Why Location Matters

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Spatial issues in data thought about at least since 1854

- John Snow’s Cholera Map
Historically - Directional Data

Directional data analysis thought about since at least 1861

Modifiable Areal Unit Problem

Thought about since at least 1934

Spatial autocorrelation in data thought about since at least 1950

Simpson’s Paradox

\[ d_{ij} = S + R y_{ij} + \epsilon_{ij} \]

| Estimate | Std. Error | t value | Pr(>|t|) |
|----------|------------|---------|----------|
| (Intercept) | -0.0000 | 0.1861 | -0.00 | 1.0000 |
| year | 0.2150 | 0.0178 | 12.11 | 0.0000 |

Simpson’s Paradox
Simpson’s Paradox

Random Coefficient Model (MLM)

\[ d_{ij} = s_i + R y_{ij} + \epsilon_{ij} \]

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Std.Error</th>
<th>DF</th>
<th>t-value</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-0.95</td>
<td>0.64</td>
<td>13139.00</td>
<td>-1.50</td>
<td>0.13</td>
</tr>
<tr>
<td>year</td>
<td>-0.18</td>
<td>0.01</td>
<td>13139.00</td>
<td>-17.18</td>
<td>0.00</td>
</tr>
</tbody>
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Why be Spatially Aware?

- Atomic fallacy - Errors due to treating elements as separate ‘atoms’ outside of their spatial context.
- Ecological fallacy - Errors occur in part from spatial aggregation - aggregated values not always representative.
- Being visual - important for spatial data
- Is everything homogeneous? - relationships between variables could change over space
- Regional Bias in response to surveys
- All of these relevant to surveys...
Introducing the talks

17:10-17:30 Using geographically weighted regression to explore spatial variation in survey non-response (Kaisa Lahtinen, University of Liverpool)
17:30-17:50 The role of geography in small area estimation (Nikos Tzavidis, University of Southampton)
17:50-18:10 Exploring survey results with visualization (Aidan Slingsby, City University London)
18:10-18:30 Discussion
Thank you

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