   700  570  370
## 14  2535 2055 1525
## 15   695  615  450
## 16  1790 1515  940
## 17  1965 1700 1290
## 18   780  625  420
## 19   730  630  390
## 20   885  715  500
## 21   630  620  580
## 22   825  760  520
## 23   540  420  345
## 24  1095  920  760
## 25  1640 1490 1220
## 26  2020 1630 1285
## 27  1335 1150  870
## 28   470  410  395
## 29   550  500  445
## 30  1000  770  545
## 31   850  765  610
## 32  1160  955  715
## 33   860  770  480
## 34   925  840  565
## 35  1625 1580  950
## 36  1450 1320  910
## 37  1030  860  675
## 38   855  750  515
## 39  1570 1310  930
## 40  1335 1180  885
## 41   715  645  470
## 42  1635 1610 1280
## 43  1030  915  720
## 44  1160 1055  820
## 45  2040 1680 1320
## 46  1030  985  825
## 47  1500 1410 1130
## 48  1250 1235  975
## 49   920 1000  745
## 50  1105 1060  725
## 51  2745 2210 1490
## 52  1135 1050  765
## 53   580  465  330
## 54  1260  980  710
## 55   800  705  520
## 56  1115  925  725
## 57   730  690  455
## 58   670  600  360
## 59  1140  990  650
## 60   590  470  305
## 61   900  635  415
## 62  1405 1195  720
## 63  1615 1325  900
```

```
## 64   795  590  345
## 65   980  660  460
## 66   600  510  410
## 67   525  470  320
## 68   820  730  480
## 69   435  380  250
## 70  1505 1280  790
## 71   870  855  615
## 72   520  370  210
## 73  1135  860  570
## 74   895  770  445
## 75  1495 1230  905
## 76   785  750  530
## 77  1845 1610 1185
## 78   865  755  525
## 79   365  365  275
## 80   660  595  525
## 81   850  770  580
## 82   805  620  420
## 83   615  560  425
## 84   615  610  475
## 85  1215 1075  715
## 86   825  670  465
## 87  1370 1235  885
## 88  1365 1155  735
## 89   630  535  310
## 90   890  670  430
## 91   765  610  380
## 92   865  640  480
## 93  1920 1595 1235
## 94   860  755  580
## 95  1680 1805 1385
## 96   765  830  615
## 97   760  820  755
## 98  1565 1555 1370
## 99  1040  955  700
## 100  735  655  470
## 101  820  755  580
## 102  805  765  470
## 103 1130  925  660
## 104 1410 1305 1015
## 105  855  795  530
## 106  875  765  525
## 107 1315 1155  945
## 108  925  790  470
## 109  630  510  370
## 110  645  590  450
## 111 1420 1220  975
## 112  365  305  225
## 113 1220  925  640
## 114  565  435  265
## 115  800  615  460
## 116 1820 1745 1195
## 117 2950 2610 1955
```

```
## 118              1655              1435              1235
## 119              1830              1465              1060
## 120              1550              1220               775
## 121               725               555               435
## 122              1745              1510               960
## 123              1130              1020               650
## 124              1220               900               645
## 125               830               685               500
## 126              1525              1190               820
## 127              1645              1505              1135
## 128              1500              1325               905
## 129              2105              2000              1430
## 130              2065              1855              1145
## 131              3355              2790              1795
## 132              2750              2535              1765
## 133              1010               940               760
## 134              1125              1050               740
## 135              1175              1000               670
## 136              1800              1515              1105
## 137              2905              2355              1950
## 138              1395              1130               850
## 139              1080               795               525
## 140               780               650               560
##     Pop.70...74.years Pop.75...79.years Pop.80...84.years
## 1                1070               895               585
## 2                 775               605               340
## 3                 370               405               290
## 4                 415               385               360
## 5                 265               235               145
## 6                 780               750               605
## 7                 910              1025               895
## 8                 505               555               570
## 9                 590               565               485
## 10                395               370               335
## 11                840               840               615
## 12                510               555               495
## 13                370               380               365
## 14               1310              1235              1200
## 15                355               345               265
## 16                830               755               635
## 17                970               690               550
## 18                360               300               170
## 19                285               195               190
## 20                395               405               355
## 21                635               575               330
## 22                525               440               305
## 23                435               325               220
## 24                665               515               340
## 25               1190              1110               765
## 26               1255              1195               890
## 27                890               825               545
## 28                395               445               300
## 29                490               505               370
## 30                515               450               370
```

```
## 31   690   755   690
## 32   655   665   715
## 33   450   400   390
## 34   505   540   560
## 35  1075   895   865
## 36   840   765   595
## 37   640   600   545
## 38   405   360   330
## 39   750   685   625
## 40   660   450   415
## 41   340   265   235
## 42  1225  1140  1215
## 43   720   655   535
## 44   695   555   370
## 45  1125  1015   845
## 46   785   610   400
## 47  1020   850   610
## 48   920   825   615
## 49   745   605   490
## 50   650   555   530
## 51  1195   890   740
## 52   680   530   490
## 53   275   230   150
## 54   565   465   400
## 55   455   380   280
## 56   465   400   385
## 57   375   305   250
## 58   330   290   210
## 59   550   475   405
## 60   285   205   170
## 61   375   315   260
## 62   495   375   315
## 63   505   390   270
## 64   235   210   170
## 65   400   310   240
## 66   325   270   190
## 67   220   175   140
## 68   370   265   185
## 69   205   135   145
## 70   620   575   445
## 71   445   305   265
## 72   140   110    65
## 73   355   215   130
## 74   330   270   175
## 75   650   465   345
## 76   460   320   285
## 77   810   595   380
## 78   560   605   450
## 79   230   240   180
## 80   460   385   300
## 81   590   565   390
## 82   255   205   105
## 83   350   290   180
## 84   470   405   290
```

```
## 85   535  400  290
## 86   395  325  235
## 87   655  560  565
## 88   505  450  385
## 89   215  190  190
## 90   305  230  195
## 91   275  260  200
## 92   470  405  345
## 93  1070  870  610
## 94   510  535  500
## 95  1100  840  685
## 96   455  330  305
## 97   525  445  365
## 98   980  825  710
## 99   490  375  265
## 100  255  240  160
## 101  445  365  355
## 102  350  285  245
## 103  385  285  280
## 104  840  615  545
## 105  355  285  260
## 106  380  260  235
## 107  820  705  510
## 108  465  370  320
## 109  320  225  185
## 110  365  340  250
## 111  805  700  530
## 112  185  155  115
## 113  520  400  350
## 114  205  155  125
## 115  365  225  200
## 116 1050  895  715
## 117 1865 1640 1270
## 118 1220 1190  945
## 119  990  860  900
## 120  650  605  540
## 121  340  250  205
## 122  705  575  530
## 123  485  525  395
## 124  540  475  365
## 125  420  330  265
## 126  655  655  540
## 127 1085 1070  850
## 128  850  705  565
## 129 1245 1025  745
## 130  960  850  695
## 131 1155  800  570
## 132 1160  825  490
## 133  560  305  170
## 134  490  345  180
## 135  600  470  335
## 136  900  670  485
## 137 1800 1690 1185
## 138  740  615  535
```

```
## 139               430               360               335
## 140               500               570               470
##     Pop.85.years.and.over Seniors.55.and.over Seniors.65.and.over
## 1                     410                8095                4330
## 2                     170                5935                2955
## 3                     260                2825                1740
## 4                     300                3245                1905
## 5                     100                2110                1100
## 6                     440                5725                3405
## 7                     760                7060                4505
## 8                     750                4090                2850
## 9                     450                4870                2770
## 10                    320                3560                1930
## 11                    465                6165                3650
## 12                    420                4110                2575
## 13                    435                3170                1900
## 14                   1260               11135                6555
## 15                    305                3010                1695
## 16                    825                7295                3985
## 17                    415                7590                3935
## 18                    235                2910                1485
## 19                    155                2565                1205
## 20                    325                3600                1990
## 21                    145                3545                2270
## 22                    215                3590                2000
## 23                    160                2465                1505
## 24                    280                4580                2570
## 25                    435                7840                4735
## 26                    615                8910                5240
## 27                    395                6010                3545
## 28                    220                2630                1760
## 29                    265                3100                2055
## 30                    305                3950                2195
## 31                    700                5070                3450
## 32                   1305                6170                4050
## 33                    400                3730                2100
## 34                    655                4570                2805
## 35                    925                7905                4710
## 36                    595                6455                3700
## 37                    505                4860                2970
## 38                    360                3565                1960
## 39                    625                6535                3650
## 40                    270                5200                2690
## 41                    200                2870                1515
## 42                   1235                9340                6095
## 43                    530                5135                3195
## 44                    245                4945                2710
## 45                    580                8605                4880
## 46                    235                4875                2875
## 47                    530                7025                4125
## 48                    495                6310                3830
## 49                    615                5135                3230
## 50                    565                5160                3015
## 51                    715                9995                5030
```

```
## 52   525  5170  2995
## 53   110  2155  1105
## 54   375  4780  2535
## 55   325  3485  1985
## 56   690  4700  2665
## 57   180  2970  1545
## 58   215  2680  1410
## 59   290  4480  2355
## 60    90  2130  1065
## 61   235  3140  1615
## 62   295  4815  2215
## 63   245  5255  2320
## 64    85  2405  1030
## 65   185  3210  1585
## 66   175  2465  1355
## 67   200  2045  1065
## 68   160  2995  1455
## 69    80  1615   790
## 70   350  5590  2810
## 71   200  3550  1815
## 72    40  1460   565
## 73   115  3395  1395
## 74   190  3060  1385
## 75   205  5325  2580
## 76   210  3375  1840
## 77   275  6670  3215
## 78   445  4175  2570
## 79   300  1920  1185
## 80   210  3140  1890
## 81   275  4030  2400
## 82    50  2455  1025
## 83   155  2550  1380
## 84   240  3140  1910
## 85   285  4495  2195
## 86   200  3105  1610
## 87   730  6000  3380
## 88   470  5085  2565
## 89   165  2250  1085
## 90   160  2880  1320
## 91   135  2630  1250
## 92   210  3425  1925
## 93   445  7750  4250
## 94   770  4525  2915
## 95   795  8305  4805
## 96   275  3595  1995
## 97   395  4075  2505
## 98   640  7640  4525
## 99   275  4110  2105
## 100  165  2670  1285
## 101  405  3730  2155
## 102  340  3270  1700
## 103  185  3825  1780
## 104  815  6540  3825
## 105  270  3330  1690
```

```
## 106                205                3230                1590
## 107                450                5925                3440
## 108                245                3580                1870
## 109                140                2385                1240
## 110                150                2810                1570
## 111                385                6070                3425
## 112                 95                1435                 765
## 113                325                4370                2235
## 114                160                1900                 900
## 115                235                2940                1515
## 116                690                8105                4545
## 117               1015               13275                7725
## 118                970                8595                5520
## 119                790                7930                4615
## 120                580                5890                3125
## 121                265                2760                1480
## 122                535                6560                3315
## 123                355                4575                2430
## 124                255                4405                2300
## 125                175                3195                1680
## 126                555                5960                3245
## 127                710                8015                4855
## 128                410                6255                3435
## 129                650                9225                5120
## 130                700                8255                4325
## 131                535               10970                4825
## 132                315                9825                4545
## 133                120                3875                1930
## 134                245                4155                1985
## 135                260                4475                2310
## 136                445                6925                3615
## 137                820               12655                7425
## 138                420                5695                3150
## 139                360                3885                2000
## 140                420                3920                2490
##     Child.0.14 Youth.15.24 Home.Language.Category Language...Chinese
## 1         5960        5400                  32215                475
## 2         7665        5015                  31140                275
## 3         1815        1350                   9455                 95
## 4         1590        1315                   9855                 95
## 5         2110        1380                   9190                 90
## 6         4470        2925                  20845                315
## 7         3415        2660                  20655                390
## 8         1470        1145                   9725                 70
## 9         2180        1860                  14620                225
## 10        1745        1750                  10965                325
## 11        2755        2545                  18310                575
## 12        1355        1170                  10145                225
## 13        1775        1415                  10170                275
## 14        5165        4315                  36420               1060
## 15        1720        1015                   9065                100
## 16        3895        2465                  23980                330
## 17        2970        2345                  25665                755
## 18        1495        1385                  10455                155
```

```
## 19        1315        1145         9330         110
## 20        1660        1325        11565         180
## 21        2315        1745        12045         125
## 22        3175        2265        15040         275
## 23        1475        1145         8380         170
## 24        5100        3390        20975         745
## 25        6565        4545        30080        1445
## 26        6040        4250        33265         730
## 27        4405        5040        26340        1750
## 28        2235        1300         9625         140
## 29        1640        1140         9605         100
## 30        3540        2460        16950         465
## 31        2140        1690        13685         640
## 32        4765        2820        20580         285
## 33        2575        1725        13985         250
## 34        2315        1805        14755         340
## 35        3525        3165        24250         480
## 36        2850        3045        21890        1660
## 37        1665        1700        14535        2020
## 38        2300        1755        14285         995
## 39        4705        2930        22655         430
## 40        2745        2780        17485        2605
## 41        1425        1360         8505         615
## 42        3685        2705        25780        3355
## 43        2735        1910        16140         605
## 44        4455        3085        20915        1235
## 45        6110        4720        33350        2255
## 46        2275        2010        15555        5040
## 47        4165        3370        25480        6655
## 48        2090        2475        17195        7580
## 49        1650        1880        12870        3695
## 50        1730        2195        15545        3950
## 51        4995        6495        43655       12225
## 52        2040        2130        17075        3800
## 53        2180        1485        10705        1655
## 54        3190        2325        17775         435
## 55        5070        2220        18150         215
## 56        3420        2025        16460         340
## 57        1590        1135        11080         415
## 58        1365         910         8795         345
## 59        2610        1545        16195        1095
## 60        1060         770         7600         580
## 61        3040        1765        14800         580
## 62        3525        2235        20075         940
## 63        3695        2120        20820         245
## 64        2055        1120        11410         615
## 65        2160        1480        13660        1910
## 66        1555        1010         9165         625
## 67        1135         725         7345         205
## 68        1885        1200        11820        1180
## 69        1370         950         7495         830
## 70        3455        2710        24595        5850
## 71         880        1085        11345         530
## 72        2025        1615         8955        1130
```

```
## 73    1275    1750   14645    750
## 74    2315    2400   16865   1035
## 75    1120    4475   27115   2145
## 76    1370    3745   18720   3220
## 77    2405    4695   41720   3730
## 78    1530    3645   17685   6070
## 79     490    1670    7175    925
## 80    1200    1755   13380    895
## 81    1730    1910   16080   3115
## 82    1380    1765   20125   1035
## 83    1310    1260   11115    690
## 84    1230    1245   11680    945
## 85    2565    2415   19440    505
## 86    2460    1340   14620    555
## 87    3255    1910   20850    320
## 88    2645    2120   20700    590
## 89    1825     970    9420    190
## 90    2025    1680   13355    565
## 91    2035    1645   11475    310
## 92    1965    1800   13180    295
## 93    4455    4355   33270   2255
## 94    1885    1515   12855    630
## 95    2195    3895   27380   1370
## 96    1160    1065   10255    255
## 97     985     925   11445    250
## 98    2495    2250   20250    515
## 99    2790    1445   15690    380
## 100   1545    1110   10380    280
## 101   1320    1590   10520    180
## 102   2015    1530   12155    225
## 103   2895    2210   14855    270
## 104   2000    2715   27655   1080
## 105   3320    1505   14205    355
## 106   2055    1730   13680    220
## 107   3130    2355   20205    570
## 108   2010    1665   13680    345
## 109   1600    1305    9430    110
## 110   1700    1385   10195    225
## 111   3820    2925   21500    475
## 112   1235     865    6245     45
## 113   3205    2370   17445    230
## 114   1630     880    7750     85
## 115   2455    1865   12425    295
## 116   3020    3500   23975  15735
## 117   6695    6210   43075  15065
## 118   4170    3305   26195   8220
## 119   4285    3465   25830   1255
## 120   4245    3170   23025   1800
## 121   2880    1650   12880    640
## 122   3210    2565   21080    740
## 123   2655    2105   15340    560
## 124   2940    2200   16255   1145
## 125   2190    1705   12475    800
## 126   4490    2995   22755   2410
```

```
## 127       4420        3735                26175               3585
## 128       3165        3095                21155               9370
## 129       4235        4150                28950              14710
## 130       3800        3710                26090              16265
## 131       8530        6925                43685               1455
## 132       9220        6960                42915               2885
## 133       2145        1915                12745                405
## 134       1745        2055                12505                685
## 135       3130        2845                16515                585
## 136       4950        3930                25380                575
## 137      10295        7585                50890               3560
## 138       4535        3080                21580                915
## 139       3485        2445                15860                330
## 140       1285        1075                 9495                185
##     Language...Italian Language...Korean Language...Persian..Farsi.
## 1                  925                95                        160
## 2                  750                60                        350
## 3                  705                35                        115
## 4                  475                30                         95
## 5                  510                55                        285
## 6                 1310               185                        475
## 7                 1745               320                        105
## 8                 1090                85                         45
## 9                  900               190                         40
## 10                 465               245                         70
## 11                 640               395                         60
## 12                 210               180                         25
## 13                 140               205                        135
## 14                1125              1315                        250
## 15                 220                65                         40
## 16                 755               135                         65
## 17                 675               235                        155
## 18                  75               115                         20
## 19                 105                25                         30
## 20                 590                40                         20
## 21                2220                15                        105
## 22                1270               115                         40
## 23                1505                25                         30
## 24                1050                25                         95
## 25                3475                40                        215
## 26                5040                80                        205
## 27                2280               265                        370
## 28                1510                10                         30
## 29                2295                15                         20
## 30                1210                30                         55
## 31                2950                50                         70
## 32                 545                65                        155
## 33                 775               115                         60
## 34                 870               240                        200
## 35                 110               680                        555
## 36                 645              2015                       1820
## 37                 365              1175                       1280
## 38                 165               580                        630
## 39                 410               110                        245
```

```
## 40  170  805  865
## 41  110   50  260
## 42  140  510  875
## 43  200  100  510
## 44   30  235 1360
## 45  290  535 1150
## 46  675  165  505
## 47   95  615 1885
## 48   50  440  670
## 49  175  745  795
## 50  405 1770 2045
## 51  360 4480 4940
## 52  110 1000 1525
## 53   35  200  805
## 54  255   60  280
## 55   30   75  960
## 56  150   85   95
## 57   95   50   65
## 58  185   35   35
## 59  490   60   75
## 60  125   25   20
## 61   45   90  180
## 62  205   90  100
## 63  175   45   40
## 64  120   45   25
## 65  155   35   35
## 66  525   45   20
## 67   95   30   40
## 68  130   25   10
## 69   70   20   50
## 70  120   70   80
## 71   90  105   50
## 72   30   35   45
## 73   90   90  130
## 74   50  325  265
## 75  220  495  345
## 76  155  815  495
## 77  365  615  640
## 78   65  180  125
## 79   95  175   45
## 80  815  125   40
## 81  540   30   30
## 82  215  165  160
## 83  215  180   15
## 84  170   35   30
## 85   85   80  105
## 86  115   65   20
## 87  210  130   90
## 88  195  420  165
## 89  165   40   15
## 90  175   65   25
## 91  665   15   10
## 92 1855   25   15
## 93 1260  230   70
```

```
## 94                  555                 105                          50
## 95                  520                 375                         270
## 96                  125                  35                          50
## 97                  120                  55                         120
## 98                  160                 150                         180
## 99                  125                 105                         150
## 100                 100                 145                          60
## 101                  95                  30                          65
## 102                 145                  85                          65
## 103                 155                  95                          90
## 104                 225                 610                         990
## 105                 180                 165                          90
## 106                 350                 120                          50
## 107                1810                 110                          40
## 108                1020                  65                          40
## 109                 780                  15                          10
## 110                 775                   5                          10
## 111                 700                  65                          55
## 112                 410                  15                           5
## 113                 650                  40                         170
## 114                  95                  45                          30
## 115                 210                 175                          70
## 116                 260                  90                          80
## 117                 715                 180                         675
## 118                 340                 170                         420
## 119                 565                 155                         280
## 120                 460                  60                         230
## 121                 120                  40                         335
## 122                 245                  20                          75
## 123                 200                  40                         150
## 124                 315                  35                         200
## 125                 140                  20                          65
## 126                 205                  50                         430
## 127                 300                 175                         425
## 128                 415                  70                         170
## 129                 150                  55                         140
## 130                  45                  30                          60
## 131                 255                  90                         410
## 132                 105                  70                         325
## 133                 250                  35                          95
## 134                 305                  70                          80
## 135                  80                  70                         215
## 136                 330                  60                         445
## 137                 430                 125                        1070
## 138                 255                  55                         305
## 139                 160                  35                         525
## 140                 110                  30                          70
##     Language...Portuguese Language...Russian Language...Spanish
## 1                     205                 15                1100
## 2                     115                 50                 820
## 3                     105                 15                 570
## 4                     145                 30                 700
## 5                      80                 30                 670
## 6                     305                150                 970
```

```
## 7   370  130  760
## 8   315  200  405
## 9   310  355  745
## 10  145  110  110
## 11  480  325  470
## 12  145  180  130
## 13  180  200  415
## 14  820  790  970
## 15   95   60  100
## 16  555  635  455
## 17  590  735  775
## 18  145  160  240
## 19  160  175  270
## 20  425  190  160
## 21  130   15  650
## 22  115   25 1585
## 23  410    5  605
## 24  120  105 1310
## 25  355   90 3695
## 26  835  180 3470
## 27  285  430 1475
## 28  440   20  680
## 29  480   40  680
## 30  985   45 1580
## 31  810   85  625
## 32  335  600  630
## 33  120  585  365
## 34  210 1695  475
## 35   55 7435  630
## 36   95 3260  385
## 37   75  975  235
## 38   90  770  320
## 39   90  300  335
## 40   70  290  330
## 41   30  130   65
## 42  110  305  360
## 43   85   90  350
## 44   60  325  550
## 45  140  490 1095
## 46  115  125  190
## 47   65  585  620
## 48   35  200  210
## 49   55  255  155
## 50   70  335  150
## 51  220 1290  755
## 52  105  265  295
## 53   35  210  220
## 54  100  110  295
## 55   45  105  385
## 56   70   80  160
## 57   60  120  250
## 58   50   35   90
## 59  120   90  215
## 60   55   35  105
```

```
## 61    60  110  185
## 62   135   75  270
## 63    75   85  180
## 64    75   35  135
## 65    70   20  210
## 66    70   25  100
## 67    35   40  140
## 68    45   55  140
## 69    55   20   85
## 70   250   70  270
## 71    85  160  305
## 72    65   35  190
## 73   105  185  320
## 74   135  305  550
## 75   235  540  815
## 76   165  265  390
## 77   350  645 1010
## 78   340   95  325
## 79   330   60  160
## 80  1195   55  375
## 81  2885   30  190
## 82   725  195  565
## 83  1955   70  550
## 84  3085   45  260
## 85   300  165  535
## 86   505   90  200
## 87   210  385  355
## 88   325  930  605
## 89   115   50  140
## 90   780  105  500
## 91  2770   25  860
## 92  3035   20 1040
## 93  6535  160 1395
## 94   795   85  540
## 95   355  315  555
## 96    70  140  220
## 97    55  180  230
## 98    80  185  310
## 99    75  180  215
## 100   45   85  235
## 101   40  120  155
## 102   85  485  475
## 103   35  110  170
## 104  260  740  900
## 105   60  135  140
## 106  255  140  605
## 107 1970  165 1405
## 108 1100  600  800
## 109 2745   20  765
## 110 2755   25  740
## 111 2540  120 2035
## 112  795   10  285
## 113  655   55 1400
## 114  125  105  205
```

```
## 115                  800                60              1290
## 116                   30                25                85
## 117                  100               100               320
## 118                   70                65               315
## 119                  145                65               515
## 120                  120                75               350
## 121                   50                55               125
## 122                  120                70               220
## 123                   65                90               200
## 124                   75                25               265
## 125                   45                15               170
## 126                   70                35               290
## 127                  110                45               335
## 128                   60                25               130
## 129                   70                20               145
## 130                   20                 0                75
## 131                  125                35               300
## 132                  100                15               445
## 133                   80                40                85
## 134                   85                15                70
## 135                   40                15               185
## 136                   90                65               435
## 137                  180                70               615
## 138                   90                30               325
## 139                   50                40               250
## 140                   40                50                95
##     Language...Tagalog Language...Tamil Language...Urdu
## 1                  850              715              715
## 2                  345             1420             1075
## 3                  130              120              300
## 4                  180               70              215
## 5                  195               60              140
## 6                  255              215             1285
## 7                  250              145              485
## 8                   40                5               55
## 9                  105                5               15
## 10                  65               20               35
## 11                 220               65              155
## 12                  80               15               15
## 13                 315              150              195
## 14                 705              205              355
## 15                  55                5                5
## 16                 260               25               35
## 17                 475               45               40
## 18                 295               30               35
## 19                 225               15               30
## 20                 260               15               10
## 21                  85              130             1160
## 22                 330              225             1045
## 23                 120              115               25
## 24                 310              725              185
## 25                 485              485              125
## 26                1565              200              130
## 27                 930             1175              580
```

```
## 28   110  190   65
## 29   400  105   70
## 30   480  250  115
## 31   605  120   60
## 32  1900   45   45
## 33  1705   25   15
## 34   840   30   15
## 35  2165   70   75
## 36  1815   45  125
## 37   235   40   50
## 38   460   15   45
## 39  1010    5   15
## 40   265   75   85
## 41   110    5    0
## 42   515  145  220
## 43   540  465  385
## 44  1100 1030 1635
## 45   965  475  610
## 46   250  190  170
## 47   905  345  320
## 48   125  130  135
## 49    80   75   60
## 50   230   40   50
## 51   380  140  260
## 52   290   75   85
## 53   520  195  380
## 54   565  270  375
## 55   780  245 4855
## 56   100   10   15
## 57   315   70   50
## 58   220    5   60
## 59   260   30  175
## 60   170    0   40
## 61   355  260  675
## 62   375   45  350
## 63    85   25   10
## 64    70   25   85
## 65   115   55  400
## 66    65   10  105
## 67    60   10   15
## 68    60    5   30
## 69    55   30   90
## 70   250   25   75
## 71   260   60   35
## 72    95  520  125
## 73   180   90   90
## 74  1560  915  340
## 75   370   85  160
## 76   175   70  220
## 77   475  120  290
## 78   190   15   60
## 79    40   20   20
## 80    55    0   35
## 81    60    5   15
```

```
## 82   230   25   60
## 83   110   65   80
## 84    65   10    5
## 85   820  380   60
## 86   145  160   35
## 87   120    5   30
## 88   170   75   45
## 89    70    5   10
## 90   290   25   35
## 91   130   30   20
## 92   190   10   20
## 93   345  285  145
## 94   205   15    0
## 95   135   30   90
## 96   145    5   10
## 97    95   10   10
## 98   185    5   40
## 99   135   20   20
## 100  115   10   10
## 101  245    0    0
## 102  750    5   20
## 103  205    5    5
## 104  495   85   70
## 105  145   10   15
## 106  780   15   20
## 107 1070   25   35
## 108 1190   80   25
## 109  395   20   20
## 110  310   65   60
## 111  365   50   80
## 112  170   90   15
## 113  270  320   60
## 114   40    0    0
## 115  390   65   60
## 116  350  270  105
## 117 1125 3655  510
## 118  820 1150  780
## 119 1705 1070  400
## 120 1360  535  740
## 121  455  200  460
## 122  345  105   60
## 123  365  415  100
## 124 1305  955  225
## 125 1100 1075  165
## 126 1310 2955  870
## 127 1445 1750  970
## 128  500 1035  395
## 129  780 2845  350
## 130  675 1515  235
## 131 2365 7140 1230
## 132 2305 6240 2350
## 133  360  265  175
## 134  465 1060  215
## 135 1075 1715  610
```

```
## 136                985                810                425
## 137               2075               4665               1740
## 138               1540               2740                340
## 139                505               1625                865
## 140                165                 75                 25
```

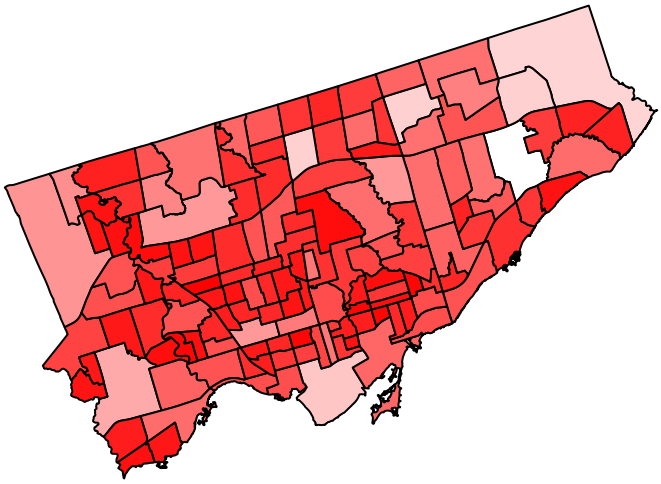
```
typeof(demo)
```

```
## [1] "list"
```

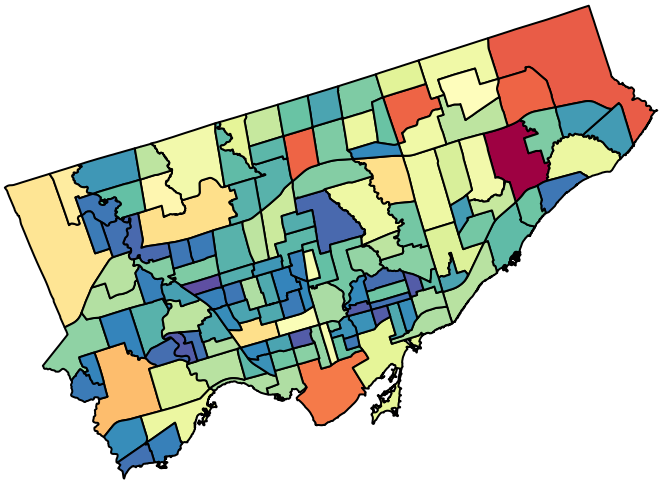
```
typeof(frame_il)
```

```
## [1] "list"
```

```
plot(sh, col = cols)
```



```
#RColorBrewer, spectral
p <- colorRampPalette(brewer.pal(11, 'Spectral'))(128)
palette(rev(p))
plot(sh2, col = cols)
```



```
#GGPLOT
points <- fortify(sh, region = 'AREA_S_CD')

# Plot the neighborhoods
```

```r
toronto <- qmap("Toronto, Ontario", zoom = 10)
```

```
## Source : https://maps.googleapis.com/maps/api/staticmap?center=Toronto,+Ontario&zoom=10&size=640x640

## Source : https://maps.googleapis.com/maps/api/geocode/json?address=Toronto%2C%20Ontario

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL can
##   Consider 'structure(list(), *)' instead.

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL can
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL can
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```

```r
toronto + geom_polygon(aes(x=long,y=lat, group=group, alpha=0.25), data=points, fill='white') + geom_po
```

```
## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL can
##   Consider 'structure(list(), *)' instead.

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL can
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL can
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```

```
## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL ca
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL ca
##   Consider 'structure(list(), *)' instead.

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL ca
##   Consider 'structure(list(), *)' instead.

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL ca
##   Consider 'structure(list(), *)' instead.
```

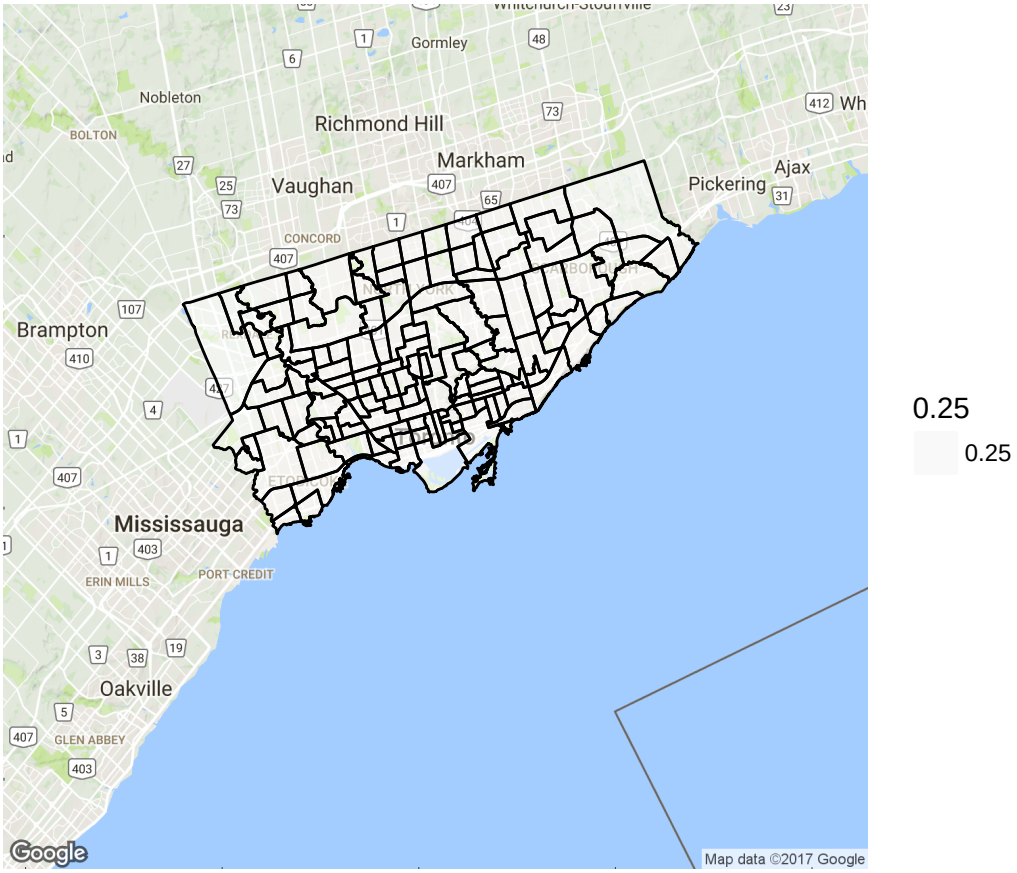


```
# merge the shapefile data with the social housing data, using the neighborhood ID
points2 <- merge(points, demo, by.x='id', by.y='Neighbourhood.Id', all.x=TRUE)

# Plot
toronto + geom_polygon(aes(x=long,y=lat, group=group, fill=Total.Population), data=points2, color='blac
  scale_fill_gradient(low='white', high='red')
```

```
## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL ca
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##   Consider 'structure(list(), *)' instead.

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL ca
```

```
##   Consider 'structure(list(), *)' instead.

## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL car
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL car
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL car
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```

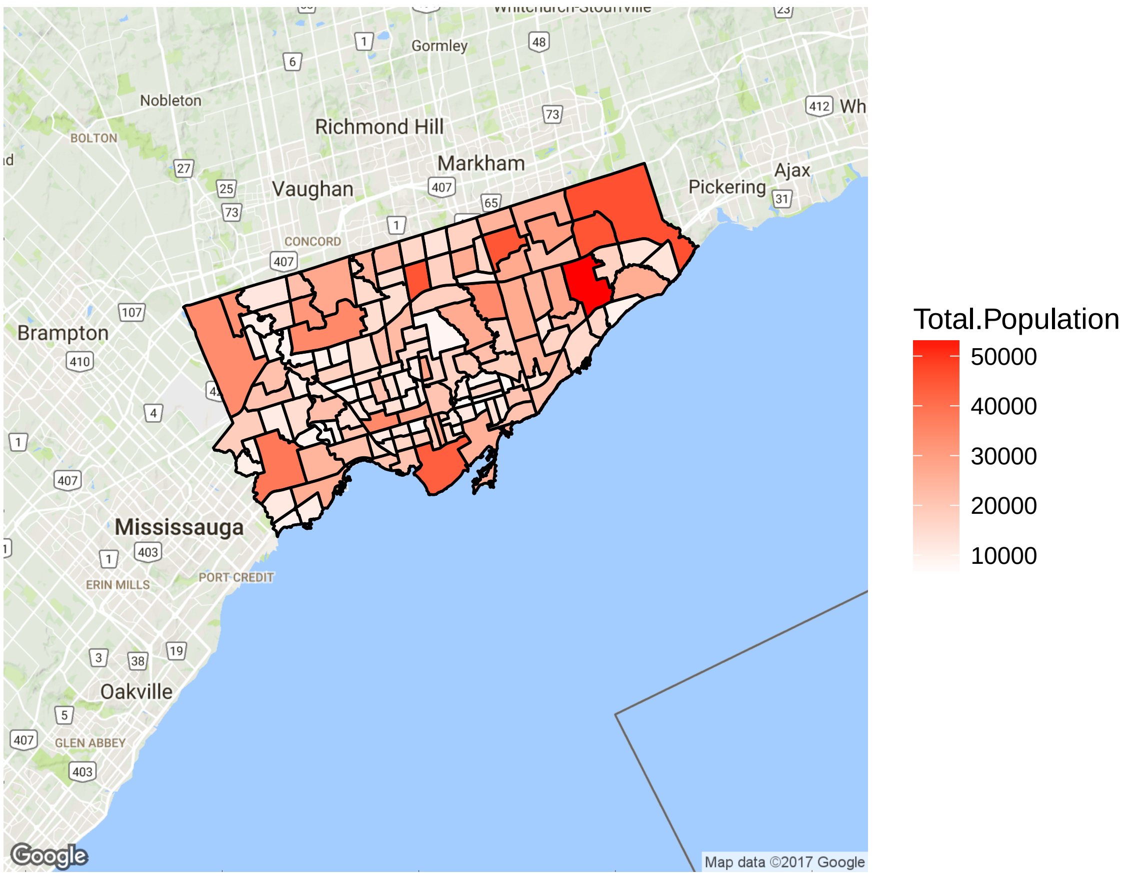


```
# Spectral plot
toronto + geom_polygon(aes(x=long,y=lat, group=group, fill=Total.Population), data=points2, color='black
  scale_fill_distiller(palette='Spectral') + scale_alpha(range=c(0.5,0.5))
```

```
## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL car
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```

```
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL car
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## Warning in structure(NULL, class = "waiver"): Calling 'structure(NULL, *)' is deprecated, as NULL car
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```

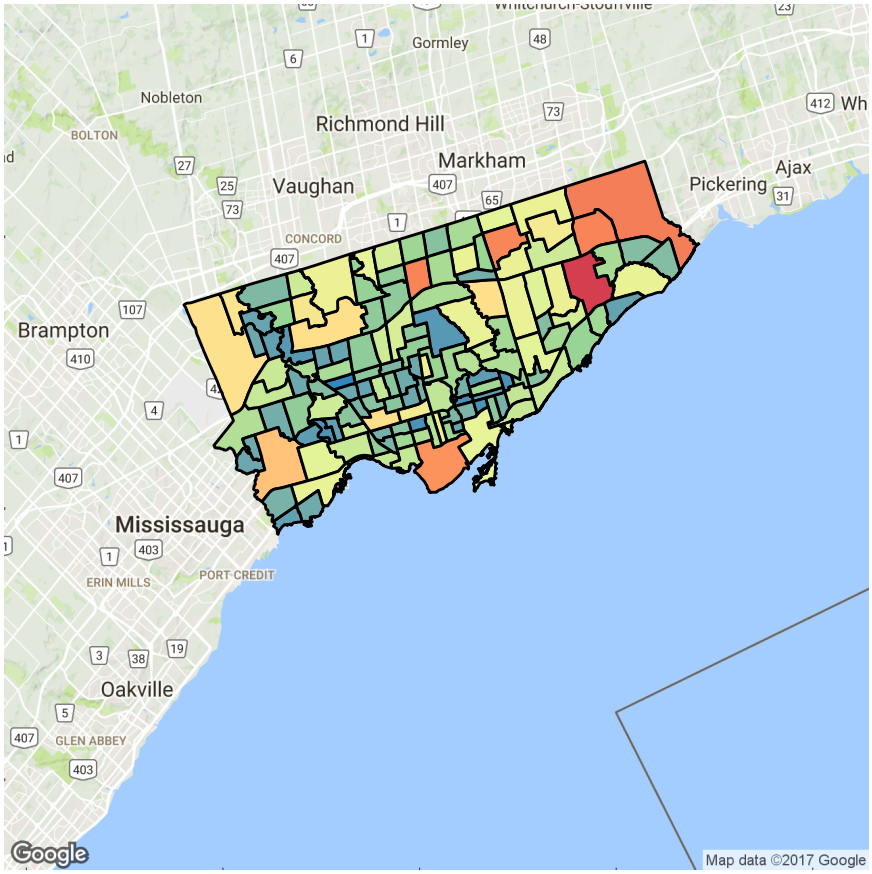

Total.Population

50000

40000

30000

20000

10000