

# Speak for Tree - Environment

Environment Group

2021-11-22

## Data source:

PM2.5:

Temperature:

Census Tracks(2020):

## Exploratory Data Analysis

### Using QGIS

We generate the plots which relate the canopy to pollution(PM2.5) and surface heat (temperature)

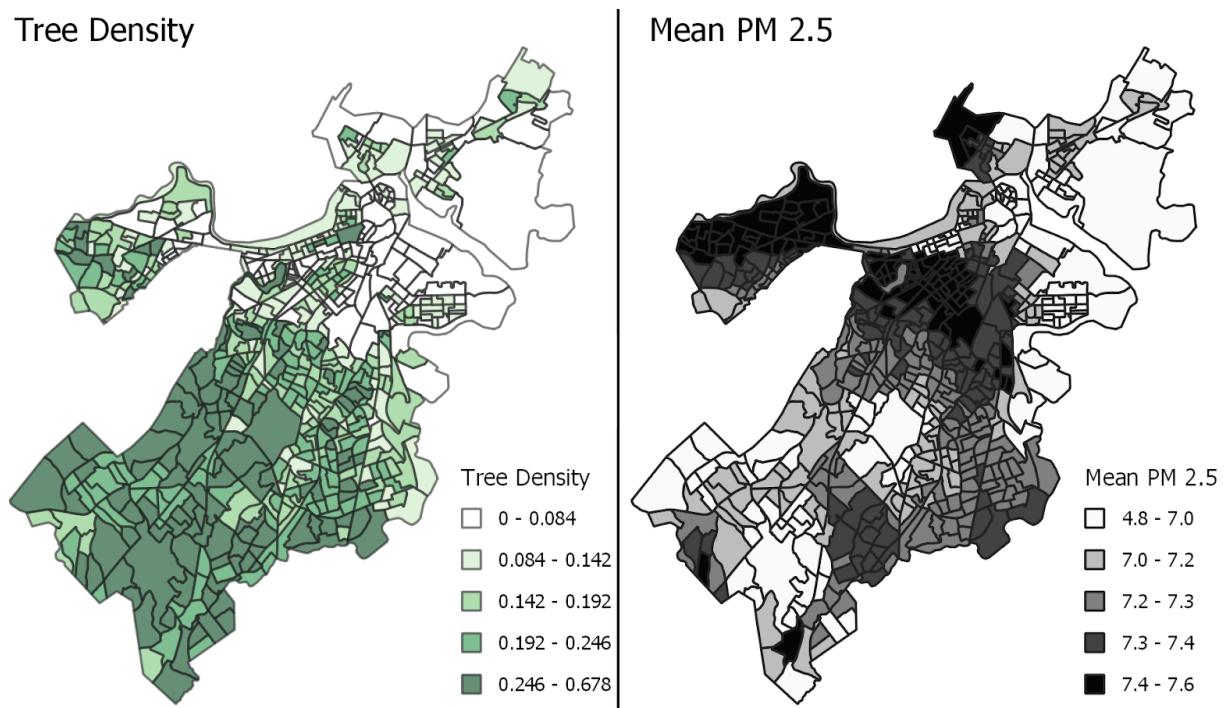


Figure 1: The PM2.5 Situation in Boston

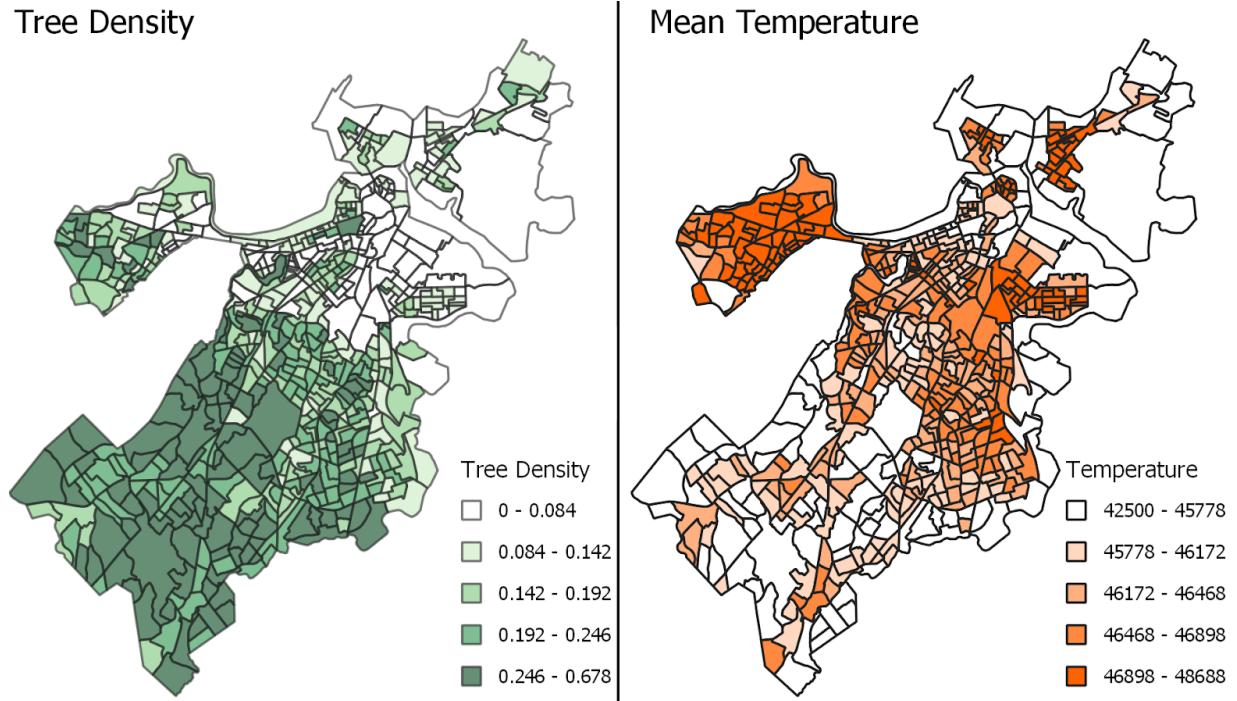


Figure 2: The Temperature Situation in Boston

## Using R

We combine the PM2.5 and temperature data to the Census2020\_Tracts data, which allow us to do more exploration in R, and use kriging to avoid spacial confounding of our data.

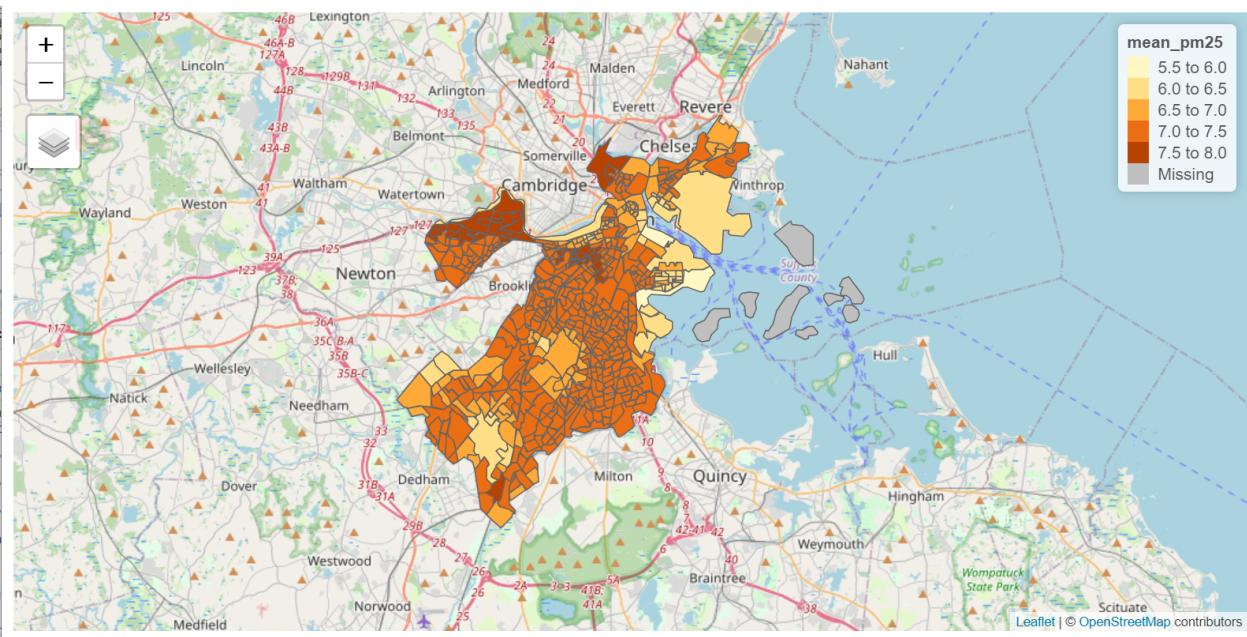
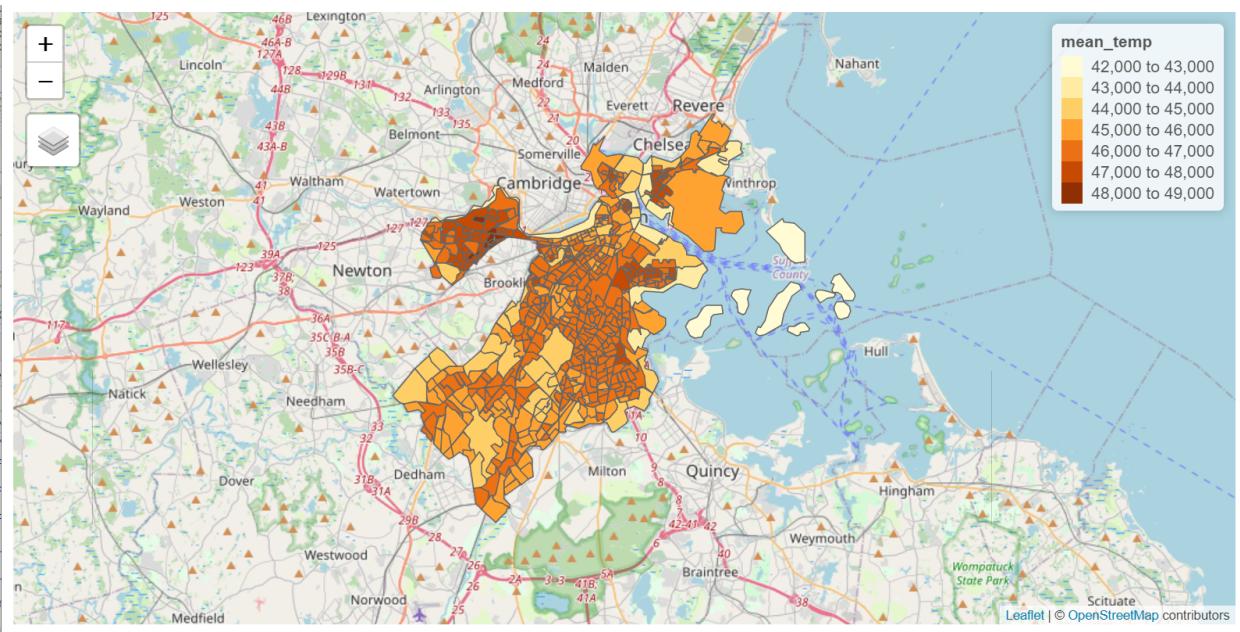
```

Reading layer `env' from data source
`D:\675 practicum\Tree\SpeakfortheTrees_Environment\env.shp'
using driver `ESRI Shapefile'
Simple feature collection with 207 features and 17 fields
Geometry type: MULTIPOLYGON
Dimension:     XY
Bounding box:  xmin: 739715.8 ymin: 2908294 xmax: 812981.4 ymax: 2972975
Projected CRS: NAD83 / Massachusetts Mainland (ftUS)

Reading layer `DemographicsSmoothed' from data source
`D:\675 practicum\Tree\SpeakfortheTrees_Environment\Demographics_Smoothed\Demographics_Smoothed\Demog
using driver `ESRI Shapefile'
Simple feature collection with 194 features and 29 fields
Geometry type: POLYGON
Dimension:     XY
Bounding box:  xmin: -71.19125 ymin: 42.22791 xmax: -70.98527 ymax: 42.3974
Geodetic CRS:  WGS 84

```

**Plot the mean temp and PM2.5 situation for each census tract**



## Bubble Plots with centroid data

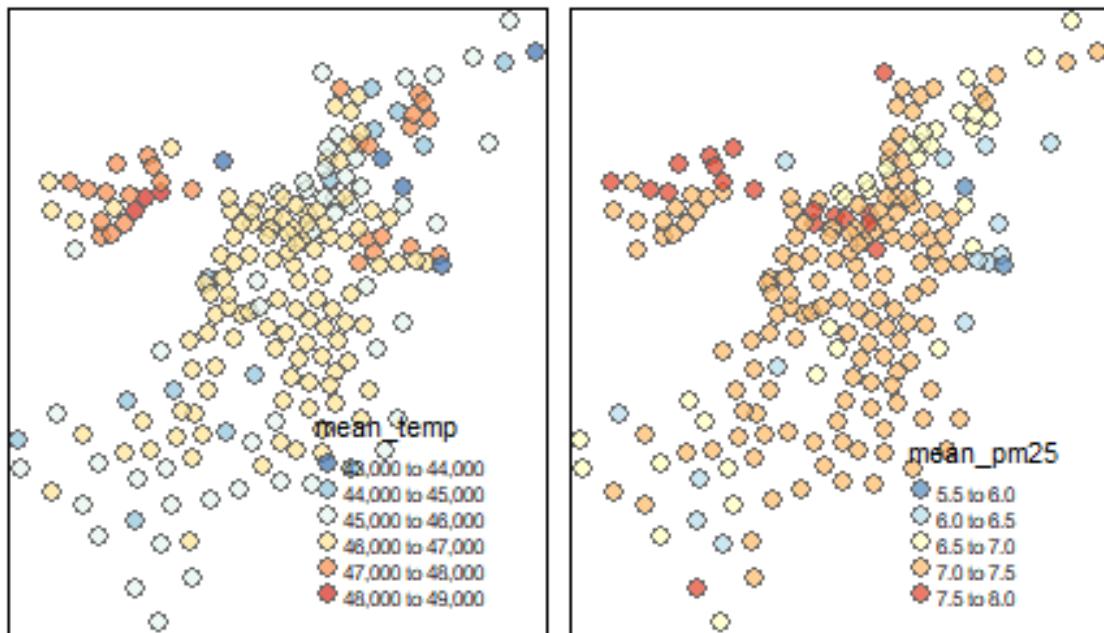
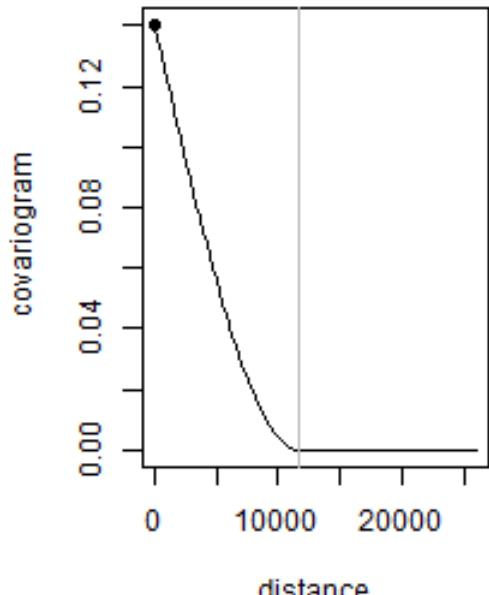
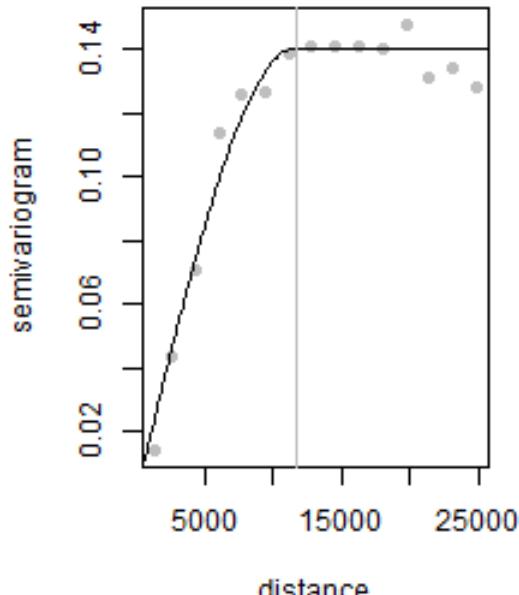


Figure 3: BubblePlots for  $mean_{temp}/mean_{PM2.5}$

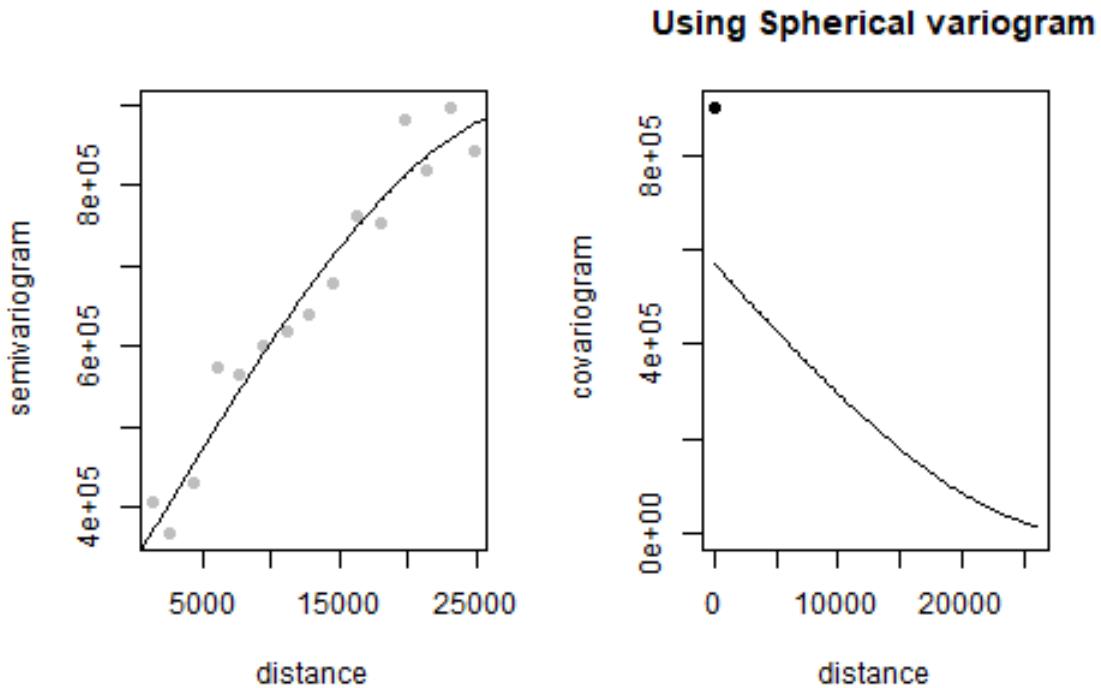
Kriging for spacial mixed effects

PM2.5: check variogram and covariance

### Using Spherical Variogram



## Temperature: check variogram and covariance



## Citation

<https://stackoverflow.com/questions/49032217/inner-joining-two-sf-objects-by-non-sf-column>

[https://www.youtube.com/watch?v=J-IB4\\_QL7Oc](https://www.youtube.com/watch?v=J-IB4_QL7Oc)

<http://www.goldensoftware.com/variogramTutorial.pdf>