

Data acquisition for LBS

by Jack Hinton

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1. LBS used for student facilities and transport guides

Location-Based Services are being more commonly employed within smart technology to streamline the user's experience. Examples of this include recommendations of nearby shops when searching for items online and adverts that are tailored to the language and region of the user utilising available telemetry data. A natural progression of this trend would be to consider using them to augment the services available to university students, with possible applications including notification of nearby events and information about shops or public transport services that offer student discounts.

2. Data collection and entry

The data used in the construction of the required GIS was obtained from various sources including the NHS informatics website[1], the UK census data service[2] and the Ordnance Survey project[3]. The data obtained from the NHS website describes the average health and wellbeing of the population in the analysed area, including aspects such as hospitalisation due to alcohol abuse, and vaccination uptake. The data obtained from the UK Census Data Service describes general statistics of the population in the analysed area such as employment, education level and access to transport. The data obtained from the Ordnance Survey project was used as a control measure to ensure that the spatial data gleaned from the above sources was accurate.

3. Layer creation

A great many layers were used in the creation of this GIS system to provide overlays visually portraying salient aspects of the data collected. These layers were created using either point data or area data. A partial list of them follows:

3.1. Point data

The point data used was applied as a map overlay using a combination of the 'create point' and geocoding tools. The points were initially created from latitude and longitude data, which was then manipulated so that it was associated with the internal location structure used by the mapping system (MapInfo[4]).

3.1.1. GPGeocoded

This array of point data is used to denote the locations of General Practitioner surgeries in the analysed area. This array is the result of the combination of a list of GP surgery postcodes and a list of relevant area postcodes and thus may be marginally inaccurate.

3.1.2. Swansea_Immunisations_15_16

This array of point data shows the immunisation uptake for a variety of vaccines at various ages throughout the analysed area.

3.1.3. Data_Townsend_30_10_2017

This array of point data shows the Townsend index for the locational subdivisions of the analysed area and the factors that are used in the calculation of them.

3.2. Area data

The area data was rendered as a map overlay first by joining the dataset with a geographical dataset to create polygons. These polygons were then downsampled using the 'trim' tool to reduce their complexity (this is due to the fact that the software used in the extraction process placed a limit on the length of each polygon equal to 2^{16-32}). The newly downsampled polygons were then saved in the 'shapefile' format in order to simplify them and prevent the base instance being exported. Subsequent to this, the 'MapInfo2Leaflet' tool was used to export the shapefiles as geoJSON objects and render them in an embedded javascript applet.

3.2.1. Ranges by Education

This array of area data shows the average level of education for the population within the locational subdivisions of the analysed area. This array was derived from a combination of the education figure given by the Townsend data set described above and the MSOA data obtained from Ordnance Survey. Two versions of this layer were created (one using colours and one using hashed lines) in order to allow the data to be compared against other data points in formats that would otherwise clash.

3.2.3. Oac_super

This array of area data describes the predominant demographic which makes up the population of the described areas.

4. Functionality provided by embedded LBS

The functionality provided by the use of the embedded LBS is simply that a user can see whether they are in an area with a low MMR vaccine uptake and then determine where the nearest GP surgery is. It is worth knowing what the vaccine uptake for the area is, as if it is lower than 90% [5] there is a chance that the herd immunity for that area is compromised. This makes it imperative for unvaccinated individuals to present themselves for vaccination in order to prevent an outbreak.

7. Bibliography

- [1] N. W. I. Service, "NHS Wales Informatics Service - an Official NHS Wales website."
- [2] "UK Data Service Census." [Online]. Available: <https://census.ukdataservice.ac.uk/>. [Accessed: 17-May-2018].
- [3] "Ordnance Survey: Britain's mapping agency." [Online]. Available: <https://www.ordnancesurvey.co.uk/>. [Accessed: 17-May-2018].
- [4] "MapInfo Professional - Mapping and Analytical Applications - Pitney Bowes Software," Pitney Bowes. [Online]. Available: <https://www.pitneybowes.com/ie/location-intelligence/geographic-information-system/mapinfo-pro.html>. [Accessed: 18-May-2018].
- [5] P. E. Fine, "Herd immunity: history, theory, practice," *Epidemiol. Rev.*, vol. 15, no. 2, pp. 265–302, 1993.

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GRADEMARK REPORT

FINAL GRADE

69/100

GENERAL COMMENTS

Instructor

Discussion / Brief report on LBS in relation to the provision of the student facilities and transport guides (CA 1) 20

A suitable discussion has been presented though perhaps you could have related this to the medical data under investigation also.

Data collection and entry to the system (CA2)20

What have you included in your data that will enhance that users experience with the GIS/LBS (CA 2)

Although you have verbally talked about your data collection methods what about some screen shots this would enhance and highlight and points under discussion.

Description of the spatial data sets (CA3)20

Again only verbal description images would enhance overall read. Also your workspace contained many unnecessary data layers form the UK training data. This may have caused your geocoding problems.

How you developed the layers within the system (CA 4)35

Functionality of system GIS and Website (CA 4)

The student has presented a good system and discussed his explorations through the GIS software and the available tools to help with the website design. Student demonstrates and in-depth understanding of the development environment and has taken several self-lead steps to enhance the programming tool which should be commended

Documentation / Report including: (CA5)5

Suitable documentation provided and generally a good development

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