The spatial analysis of accuracy using geographically weighted frameworks

Lex Comber & Paul Harris

June 2016

Overview

This workshop is structured as follows:

- 09h15-10h45 1. Introduction & 2. GW framework and Computer practical
- 10h45-11h00 Coffee break
- 11h00-12h30 3. Mapping spatial accuracy and computer practical
- 12h30-14h00 Lunch break
- 14h00-15h30 4. Putting it all together (loops, functions) and computer practical
- 15h30-15h45 Coffee break
- 15h45-17h15 5. Additional materials (Kappa etc) and computer practical support

Each session will include a short introduction (some slides by Lex or Harry), followed by some participant coding.

The workshop main aim is get you thinking a bit more like a geographer. It draws from the plethora of methods for analysing point data many of which were developed within the domain of *quantitative social geography* and explores their application to observations about land cover. The fundamental theme that it promotes is that *Space is Special*. Through a series of illustrative analyses it argues that location, *latitude* and *longitude* or *easting* and *northing*, cannot be treated as just another variable. Specifically, the workshop encourages those interested in remote sensing and land cover scientists to wear 'geography goggles' through which to view the world. These promote a view of the world in which the wearer:

- does not expect relationships to be same everywhere
- does not consider the world to be not normally distributed esp. in space
- expects processes, relationships, trends etc to vary spatially
- and therefore expects to find clusters, hotspots, coldspots, etc

In the context of remote sensing accuracy assessments it seeks to move away from the a-spatial nature of the measures generated by the confusion matrix. The background to this work is clearly outlined in three papers:

FOODY, G.M., 2005, Local characterization of thematic classification accuracy through spatially constrained confusion matrices. *International Journal of Remote Sensing*, 26, pp. 1217–1228.

COMBER, A., FISHER, P.F., BRUNSDON, C. and KHMAG, A., 2012, Spatial analysis of remote sensing image classification accuracy. *Remote Sensing of Environment*, 127, pp. 237–246.

COMBER A.J., 2013. Geographically weighted methods for estimating local surfaces of overall, user and producer accuracies. *Remote Sensing Letters*, 4(4): 373-380

The last of this is available at this location `from XYZ-GITHUB` and provides an thorough introduction to the materials covered in this practical.

Practicalities

Before we start you should do the following :

- install R on your computer R which an be downloaded from CRAN at `https://cran.r-project.org`
- you may prefer use R through RStudio `https://www.rstudio.com/products/rstudio/download/`
- you should use the code below to install a number of `packages` or `libraries`

```
install.packages("spgwr", dep = T)
install.packages("GISTools", dep = T)
install.packages("repmis", dep = T)
```

Code and data are provided and can be downloaded from Lex Comber's github site https://github.com/lexcomber/LexTrainingR/. You will a summary of the materials of the course.

Tips

For efficient R coding and learning it helps if you:

1. Keep your code in scripts, typically saved with a `.R` extension and a file name that has some meaning (eg 'WorkshpPt1.R')
2. Annotate your scripts with comments to help you remember what you have done when you come back to a piece of code that you wrote a few years ago. Annotations starts with `#` and you should use them freely. Every after the `#` is not read by R
3. Use the shortcuts in RStudio and R for running code - highlight cmd / ctrl `Return` in R for example
4. Use the massive amounts of online help that is available via RBloggers http://www.r-bloggers.com and StackOverFlow http://stackoverflow.com/questions/tagged/r
5. Copy and modify code where you can - the standard rules of plagiarism do not apply, although acknowledgements and licensing are important

Finally. . . .

We hope that you enjoy this day and that you find that you find it useful.

Lex and Harry