

allocated and aggregated spatially and then analysed, with the results potentially re-used in other applications.

Actionable insights

From political campaigning to news reporting, and from highlighting commercial opportunities to predicting problem hotspots, real-time social media information provides real insight and allows analysts to devise more proactive responses. The predictive analytics field is on the rise, with current methods able to classify and segment the population of a constituency with high accuracy, which can be then utilised for political purposes.

Companies such as Cambridge Analytica are said to have played an important role in the recent US Presidential election campaign, gathering profile data from multiple sources and applying advanced data modelling methods and psychometrics to identify target audiences in each state. The resulting communication strategy derived from this geospatial analysis often focused on identified undecided voters. By pushing a tailored message that ticked the boxes of particular profile groups, candidates sought to gain that extra edge in their campaigns.

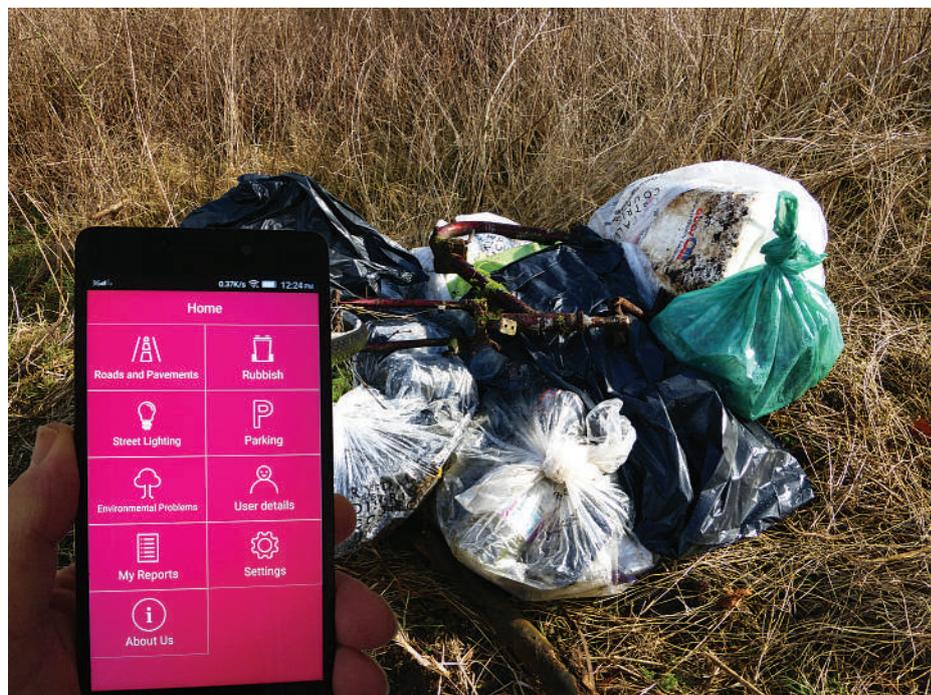
But it's not only for electoral purposes that geographical data is currently being used. Our mobile devices can also contribute towards causes for the public good. Initiatives such as the Humanitarian Open Street Maps Team have played a key role in natural disaster situations, providing accurate, reliable and current cartographic information for emergency response teams.

In parts of the world where such data is not easily available, the Humanitarian Open Street Map (HOTOSM) project (<https://hotosm.org>) enlists a huge network of volunteers to fill the gap. These volunteers use satellite imagery to update or compile mapping on terrain, transport networks and other vital infrastructure that teams on the ground can then access. These crowdsourced maps have helped to save lives in events such as the 2011 earthquake in Haiti, the 2014 Ebola epidemic in West Africa and the 2015 earthquakes in Nepal.

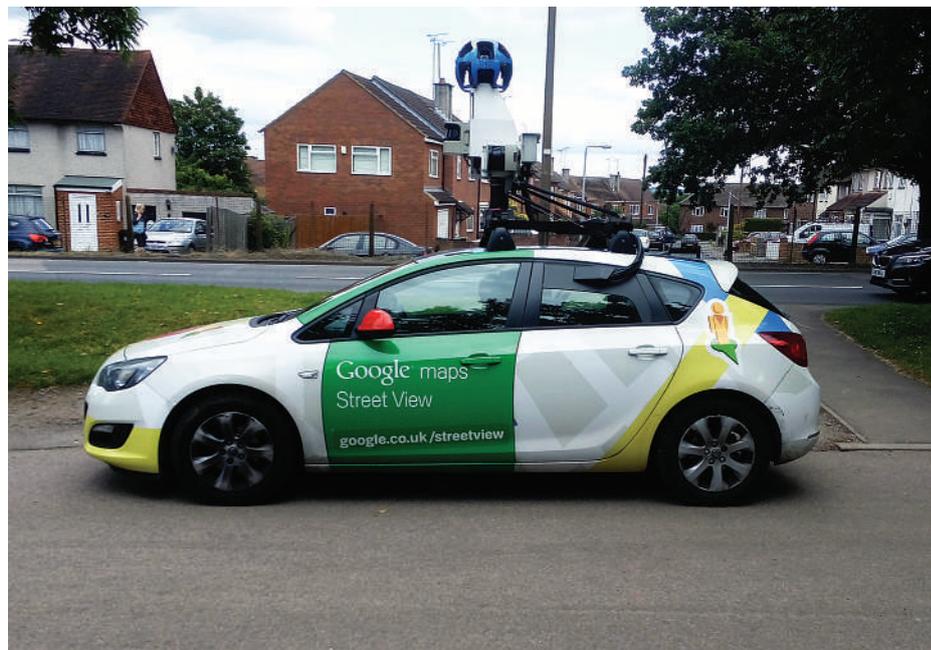
Data avalanche

The avalanche of data we generate can be difficult to process. The complexity of getting specific insights from these huge swathes of information has been likened to trying to take a sip of water from a fire hose. The term Big Data was coined to describe and frame these large volumes of digital information, both structured and unstructured, which can be very hard to analyse using traditional statistical methods and tools.

It's not only the sheer volume that represents a challenge, but also the speed at which this constant stream of information



Using the mapping-enabled My Glasgow app, citizens of Scotland's largest city can keep the Council informed of incidents of fly tipping, potholes, overhanging trees, street light failures and more



As well as capturing its own data, Google makes use of information from users to improve its mapping service. Photo: GeoConnexion

is coming into organisations. This makes it particularly challenging to process and integrate within corporate systems. Businesses and public bodies are trying to adapt and integrate data analysis into their decision-making processes.

Summarising and visualising patterns and insights from datasets is critical. Most of us are much more comfortable reading a map than we are deciphering a spreadsheet. Geographical information System applications play a key role in processing this spatial data into maps that we can then interact with to make informed personal and commercial decisions.

There are multiple initiatives to make

more datasets open and available to public and businesses alike. There are many benefits to be had from sharing information, from informing customer choices to keeping residents up to date with local news.

Commercial potential

There are numerous commercial uses of real time mapping data, from exploring consumer behaviour to identifying buying patterns and trends, all of which can help companies more effectively target their products and services.

For example, shopping centres can produce heat maps of footfall, identify areas that are more attractive to customers and,



On the trail in Arizona. But did Donald Trump's victory in the presidential campaign owe more than a little to data modelling and psychometric profiling to sway voters? Photo: Gage Skidmore

just as importantly, areas that are being avoided. This can be used when selecting the best location for a particular kind of retail outlet. Using technology such as Bluetooth beacons within premises, mapping can be taken down to a more granular level, even to recording which shelves in a shop are most popular and the typical routes taken through a shop by customers

The mobile data we generate as consumers and as residents of towns and cities already has an impact on how our surroundings are being shaped. Our spatial behaviour is analysed by business planners when looking for new premises. Data-generated maps that depict a high footfall, when coupled with geodemographics and consumer-generated data for an area of interest, can identify the ideal location for, say, a restaurant, hotel or business hub.

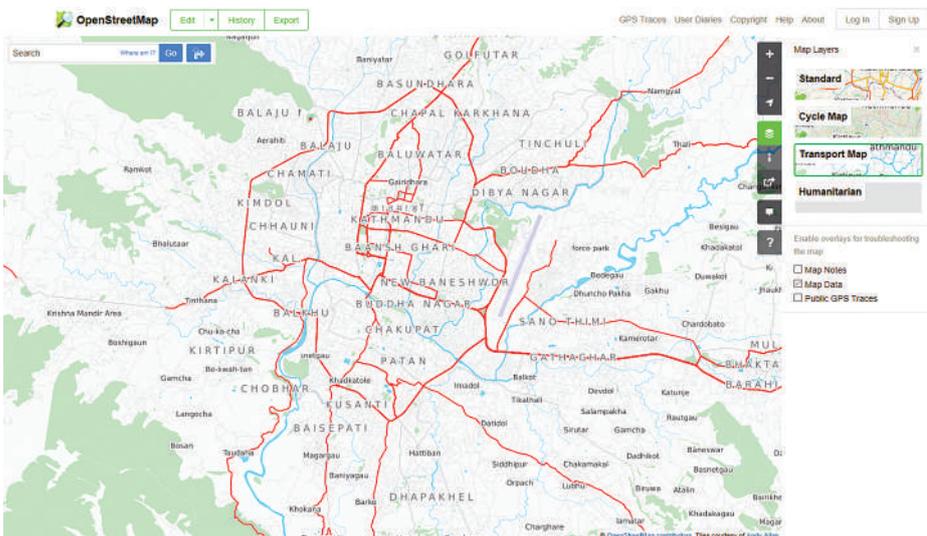
Citizen engagement

These kinds of datasets also encourage citizens to engage with urban planning and local authority initiatives. If we are given access to information in a form we understand, such as a map, we are much more likely to interact and give informed opinions on what is happening, or indeed should happen, and keep us involved with the development of our towns and cities. If local authorities continue to make information available through open data initiatives, then it is only a matter of time before the public sees the benefit of it, uses it, and adds to it.

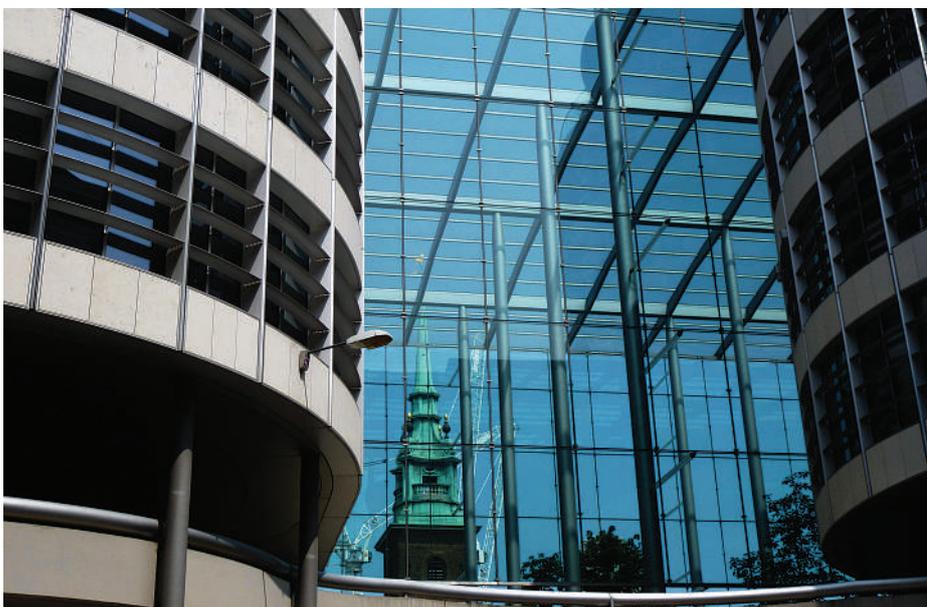
The information we are sharing can also be captured and used for malicious purposes. Each mobile phone has a unique identifier which can be traced to the data being collected, regardless of the network being used, so there is potential for data breaches. Hence the emphasis on data privacy and concern that the right policies are in place to protect us from the misuse of data. While all released information should be aggregated to protect individual identities, adherence to digital best practice is still the way forward.

We are all producing cartography without even realising it. Whenever and wherever we use a cellphone or wearable device we are helping to create a map. If this is used wisely, our data could improve our experience as customers and our quality of life as citizens.

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Mapping compiled and provided by the HOTOSM project helped with aid delivery and reconstruction efforts in the aftermath of the 2015 earthquakes in Nepal. Image: HOTOSM Team



The use of retail and office space can be optimised by exploiting real-time mapping data. Photo: GeoConnexion