

---

## NOTES ON GEODA

The following notes are intended as a brief introduction to GEODA. The software can be downloaded from the web site <https://www.geoda.uiuc.edu>. Be sure to download the workbook as well. We begin by loading and displaying a map file, and then consider some useful options and analyses available in GEODA.

### 1. Getting Started in GEODA

After downloading GEODA, put in your home directory, say **e:\home**. Now we will use the “Eire” data from Assignment 6 to illustrate how to use GEODA. This assumes that you have copied the shapefile, **eire.shp**, to your home directory from Assignment 6. Open GEODA, and click on **File** → **Open Project**. Now browse for **eire.shp** and open it. You will see the selection “AREA” in the **Key Variable** window. The **Key Variable** is used to identify each boundary polygon (state) in the boundary file. It *must* have unique (non-decimal) values for each polygon. For example, try scrolling down in the box and using “EASTING” as the identifier. When you click **OK** you will get an error message telling you that “516.00” appears twice. Now try using “BLOOD\_GROUP” and you will now get an error message telling you that this is “decimal”. If you have no unique integer or alphabetic identifiers, you must add a new column to the Attribute Table using ARCMAP. [If you edit the **eire.dbf** in EXCEL by adding a new column, say **ID**, that contains the number of each row, then this will also work as an identifier. But it is important to emphasize that such edits *will corrupt* any map documents (.mxd files) in ARCMAP currently using this file. So you must make a copy of the entire shapefile, say **eire\_geoda.shp**, and use this copy for GEODA].

To construct a choropleth mapping of a variable, right click on the map and select **Choropleth Map**. Start by selecting **Quantile** (other plot styles are listed), and in the “Variable Settings” window that opens, select a variable, say BLOOD\_GROUP. Click **OK**, and in the next window choose the number of classes to be “5” (or whatever else you want). Click **OK** and the choropleth map should now be visible. The legend should also be visible on the left hand side (you may have to adjust the vertical separator).

If you click on the **Table** icon in the Main Menu, you can also look at the Attribute Table. Also, if you click **Edit** → **Duplicate Map**, you can create another choropleth map, say for BEYOND\_THE (\_PALE). [This is very *cumbersome* to do in ARCMAP!]

### 2. Weight Matrices and Spatial Regression

One particularly useful feature of GEODA is its ability to construct a range of spatial weight matrices and estimate both spatial error models and spatial lag models. We begin by constructing a *contiguity matrix* indicating which polygons share positive boundary lengths (called “rook” contiguities). To do so click

**Tools → Weights → Create**

and in the window that opens, set **Input File** = “eire.shp” and save as “eire\_rook\_wts”. Set **ID** = “ROW” [or “ID”, both at the end of the list]. Under **Contiguity Weight** check “Rook Contiguity” and at the bottom click **Create**. Then click **Done**, and the file will be saved to your home directory as, **eire\_rook\_wts.GAL**. [Check to be sure it is there.]

Next we will use this weight matrix to estimate a **spatial lag model** for Eire and save the results. To do so click **Regress**, and in the window that opens, you can rename title to “SPATIAL LAG REGRESSION” and the output file to “sp\_lag\_eire.OLS”. You can also choose to save Moran’s I, etc. Click **OK**, and in the new window that opens, set **Dependent Variable** = “BLOOD\_GROU(P)” and **Independent Variables** = “BEYOND\_THE(\_PALE)”.

To active the **Spatial Lag** option you must first select a weight matrix. Click the folder icon and in the window that opens click the folder icon again and select the weight matrix, **eire\_rook\_wts.GAL**, created above. Click **OK**, and you will now see that **Spatial Lag** has been activated in the SPATIAL LAG REGRESSION window. Check **Spatial Lag**, click **Run**, and when finished click **OK**.

A regression summary will then appear as a new window. This output will also appear in the file **sp\_lag\_eire.OLS** that has now been added to your home directory. You can open this file in WORDPAD.