

A New View of the Irish Famine through Geographic Information Science and Geographic Weighted Regression, by Stewart Fotheringham

University of Dundee, 8 December 2011

Reviewed by Ellie Bates, a PhD student in Criminology at the University of Edinburgh, currently writing up research which has been looking at using various Exploratory Spatial Data Analysis techniques in exploring the Space and Time Dynamics of Vandalism

Professor Stewart Fotheringham gave a fascinating presentation on how Geographic Information Science and in particular Geographic Weighted Regression has been used to provide some new insights into a much researched area. The project has sought to actively address some of the problems of working with geographic data. Stewart is currently Professor of Human Geography at the School of Geography and Geosciences at St Andrews University, and was previously Director at the National Centre for Geocomputation (NCG) at the National University of Ireland Maynooth (NUIM). He has been involved in quantitative research human geography for a number of years and is a key member of the team who developed Geographic Weighted Regression (GWR).

The Irish famine occurred between 1845 and 1849, and was caused in part by a blight in the potato crop. Between censuses of 1841 and 1851 there was a startling fall in the population. The reasons for this fall in population have been the subject of much research. Stewart Fotheringham working alongside others at the University of Maynooth in Ireland has been involved in a project that has aimed to provide a new perspective on a very well researched period of history.

The Irish population had been growing rapidly until 1841. It was a predominantly rural population, sometimes living in quite harsh conditions. Ireland was heavily dependent on the potato, and in many areas there was no other substitute industry. The population decline is measured as 1.5 million between census years, but may be as much as 2 million given the rapid population expansion expected until the 1845 famine. Of these 2 million a rough estimate is that around half died and the other 1 million emigrated predominantly to the United States, United Kingdom, Canada and Australia. Ireland is the only country in Europe where the population is still only today $\frac{3}{4}$ of what it was in 1841.

The purpose of the 'New View of the Irish Famine' project was to examine the spatial impact of the famine. It was funded by the Irish Research Council of Humanities and Social Science. Cartograms were used to show Ireland had a very evenly distributed population in 1841. However, after the famine, this was no longer the case and the population around Dublin in particular expanded, whereas the population in most counties contracted. The area around Cork in particular experienced substantial population loss.

One of the challenges of understanding population change around the time of Irish Famine is that the reasons are complex and whilst in some areas there is much information, in others data and research was lacking:-

- Population decline was multifaceted
 - o Famine death versus natural death
 - o Emigration versus migration
- Famine involved complex interrelated reasons
 - o Potato blight
 - o Over-dependency on single crop
 - o Lack of alternative food supply / logistics of relief schemes
 - o Lack of a cash based economy (barter still in use)
 - o Laissez faire ideology (no real social safety net present)
 - o The English (the attitudes of English Governments in power over the time period)
- The impacts were spatially uneven, making it difficult to explain
- There is much detailed local history, but very limited examination across a national scale of the Island of Ireland (there is a general feeling that the West suffered more than the East which is true to some extent, but there was much local variation – as this project has shown)

Central research objectives of the project have included:

- 1) Mapping the population change at a finer spatial scale than done before – Enumeration District (ED) level
- 2) Obtaining and mapping explanatory variables at ED level
- 3) Regression analysis – using Geographic Weighted Regression (GWR) to shed light on determinants of spatial variation.

One of the key outputs of the project was the collection and digitisation of data from the time of the famine. Much of this data is now available online and collected in the Irish Famine Data Atlas and the Irish Population Change Atlas. For more information see:-

<http://ncg.nuim.ie/content/projects/famine/>

and

<http://ncg.nuim.ie/redirect.php?action=projects/famine/explore>

These web pages have an excellent set of visualisations of data from the time period, and data can also be downloaded. After the lecture I had a little explore of this information. For a very interesting example of the scale of population change take a look at the area around Cork. Highlight Cork City for a timeline of Cork Cities population.

<http://ncg.nuim.ie/content/projects/famine/maps/pop/Cork/>

Gathering data at ED level has been in part possible as considerable socio-economic data exists at the same very local level for both years. The census takers of 1851 had the amazing foresight, understanding that there had been substantial population change, to re-calculate and re-code all the 1841 census data to the same enumeration districts used in 1851, meaning data can be directly compared. Using data at ED level was also aided in that ED boundaries in Ireland have changed very little between 1851 and the current day. A boundary set from 1891 was used to derive the 1851 boundaries that were used in this project.

Existing literature was drawn on to decide on key variables that should be used for analysis. From the literature a number of key factors included: population density and over population; poverty and over-dependence on potato crops; land ownership and agricultural use patterns; accessibility to towns and relief schemes; proximity to ports; and whether assisted migration schemes were in place (some English landlords paid people to leave land so it could be turned over to sheep and cattle). Various socio-economic measures were used from the 1841 and 1851 census, and combined with information from the agricultural census of 1851 on the crops grown; additionally physical attributes such as distance to workhouses, the coast and ports, proximity to urban centres and mean elevation were calculated.

Geographic Weighted Regression (GWR) offers a particularly useful method for understanding local variation. Whereas the traditional solution might be to run a global model (ie where parameters are assumed constant across locations), GWR runs a series of local models and can specifically estimate local variations. It is therefore well suited to examining a problem where very localised factors are at play. Bespoke software to perform GWR are available from the NCG and NUIM see :- <http://gwr.nuim.ie/>

Final findings of the project are still to be published, but using GWR has shown how local areas are differently impacted by variation of the variables included in the model. For example, population pressure variables had a much bigger impact in the South than in Ulster, whereas, proximity to coast proved to be complex being advantageous for some areas but not for others. The model also demonstrates that there are significant and intriguing local variations in some of the key determinants of the famine. Finally, the project has opened up new lines of inquiry in an area of research already intensively studied and usefully demonstrates the value of using quantitative methods to complement existing extensive qualitative research.

Overall, this talk provided a fascinating insight into the impact of the Irish Famine on the local population, ably demonstrated the value of GWR as highly valuable research technique for exploring local spatial variation, and was an excellent companion talk to the brilliant course on Geographic Weighted Regression on 8-9th December 2011 I attended.