Practical Spatial Statistics & Econometrics with R

Session 4: Computing Experimental Variograms - Part I

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How to excel at spatial stats (or anything else)?

Understanding

Clear conceptual understanding

Listening, Reading, Thinking, Writing

Skill

Apply understanding to real world problems.

Doing, Trying, Failing, Coding

~~Watching to a lot of lectures (like this one)~~

~~Reading many programming books~~

Pause and Play frequently!

What should we know/will we learn in this session?

Understanding

What we should know:

- The idea/definition of spatial stationarity
- The definition of a semivariogram
- Estimator for experimental variogram
- Variogram cloud

Skill

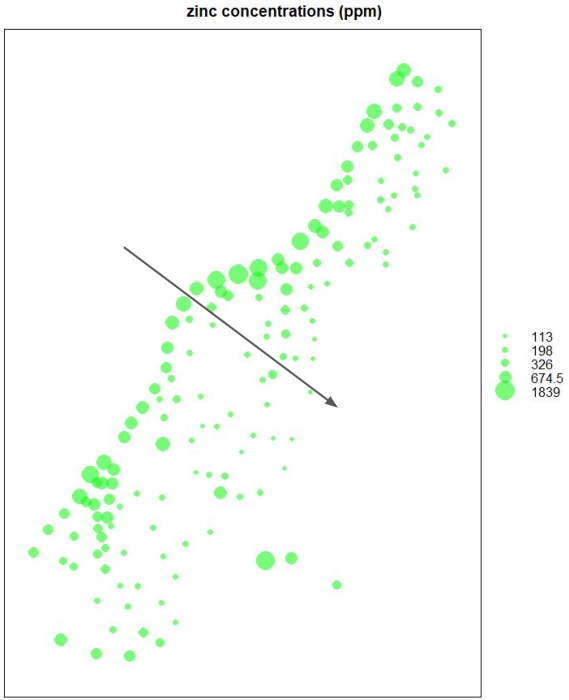
What we should have already done:

- Made a spatial points dataframe using the `meuse` data set

What we will do now:

- **Consider spatial stationarity**
- **Make a variogram cloud**
- **Estimate a variogram**
- **Remove trend from data**

Stationarity - BEFORE we start estimating a variogram



Looking at this realization, can we *decide* on a spatially stationary stochastic process to model zinc concentrations?

Cannot verify stationarity but can rule it out.

Look carefully. There is a trend from NW to SE.

Trends imply non-stationarity. We have to remove the trend.

Demo 4: Live Coding Session with R

Exercise

```
lzn.vgm.detrend = variogram(log(zinc)~x+y, sp.data.in)
```

What does the clause "`log(zinc)~x+y`" mean in the above code fragment?

Answer: It means that we want to estimate the experimental variogram after removing the trend from the zinc variable. We want to estimate the trend using `x` and `y` as regressors. We believe that trend is purely a function of location. This may or may not be true and it depends on how knowledgeable we are about heavy metal pollution.

Summary

- **Wrote our very first R function!**
- **Estimated an experimental variogram using `meuse` data set**
- **Compared variograms with and without trend removal**
- **Learned about a new library - plotly**
- **R functions, types**
  - `variogram, plot_ly`