The Potential of Geographical Information Systems

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Rates of chronic kidney disease in Sheffield

Source: Aminu Bello, SKI
Genuinely Irritating Software?

Standard GIS definition:
“A computer system for capturing, storing, checking, integrating, manipulating, analysing and displaying data related to positions on the Earth's surface”

[AGI GIS Dictionary]
What is Geographic Information?

Any information or data that has some **spatial** characteristic or element
Points (a hospital?)
Lines (a road?)
Areas/Polygons (a district?)
Geography + Data

• Each geographical feature is treated as a specific ‘object’ described by co-ordinates

• And has a single record in the underlying database (‘attribute table’)

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Doctors</th>
<th>Nurses</th>
</tr>
</thead>
<tbody>
<tr>
<td>342</td>
<td>Dr. James</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>343</td>
<td>Dr. Smith</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID</th>
<th>Road</th>
<th>Speed</th>
<th>Collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>A34</td>
<td>60</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID</th>
<th>Authority</th>
<th>Population</th>
<th>SMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>25AA</td>
<td>Flatland</td>
<td>60000</td>
<td>123</td>
</tr>
</tbody>
</table>
What can it do?

Here’s a table of data

Injuries from road traffic collisions: sex, age, nature of injury, vehicles involved...

Here’s a map of it

where did the collisions occur?

Here’s an analysis of it that uses both spatial and aspatial characteristics

How does survival from serious injury vary according to the degree of rurality of the collision location?
Modelling campylobacter loading from farms in New Zealand
Hunter, Hawke, Rigby
Ireland: access to service locations by travel time
Existing locations: 23 service points

Constrained to drive time below 45 mins
• What does this map show?
  – The relationship between pokie locations and NZDep varies across the South Island
  – The ‘most unequal’ distribution of pokies is in the southern part of the island

• Why is it helpful?
  – The results suggest that actions to deal with the disproportionate location of pokies in poor areas could be targeted toward these areas
Maps have to be carefully constructed. The introduction of computer-based mapping, and the decline in formal training in cartography, mean that many maps are produced by people who are not trained in their construction.

Decisions are made based on maps: hence the effects can be drastic
  Inadequate resource allocation
  Wrong location of healthcare to meet need
  Inappropriate policy decisions….

Spatial analysis: do the users understand what has been done?

- KFC approach    [do you use peer-review?]
- Reproducibility

Looking at simple thematic maps, we need to consider several issues:
  •Purpose
  •Classification
  •Colour
  •Scale
  •Data
Illustrating the effects of a number of classes
Deprivation in Wakefield District
Population and Deprivation adjusted Cartogram

Wakefield City subdivided into:
a) Wenthorpe, Outwood, Stanley
b) Lupset, Painshaw, Thornes
c) Eastmoor, Portobello, Agbrigg, BelleVue
d) Sandal and South

IMD 2004 Deprivation Ranking
- Most deprived 10%
- Most deprived 20%
- More deprived 40%
- Least deprived 60%
Estimated TB incidence rate, 2003
Cartogram of tuberculosis cases

Source: www.worldmapper.org,