
Putting data on Maps

The webinar will begin at 3pm

- You now have a menu in the top right corner of your screen.
- The red button with a white arrow allows you to expand and contract the webinar menu, in which you can write questions/comments.
- We won't have time to answer questions while we are presenting, but will answer them at the end
- You will be on mute throughout – we can't hear you.



Putting data on Maps

Webinar

4 April 2017

Peter Smyth
UK Data Service

UK Data Service



Can you hear us?



UK Data Service



Can you hear us?

- If not:
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 - Your invitation also included a phone number, you can call that to listen in.
 - UK +44 20 3713 5022
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 - We are recording this webinar, so you can always listen to it later.



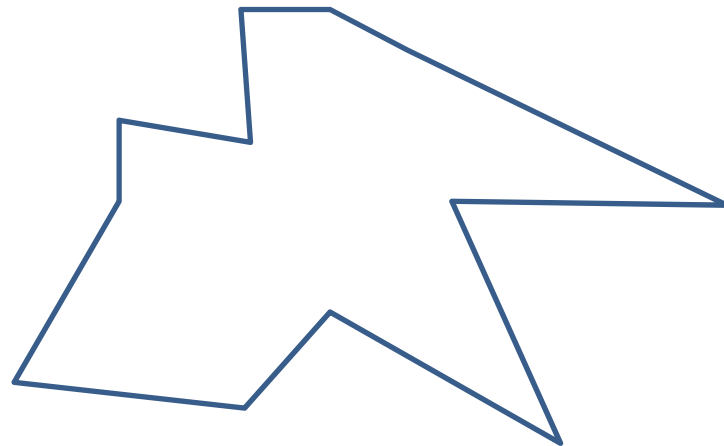
Overview of this webinar

- What kind of data?
- What kind of maps?
- Data formats
- Demonstration of googleVis
- Demonstrations of Leaflet



What kind of Data?

- In order to create our map we need two kinds of data and a way of associating them with each other
 - We need the data we wish to show on the map
 - Possibly the results of your research
 - We need to know how it relates to the map
 - as a point
 - as an area (a polygon)



What kind of Data?

- Points
 - are easiest to deal with
 - just need Longitude and Latitude (or equivalent)

PC	Name	Location	Admin	Lat	Long
AB10 1AA	George St/Harbour Ward	Aberdeen City	S12000033	57.14823	-2.09665
AB10 1AB	George St/Harbour Ward	Aberdeen City	S12000033	57.1496	-2.09692
AB10 1AF	George St/Harbour Ward	Aberdeen City	S12000033	57.1487	-2.09781
AB10 1AG	George St/Harbour Ward	Aberdeen City	S12000033	57.14823	-2.09665
AB10 1AH	George St/Harbour Ward	Aberdeen City	S12000033	57.14808	-2.09466
AB10 1AL	George St/Harbour Ward	Aberdeen City	S12000033	57.1496	-2.09535
AB10 1AN	George St/Harbour Ward	Aberdeen City	S12000033	57.14979	-2.0947
AB10 1AP	George St/Harbour Ward	Aberdeen City	S12000033	57.14897	-2.09569
AB10 1AQ	George St/Harbour Ward	Aberdeen City	S12000033	57.14808	-2.09466
AB10 1AR	George St/Harbour Ward	Aberdeen City	S12000033	57.14808	-2.09466
AB10 1AS	George St/Harbour Ward	Aberdeen City	S12000033	57.14831	-2.09752

In the above example each Aberdeen postcode a Latitude and Longitude associated with it, as well as other information



What kind of Data?

- Polygons
 - An ordered series of points and you join the dots
 - You don't actually join the dots, the software does it for you
 - Can be very large, depending on the accuracy and detail you want
 - Each dot is represented by a Longitude and Latitude value
 - The first and the last dot coincide to make an enclosed polygon
 - Associated with each complete polygon there is data which is related to it. It could be anything.
 - In many cases there will be some continuous or discrete variable which you wish to represent as a coloured polygon on the map



What kind of Maps?

- **Static Maps**
 - Essentially a picture (jpg, png) of a map with your data on it
 - A snapshot
 - Example R libraries :- rworldmap, ggmap and probably many more
- **Dynamic Maps**
 - The map can be scrolled
 - The map can be zoomed
 - The displayed information may change as you zoom
 - Example R libraries :- googleVis, Leaflet and probably many more



What kind of Maps?

- In both cases the initial map may need to be downloaded from the Internet
- Dynamic maps typically make use of a web browser to display them
- Although hidden from the R user, dynamic maps will often make use of javascript code in the background (hence the need for the web browser)



Sources of map data

- UK Data Service
 - <https://www.ukdataservice.ac.uk/>
- Ordnance Survey
 - <https://www.ordnancesurvey.co.uk/opendatadownload/products.html>
- GeoNames
 - <http://www.geonames.org/>
- Many more – Google for shp files



Data Formats

- Need to consider
 - Your data
 - The map data
 - And how you match them up



Data formats – Your data

- Regardless of whether it refers to points or areas, it will most likely be tabular data
- For points you will probably want to restrict the number of items shown to 3 or 4 to stop the map getting cluttered
- For areas, typically one of your data items will be represented by colour
- Could be continuous or discrete, but you probably don't want to use too many colours



Data formats – the map data








- Two basic choices
 - Points which are represented by Longitude and Latitude
 - You may have different coordinates systems, but depending on your software, you may have to convert them.
 - Typically these will just be 2 columns in your table of data
 - Polygons representing the outline of an area on the map
 - You could create your own, but
 - Most often found in shp files
 - Although there is actually a .shp file involved, shp files normally come in folders which contain not only the .shp file but also a .dbf file which will contain the data related to the polygons



A shp file folder

- This shp file folder has been downloaded from the UK Data Service

;) > shp > England_parl_2011_gen_clipped

<input type="checkbox"/> Name	Date modified	Type	Size
 england_parl_2011_gen_clipped.dbf	28/02/2017 14:37	DBF File	45 KB
 england_parl_2011_gen_clipped.prj	28/02/2017 14:37	PRJ File	1 KB
 england_parl_2011_gen_clipped.sbn	02/03/2017 14:56	SBN File	6 KB
 england_parl_2011_gen_clipped.sbx	02/03/2017 14:56	SBX File	1 KB
 england_parl_2011_gen_clipped.shp	28/02/2017 14:37	Adobe Acrobat D...	4,742 KB
 england_parl_2011_gen_clipped.shx	28/02/2017 14:37	SHX File	5 KB
 TermsAndConditions.html	28/02/2017 14:37	Firefox HTML Doc...	3 KB



A shp file folder

- There are several files including the .shp and .dbf files
- These are proprietary formats, and you need appropriate software to read them
- Most GIS or R libraries will combine and use these files together



Adding Data

- Points
 - Just a case of adding columns to the table with the Longitude and Latitude values
- Polygons (shp files)
 - Depends on the software in use.
 - For leaflet in R, the .dbf file is exposed as a dataframe and we can columns to it in a standard R like way.
 - We can also save the shp file with the changes in it for future use



Leaflet

- Originally Leaflet was written to be used with JavaScript
 - Allowing maps to be written as HTML pages and displayed using a Web browser
- Now there are Leaflet libraries available for other languages like:
 - Python
 - R



Leaflet

- Functionality may differ slightly between the languages, but they all basically allow the user to create maps with data on them
 - Create a web based map area based on provided initial co-ordinates and zoom level
 - Add popup markers to the maps
 - Associate data with the markers



Leaflet

- Official documentation
 - <http://leafletjs.com/> (This is the JavaScript documentation)
- Other documentation
 - <https://rstudio.github.io/leaflet/> (Leaflet for R specific)
- Example map types
 - <https://www.bing.com/images/search?q=R+Leaflet+Map+Examples&FORM=IRMHRS>



Demonstration - googleVis

- An R library designed for interfacing to R Charts, but has some mapping capabilities



Demonstration – Leaflet popup data

- Load the library
- Create an empty canvas
- Add a map
- Centre and zoom the map
- Add single popup marker with text
- Add single popup marker with rows of HTML text
- Add multiple markers with data from a file
- Add multiple markers with data from a file and rows of HTML text
- Dealing with the ‘mess’ problem
- Saving to an HTML page



Demonstration – Leaflet choropleth map

- Load a shp file
- Convert the coordinate system
- Add some data
- Set up the colour palette and Legend
- Display the map



Questions

Peter Smyth

Peter.smyth@manchester.ac.uk

ukdataservice.ac.uk/help/

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