# Exploring Travel Efficiency Methods in Ireland



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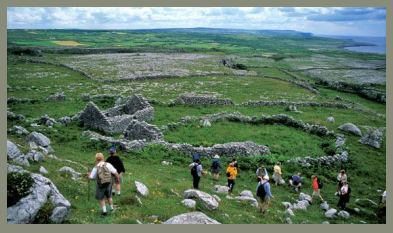
# Research Question:

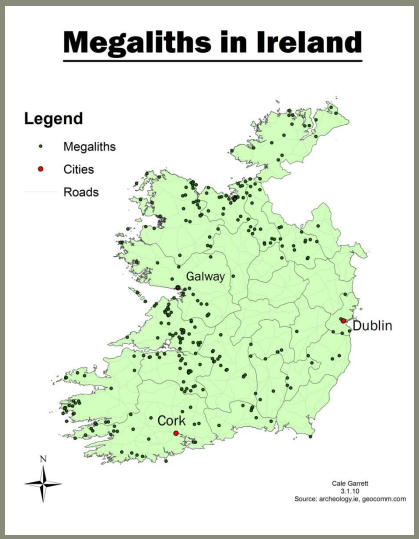
Can we use GIS to improve the efficiency of our travel plans in Ireland?

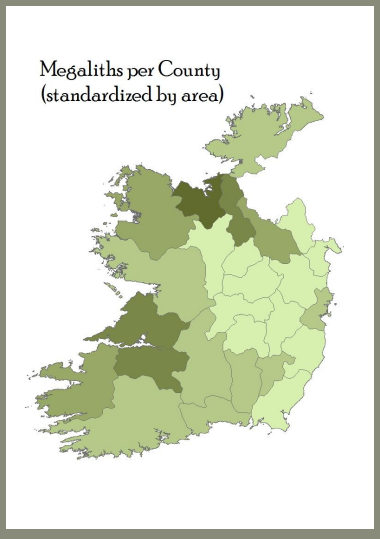



# Breton Culture in France and Ireland

- Breton language is a Celtic language spoken in Bretagne, France.
- Bretagne had strong political and cultural ties to Ireland throughout pre-history and until the early Middle-Ages.
- Megaliths are large stone structures built in the Neolithic through the Bronze Age (8000-1200 b.c.)
- Megalithic architecture in Ireland and Bretagne appeared in the same periods and shared similar styles. This supports the belief that the cultures were intertwined as early as the Neolithic period.
- In this project I am going to try to find hot spots of megalithic architecture that I can visit and maybe see if similarities still exist between the two cultures.

# Base Maps and Chloropleths



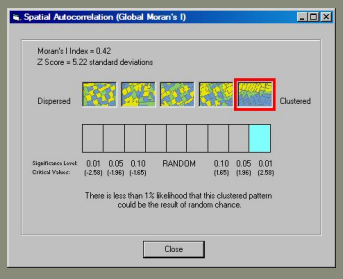



# Methods:

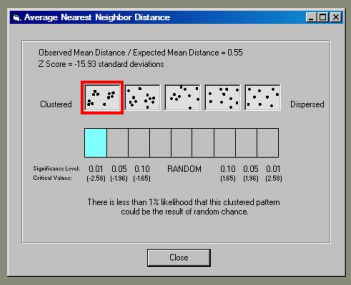
-Run statistical analysis to see if there is clustering or if the megaliths are evenly spaced.
- Use Euclidian Distance tool to make rasters of travel efficiency.
- Reclassify rasters, weighted overlay to create final travel efficiency raster.
- Create reclassed density map of megaliths and overlay with travel efficiency layer to create optimal travel locations.
- Create map of intended travel path.
- Compare with mental map to see if it improved our efficiency.
- Used NA to find improved route.

Data used:
-Megalith sites .shp (Ireland National Monuments Service)
- Counties, Roads, Cities .shp (GISlounge.com)

# Is there megalith clustering in Ireland?



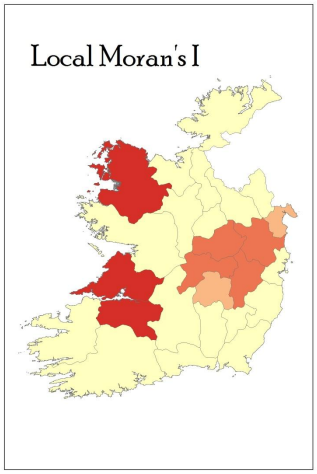

Global Moran's I shows us that counties with high amounts of megaliths are spatially autocorrelated and clustered together.




NNA shows us that the megaliths are clustered.

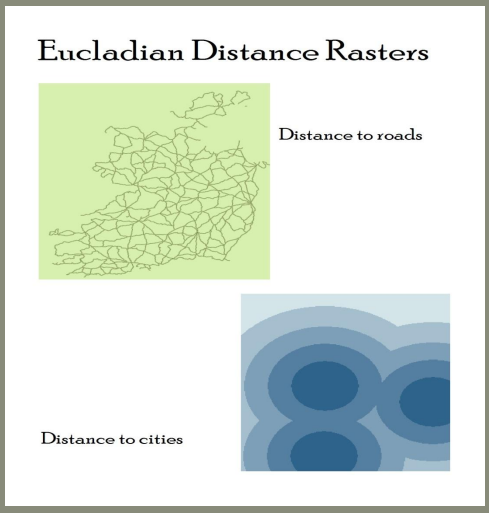
So the megaliths are clustered together, but where?

# Local Moran's I

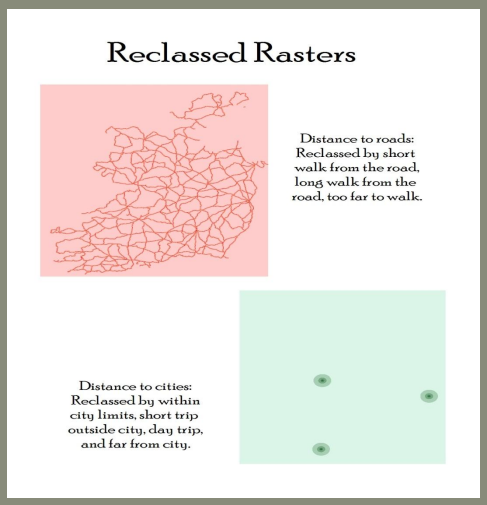



Local Moran's I shows clustering of counties with high amounts of megaliths.

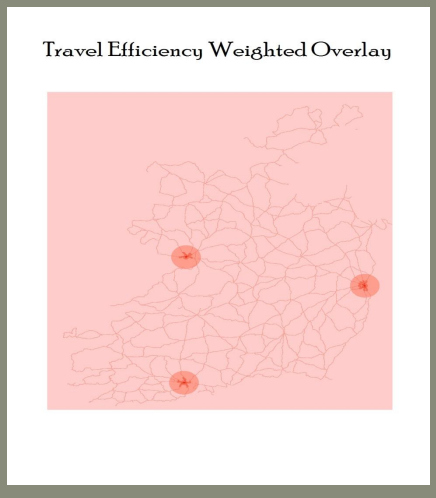
# Distance Rasters



# Reclassed Rasters

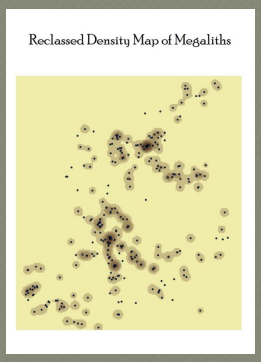


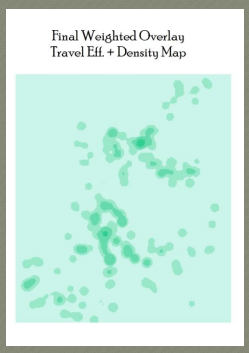

# Weighted Overlay: Final Travel Efficiency Map




I played around until I found a weighting system that did not minimize the distance to roads. Because I felt open to exploring via car.

# Density Map and Overlay



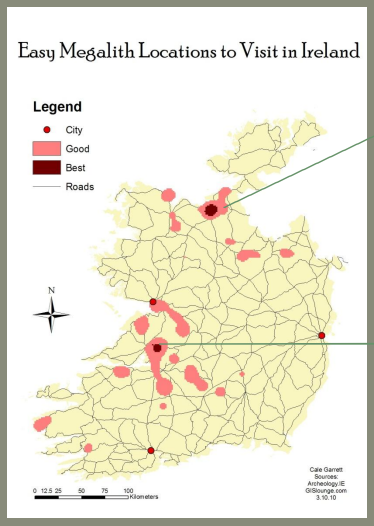

# Con and Majority Filter

-I used the CON and Majority Filter tool on the overlay of the travel efficiency layer and density map.

- The CON tool allows you to choose the suitable sites in a raster.

- The Majority Filter tool replaces cells in a raster based on the majority of their contiguous neighboring cells.

# Results: Final Map of Hotspots




Megaliths near Sligo

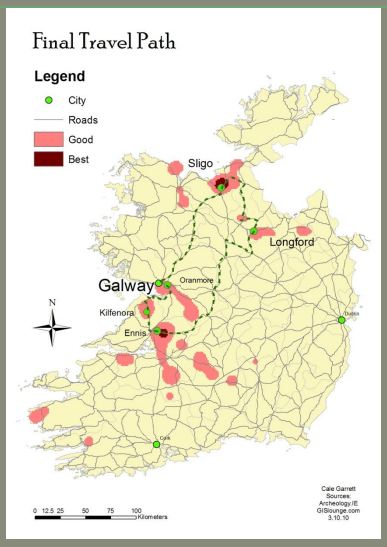
Recreated Neolithic settlement at the megaliths in Ennis

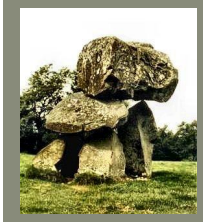
# Problems with data acquisition

- We had problems finding a towns layer for Ireland.
-In order to get towns to visit we had to reproject the map into WGS 1984.
- Record Lat/Long of hotspots and enter in Google Earth.
- Find towns to visit in Google Earth and then Geocode those locations and reproject back to original projection.

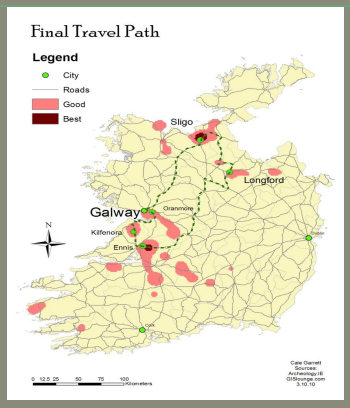
The lesson learned is to always have every piece of data you need before you start!

# Travel Path with GIS



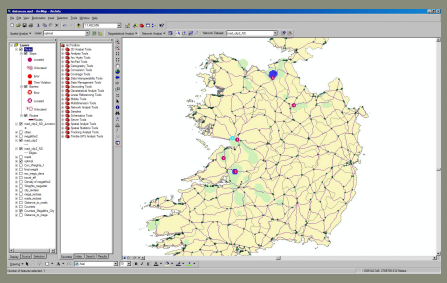



# Mental Map v GIS Map

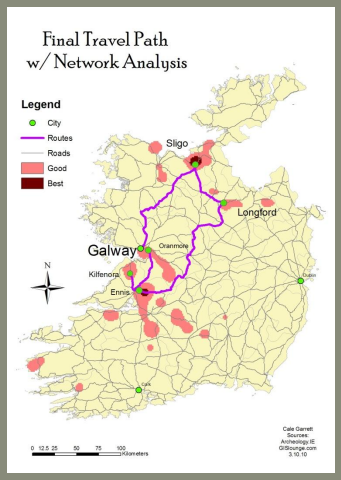

Comparing the mental map to the GIS aided map we see that it is much more efficient to design your travel route with GIS!

# Using Network Analysis



-Turned roads layer into network dataset.
- Added stop locations at desired hotspots.
- Built route from stops.

# New route using NA



# Limitations:

- Data! Originally we wanted data for small towns, train stations, better streets data.

- Edge effect with Northern Ireland.

- Change of scale could produce different results.

- For the NA to be efficient there needs to be temporal cost associated with the highways. As the highways were not delineated we had to treat them equally.

- Lack of ground truth accuracy.

# References:

- National Monuments Service. Datasets. archeology.ie, 2010.
- GIS Lounge. Ireland datasets. Gislounge.com, 2010.
- Robb, Graham. The Discovery of France. Norton. 2007.
- Burke, John. Seed of Knowledge, Stone of Plenty: Understanding the Lost Technology of the Ancient Megalith-Builders. Princeton. 2005.

# Any Questions?