Module INM433 – Visual Analytics

Practical 01

Display Interaction

given by

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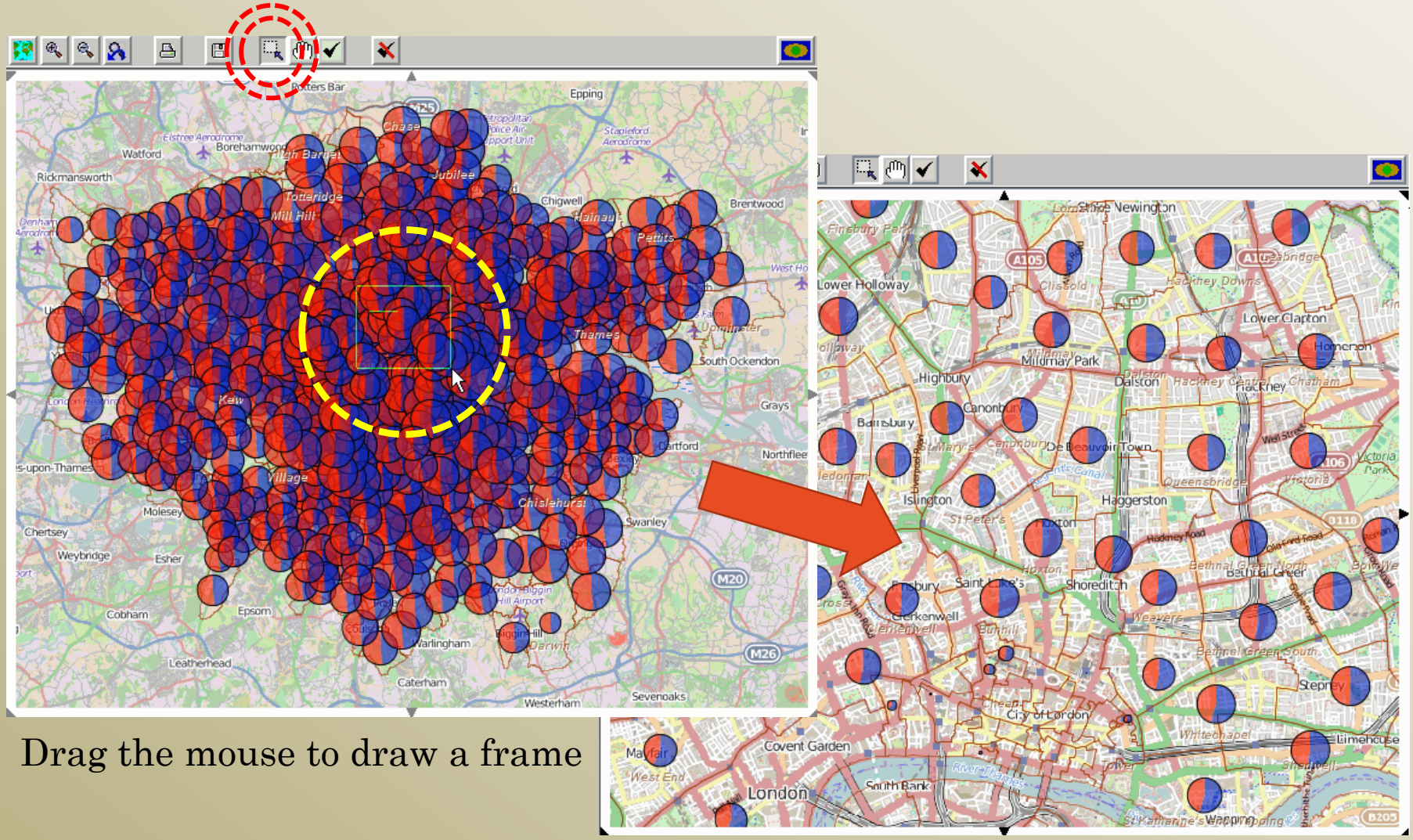
Display interaction

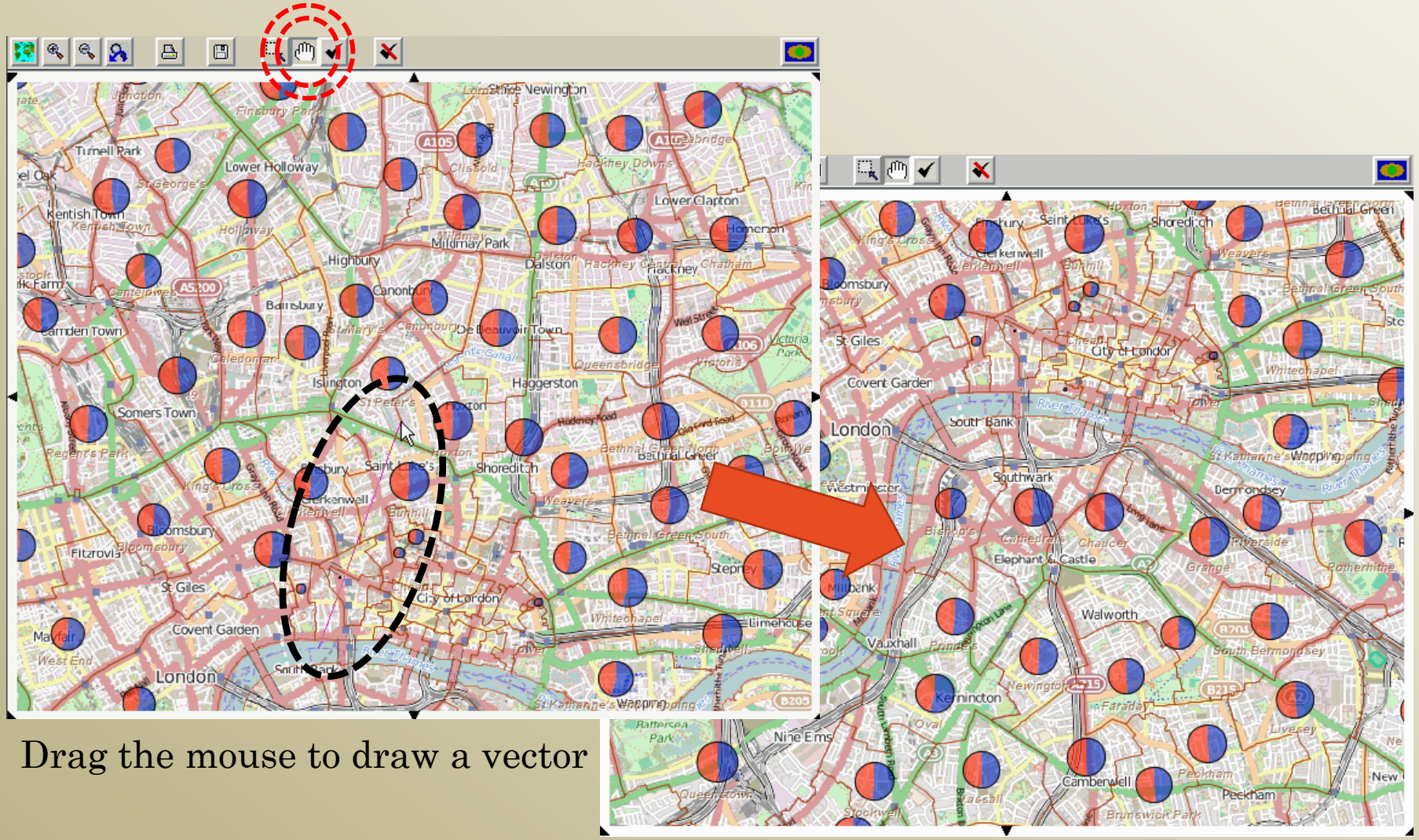
- It is often impossible to create a picture that would be fully sufficient for a task
- Interactive operations help analysts to gain more information from a display than would be possible by only viewing
- Purposes of interactive operations:
  - Access exact data values
  - Link pieces of information from complementary displays
  - Decrease display clutter
  - Focus on data portions
  - Find particular pieces of information
  - Compare values
  - ...

Map zooming



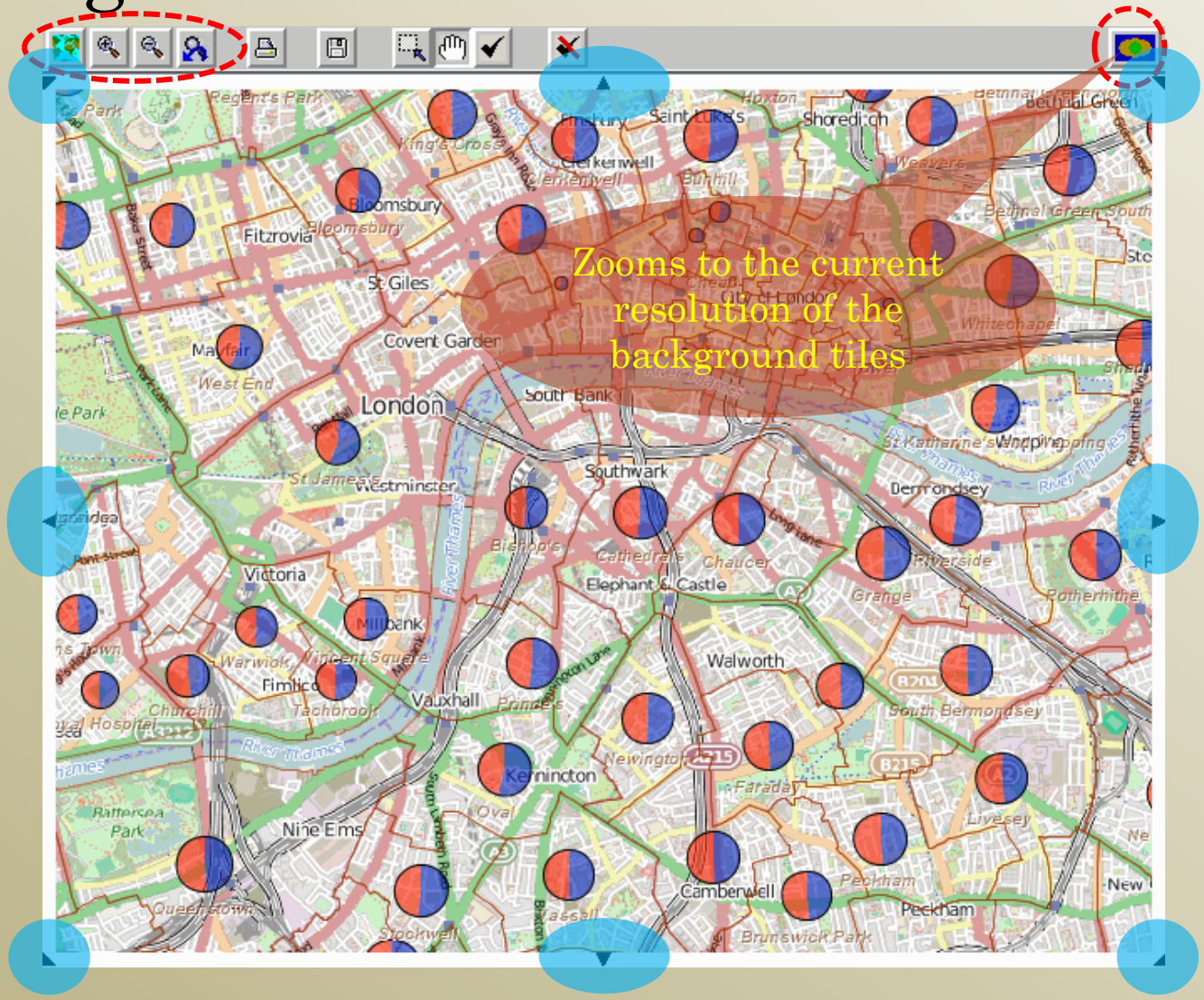
Drag the mouse to draw a frame

Map shifting

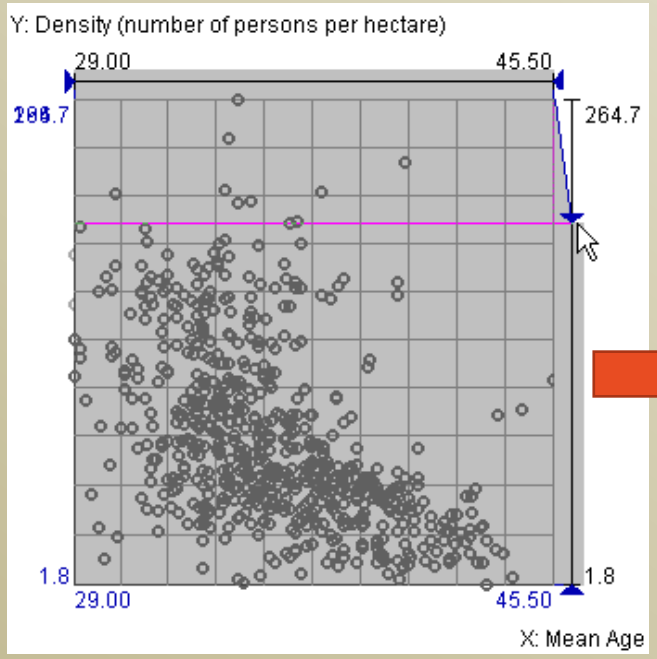


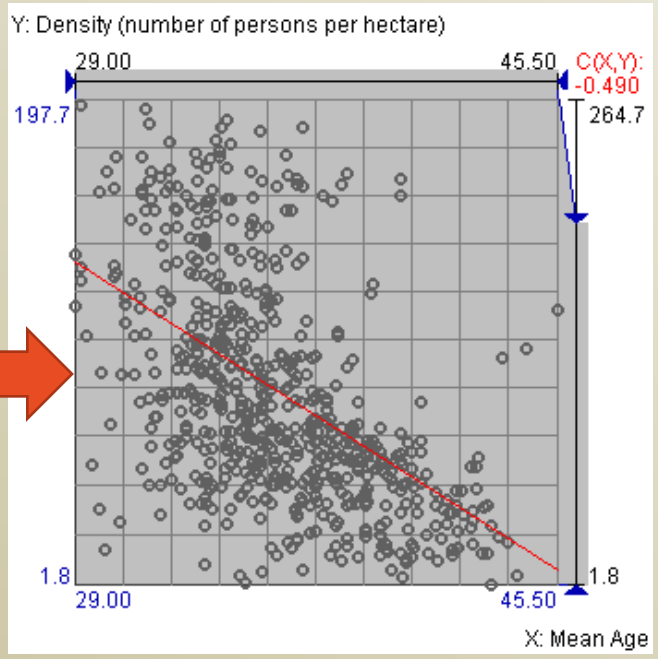
Drag the mouse to draw a vector

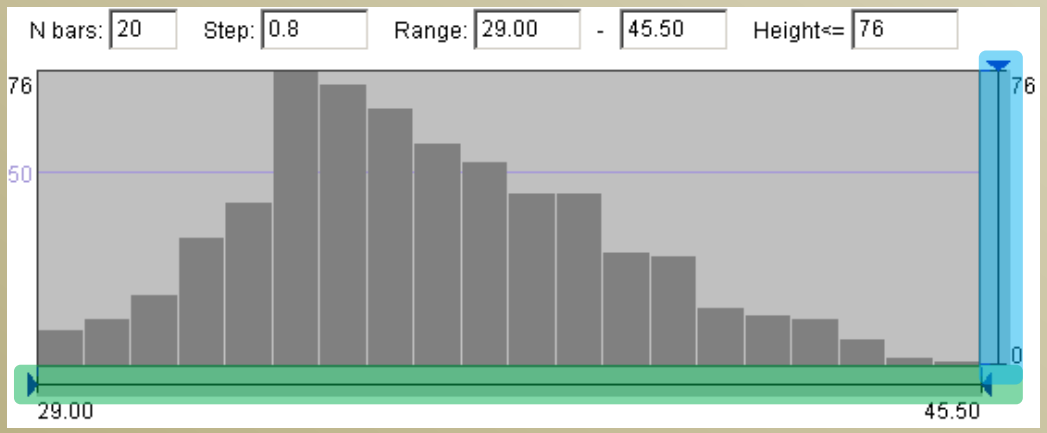
Map: further controls for zooming and shifting



Zooming and focusing: other displays

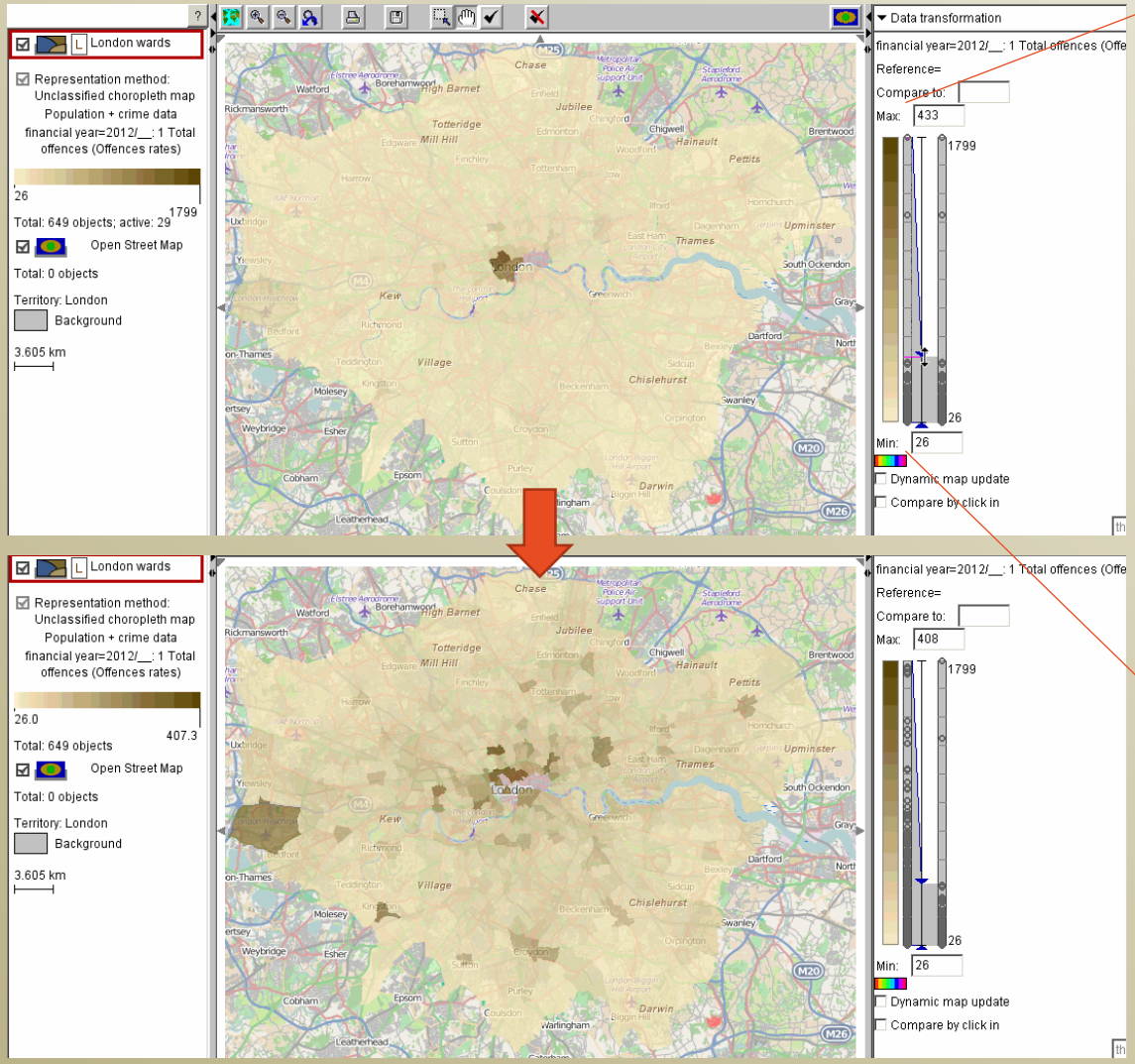


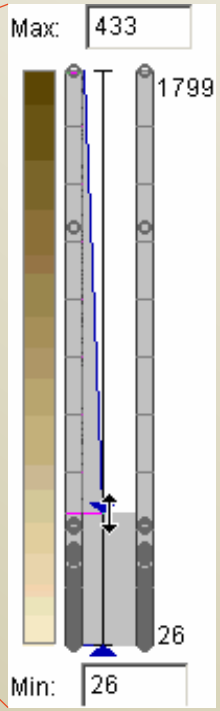




Horizontal and vertical focusers are included in many displays. They are operated by putting the mouse cursor on one of the triangles and dragging the mouse.

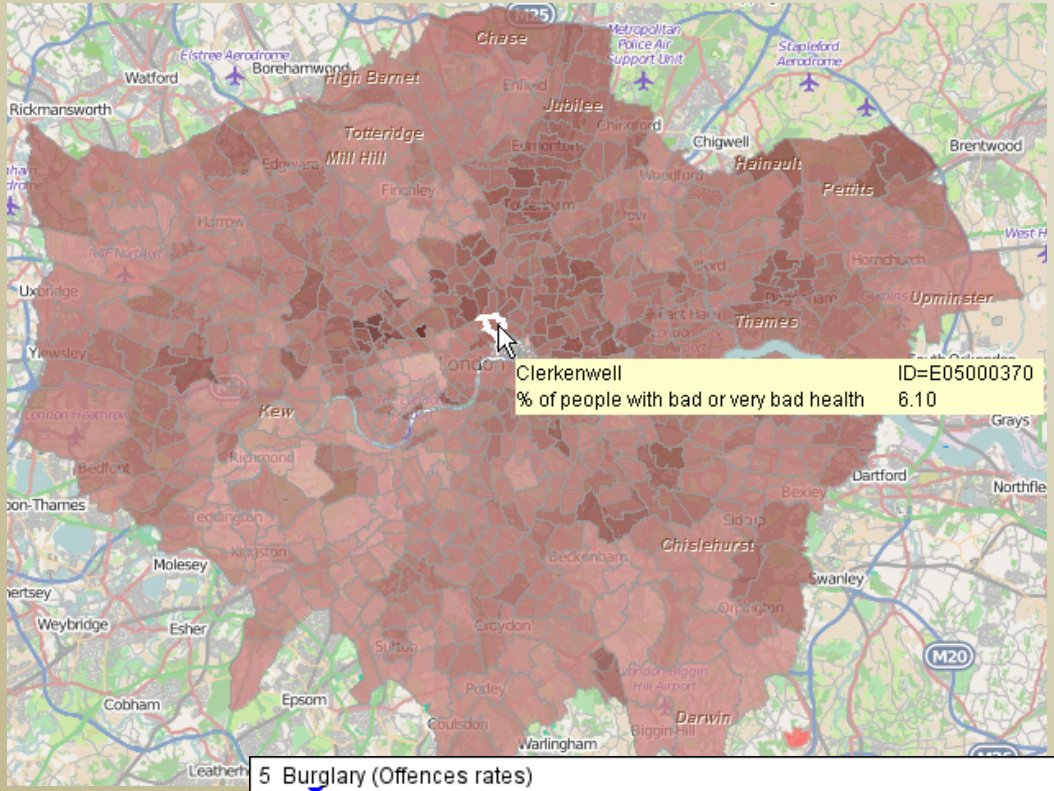
Focusing applied to data visualisation on a map

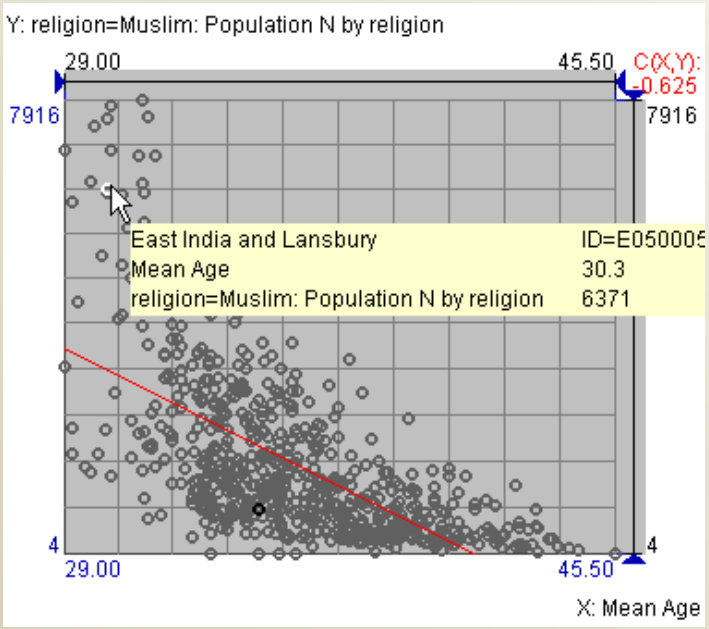


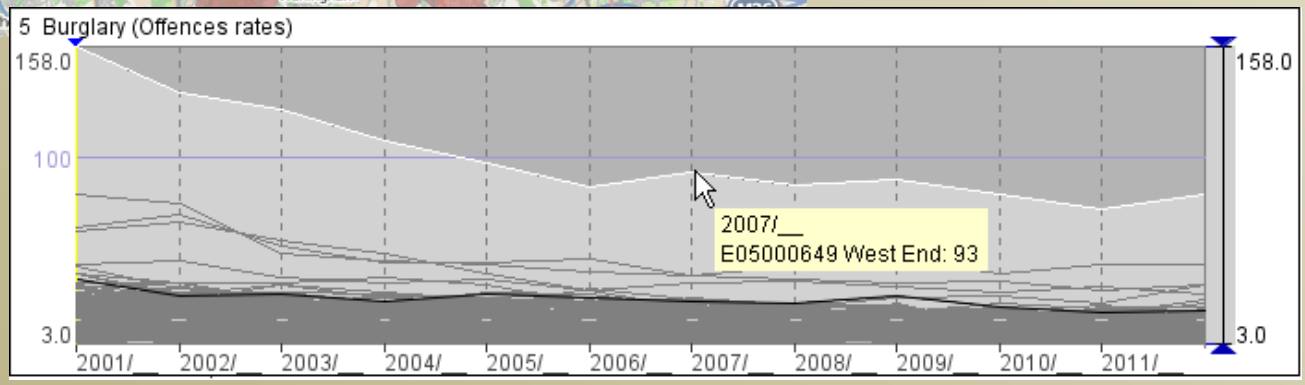


The focusing has made the map more expressive.

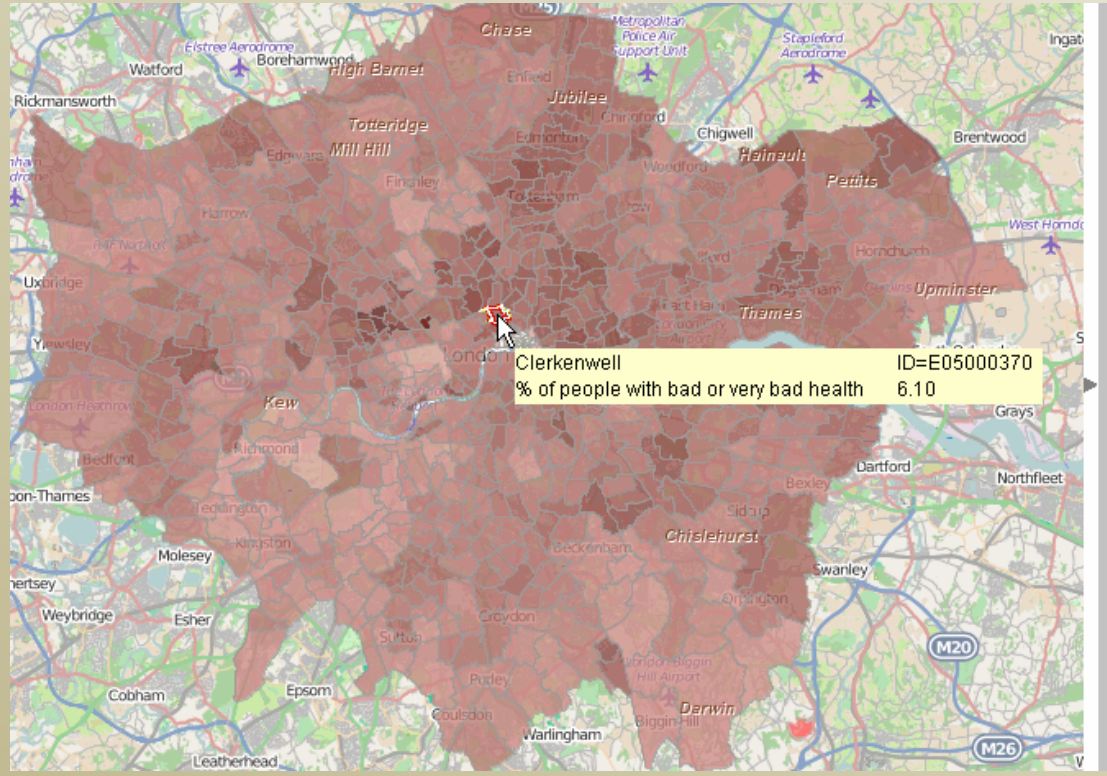
Access to exact data values

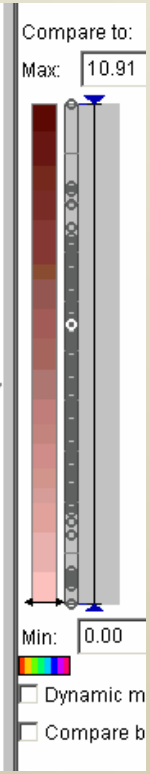


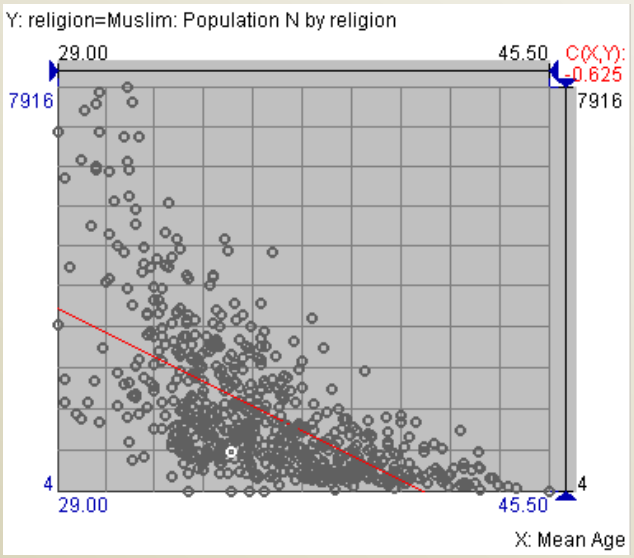


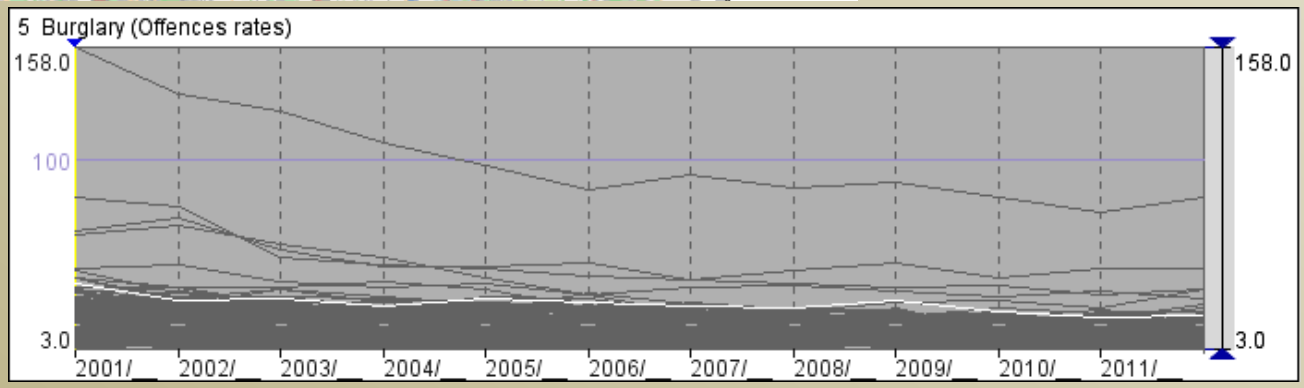


Display linking through highlighting

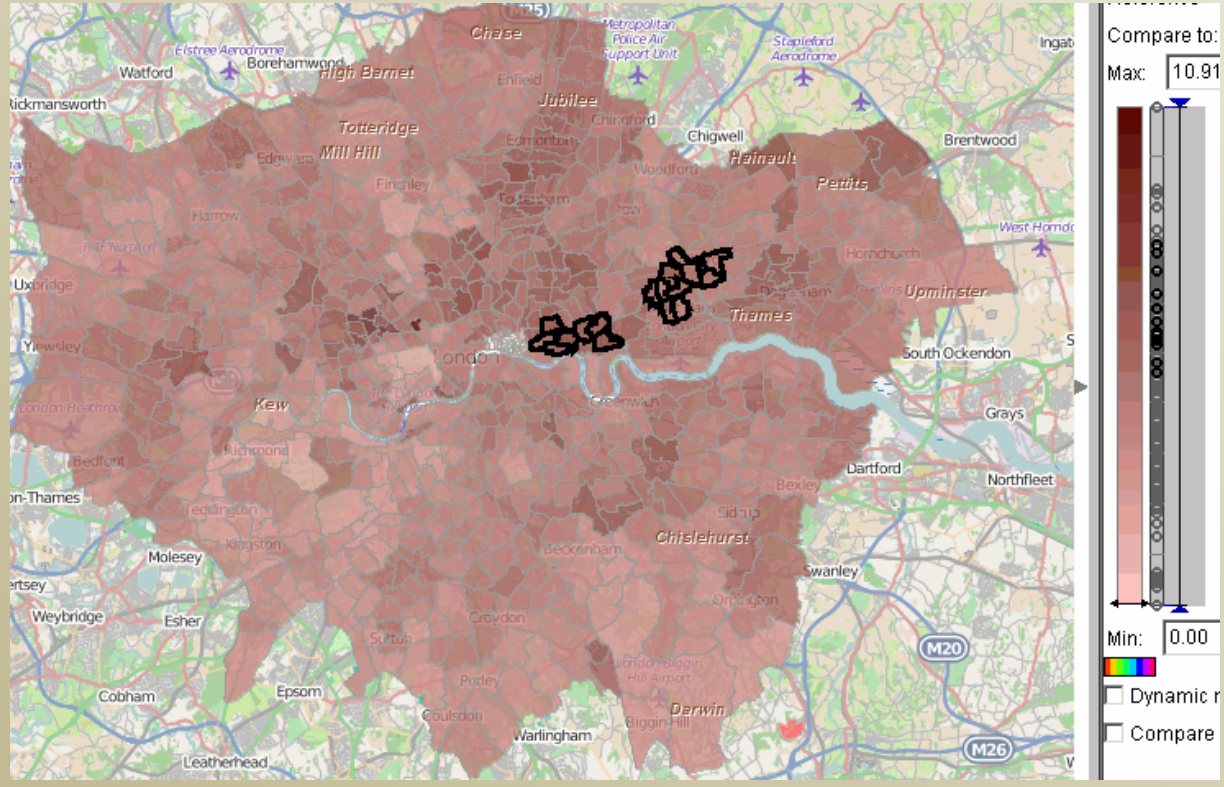


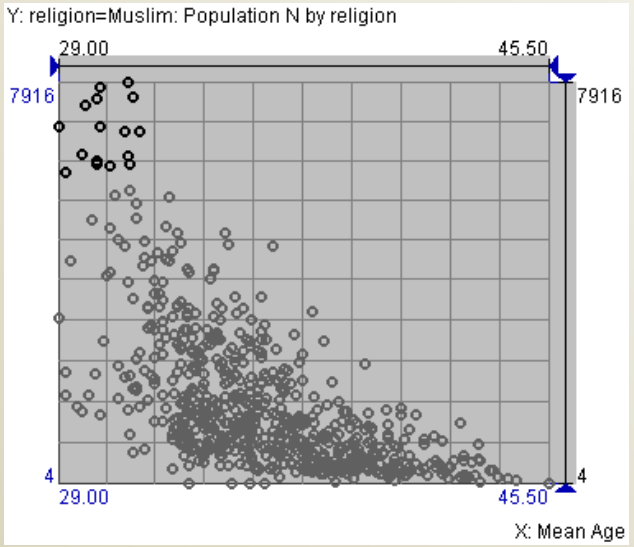


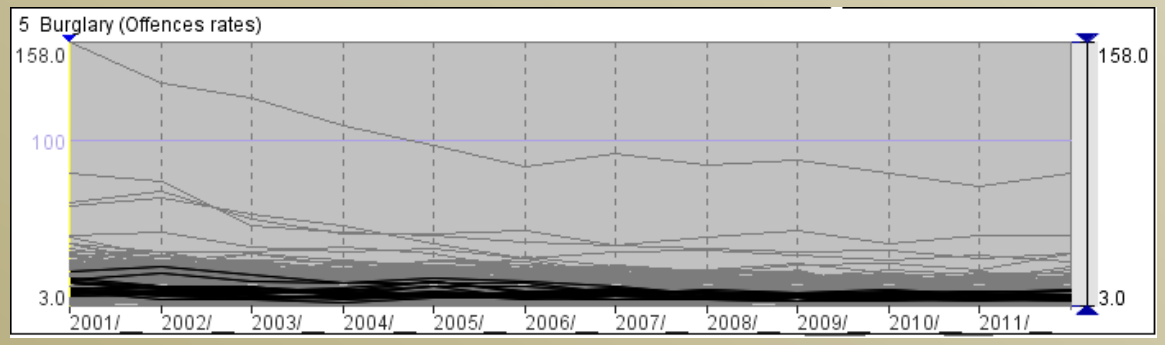




Display linking through selection







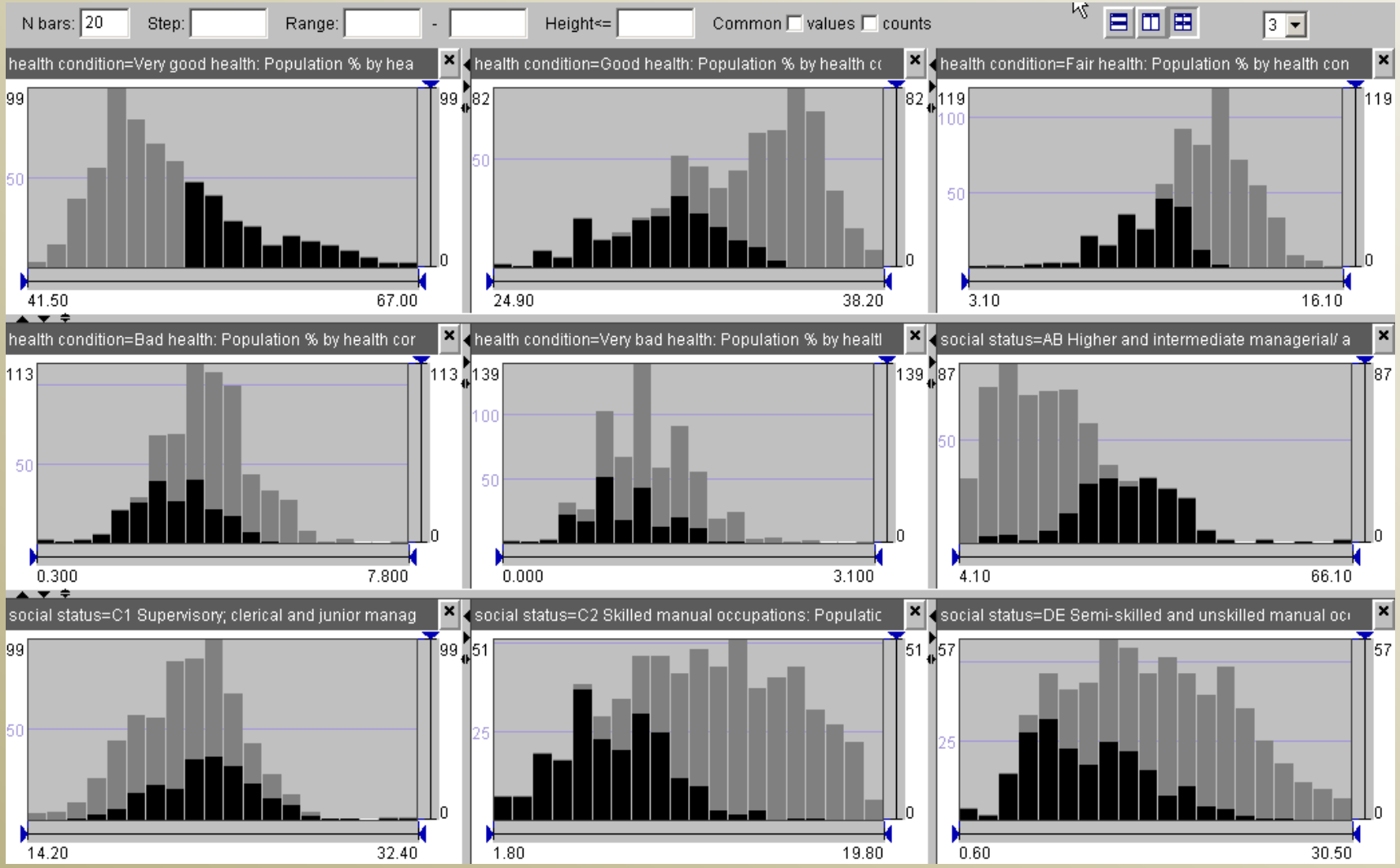
<u>To select</u>: click or drag the mouse.
<u>To deselect</u>: click or drag the mouse again.
<u>To deselect all</u>: double-click on a mark-free location within the display.

Highlighting and selection on a map

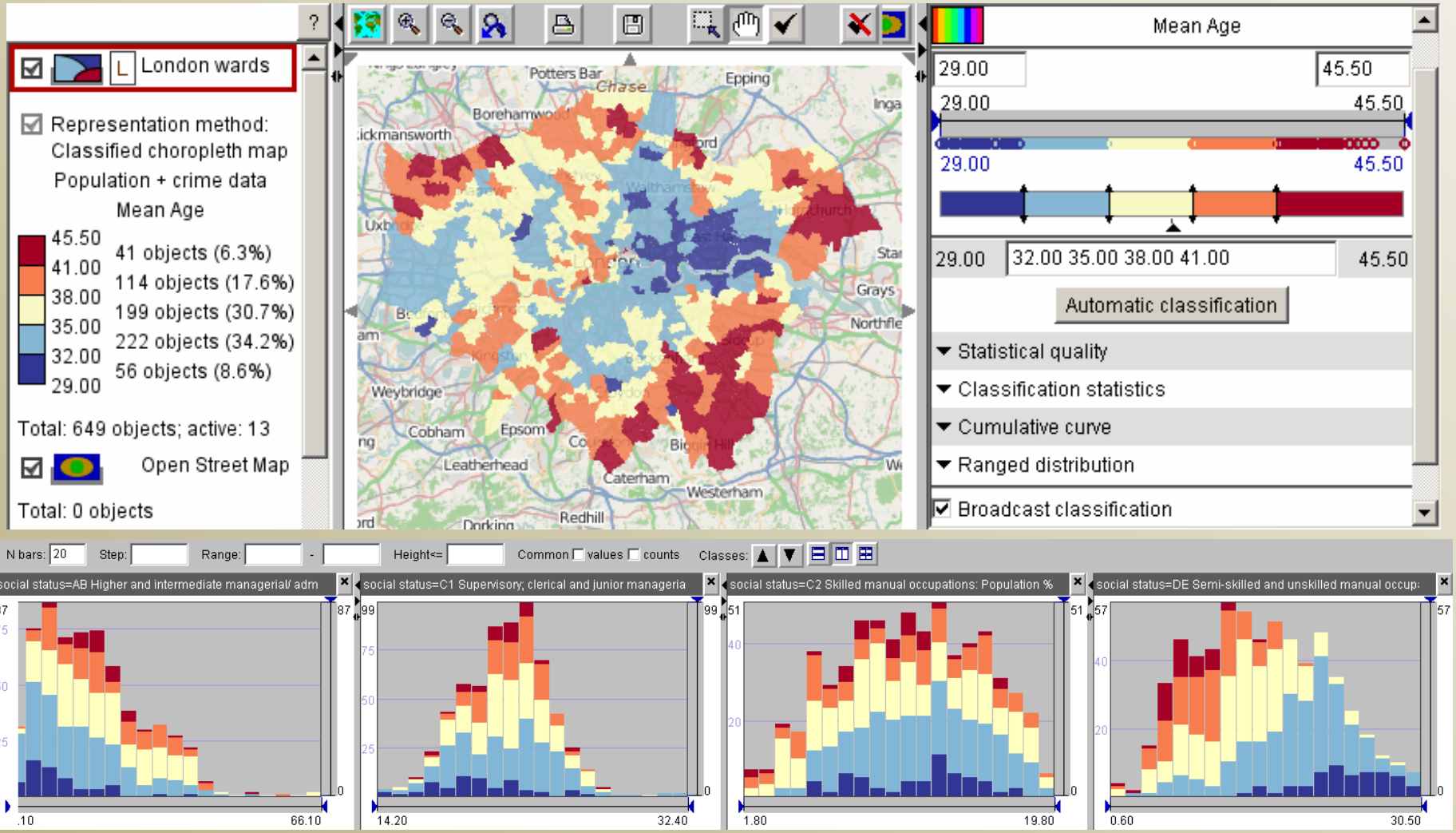
- Is applied to the currently active layer (marked in the map legend by a red frame around the layer's name)
- Selection by mouse dragging works when the button ✓ above the map is in the sunken state:

- The next button deselects all selected objects of the currently active map layer.

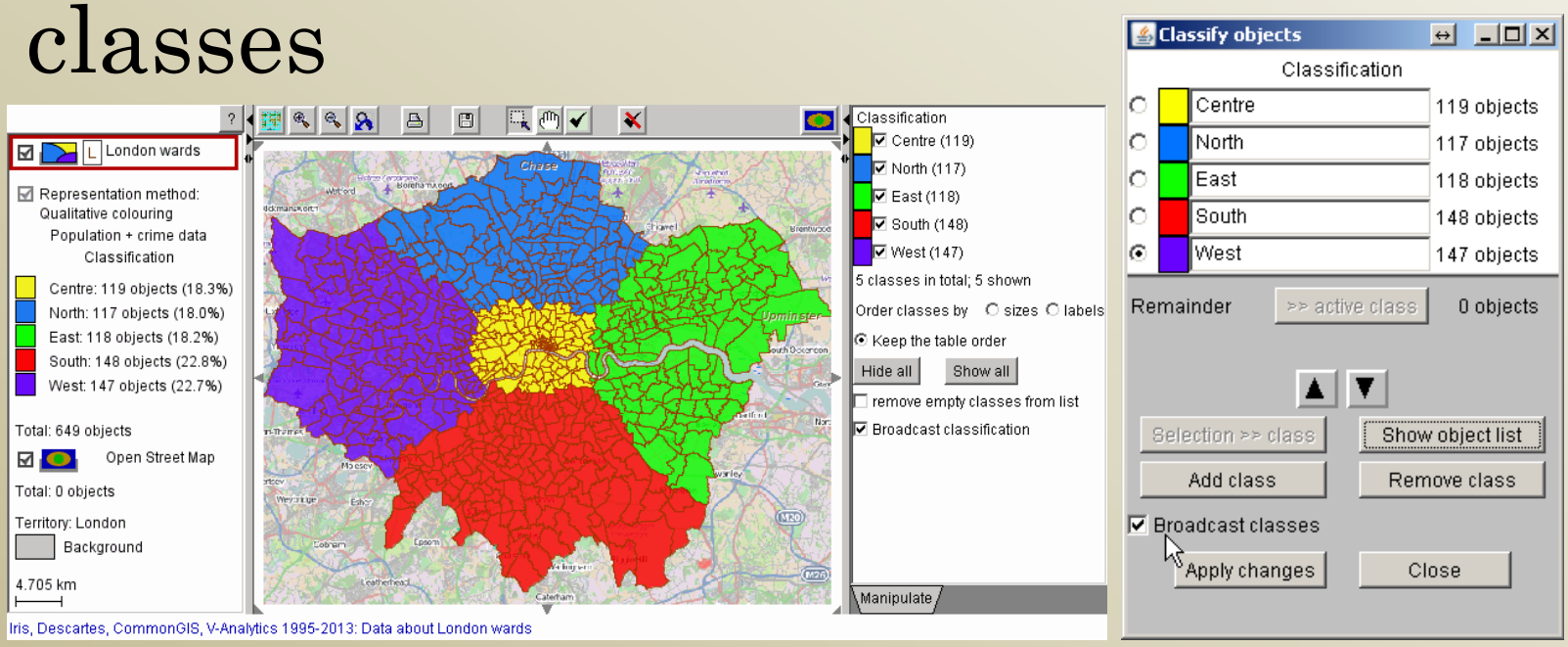
Exploration of relationships between attributes using interactive selection

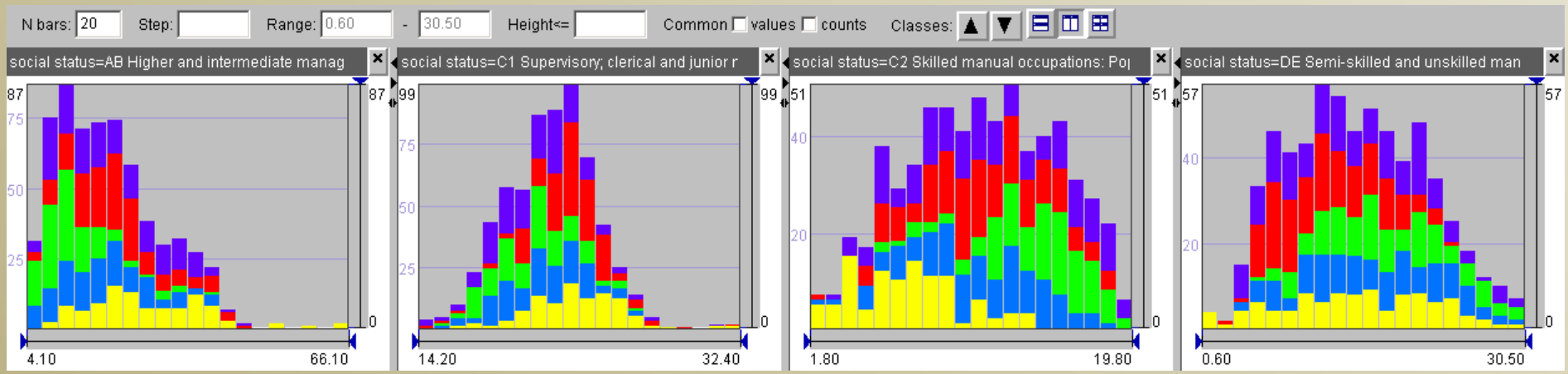


Classification and propagation of classes

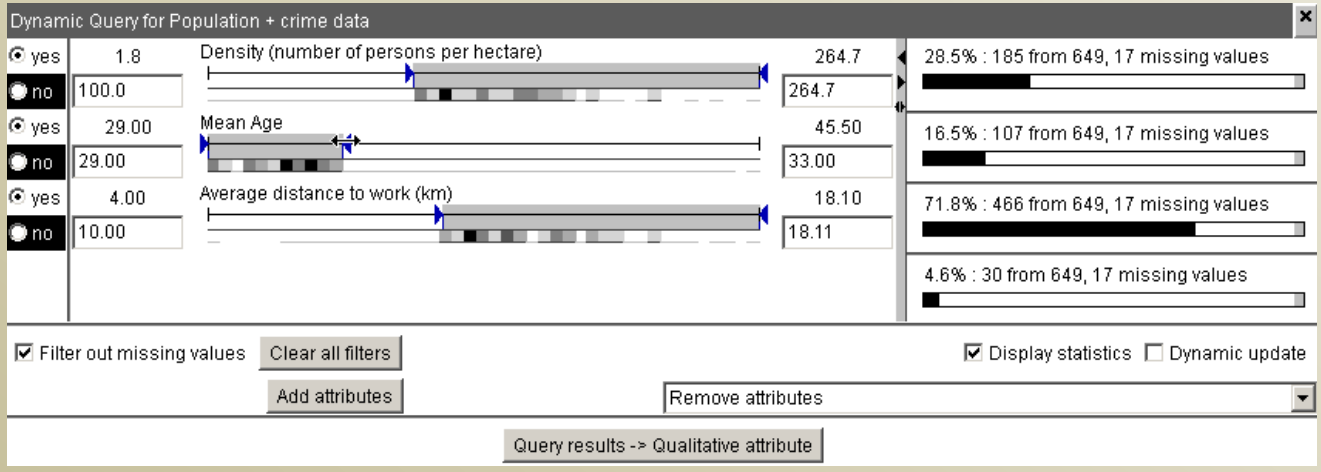


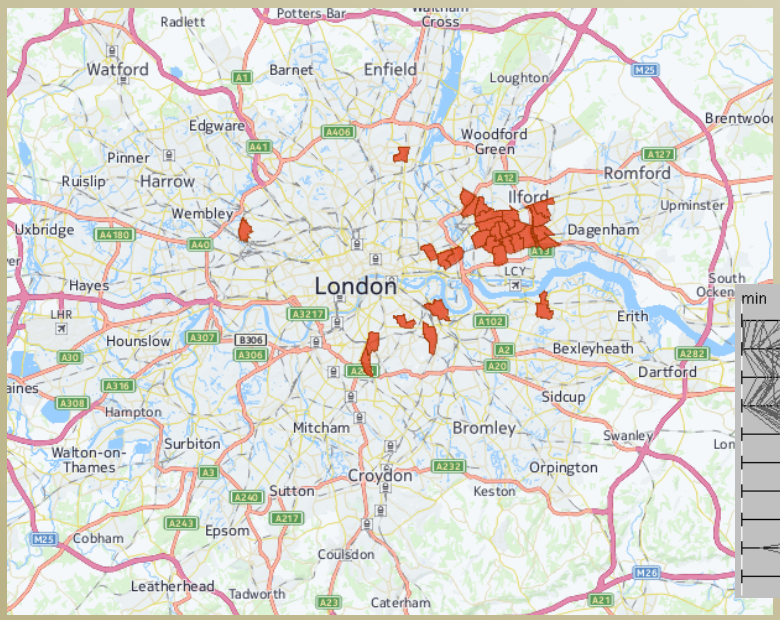
Classification and propagation of classes

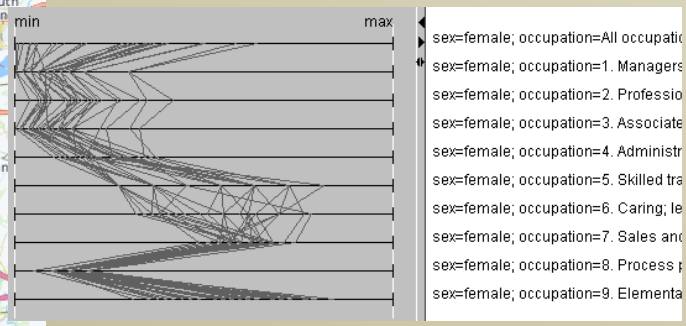


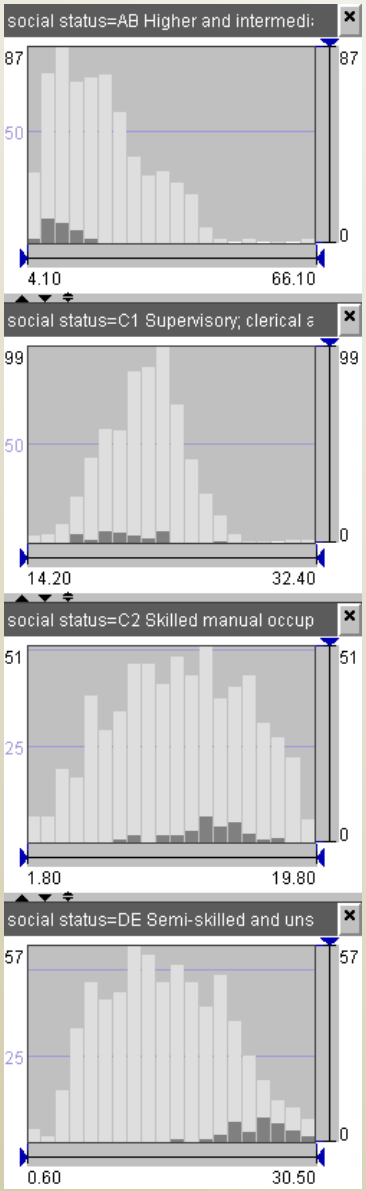


Filtering by attribute values

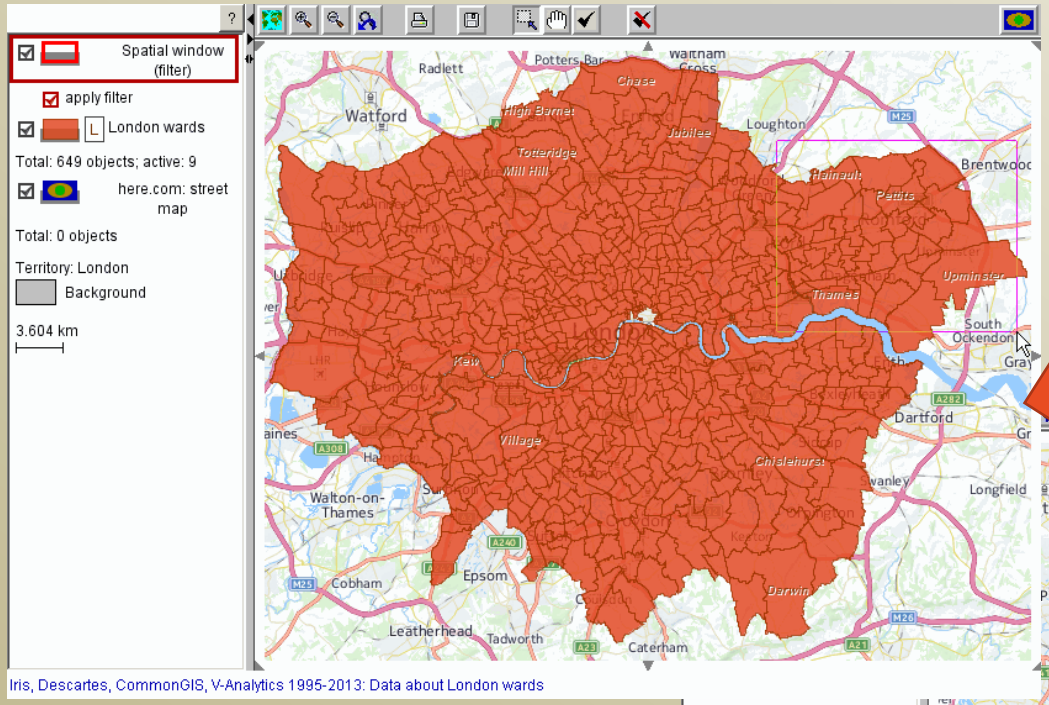


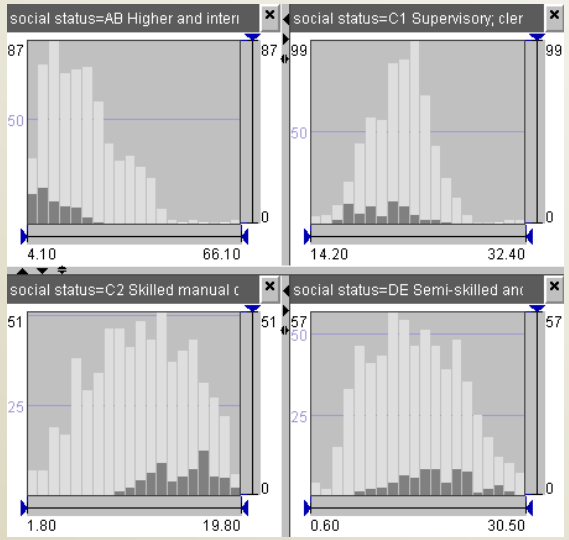


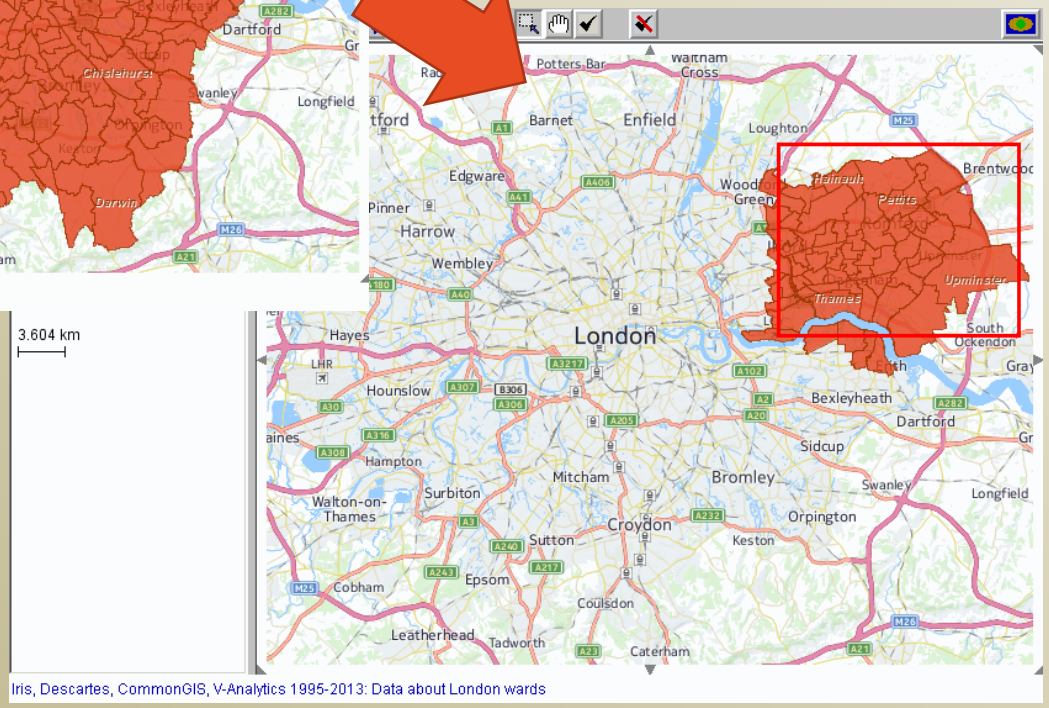




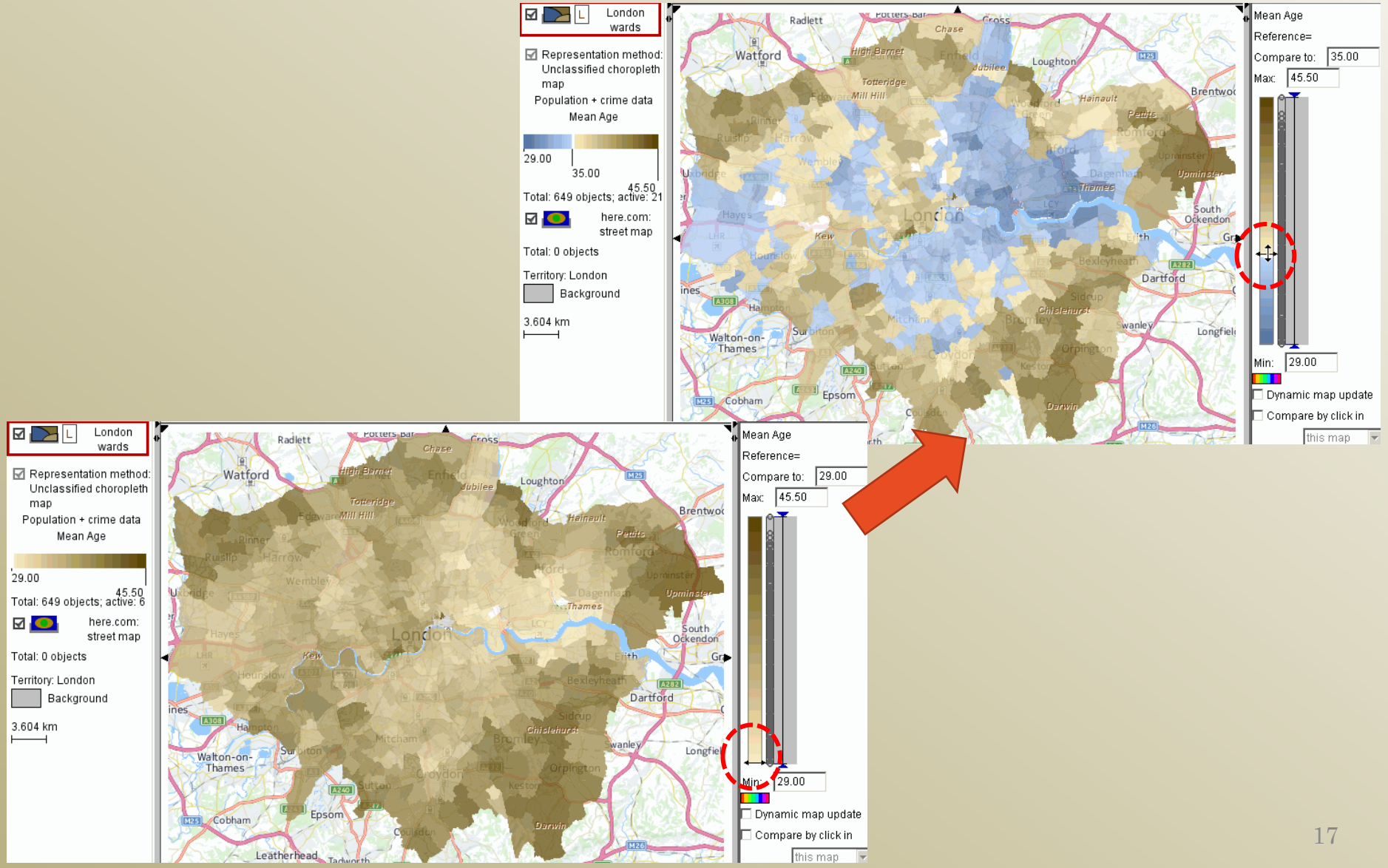
Spatial filtering



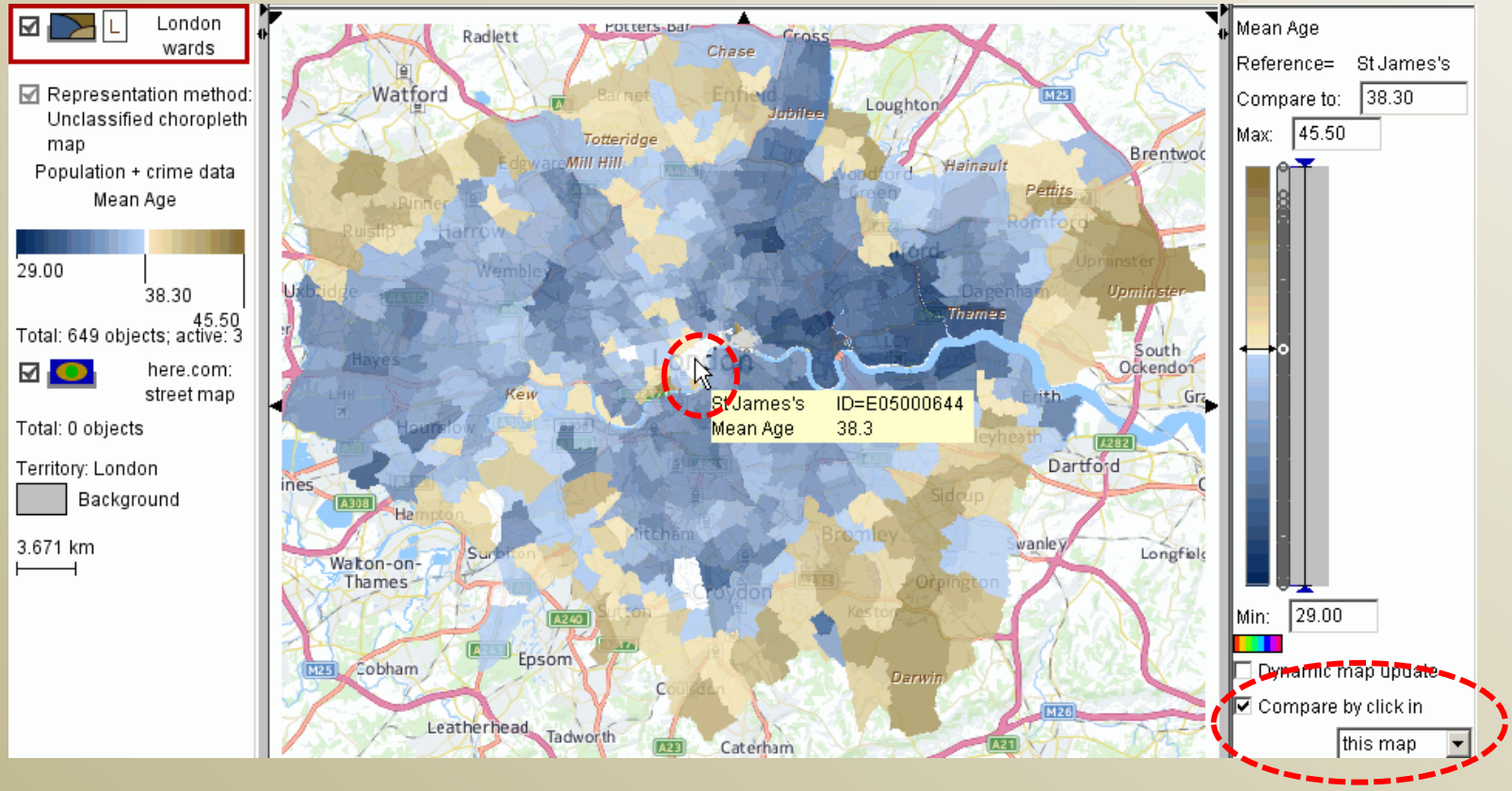




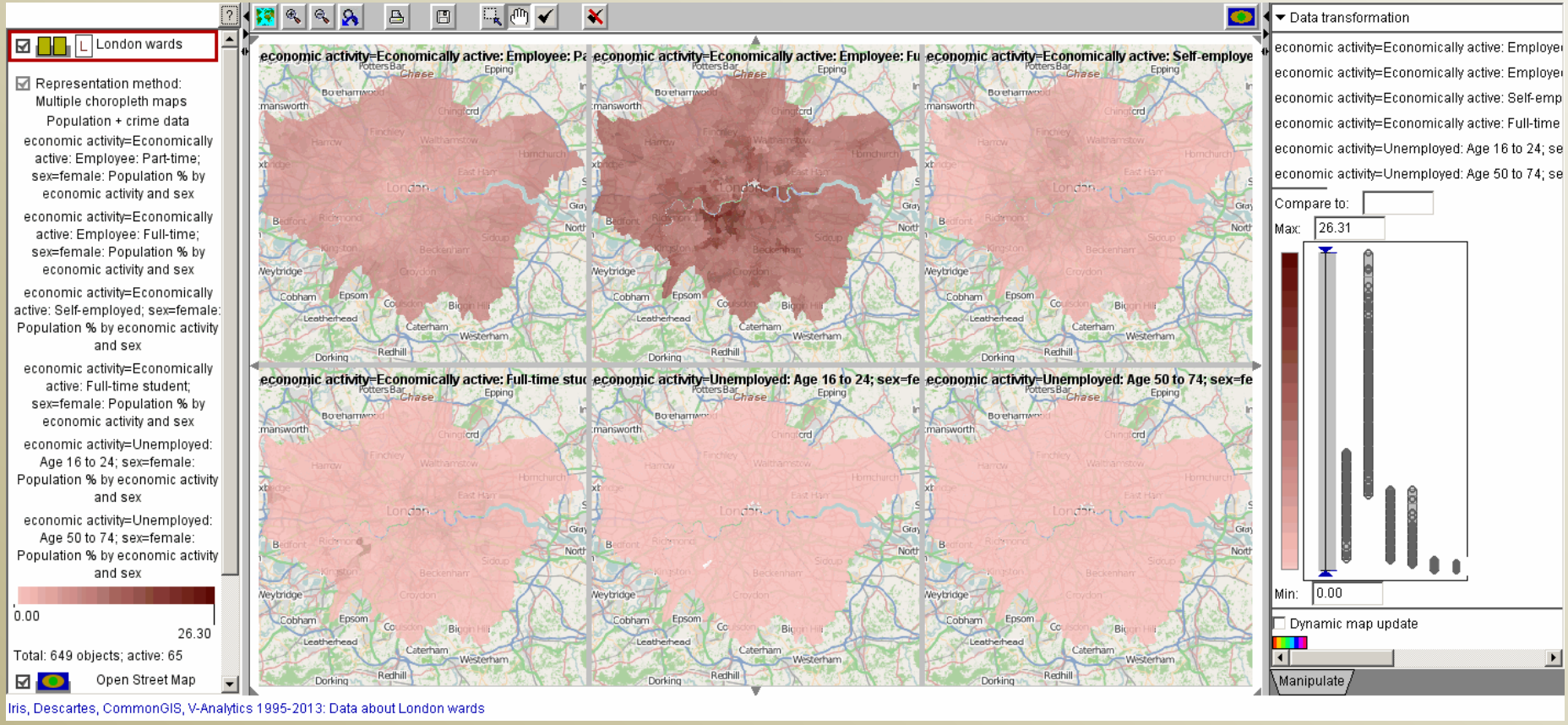
Modification of colour scale



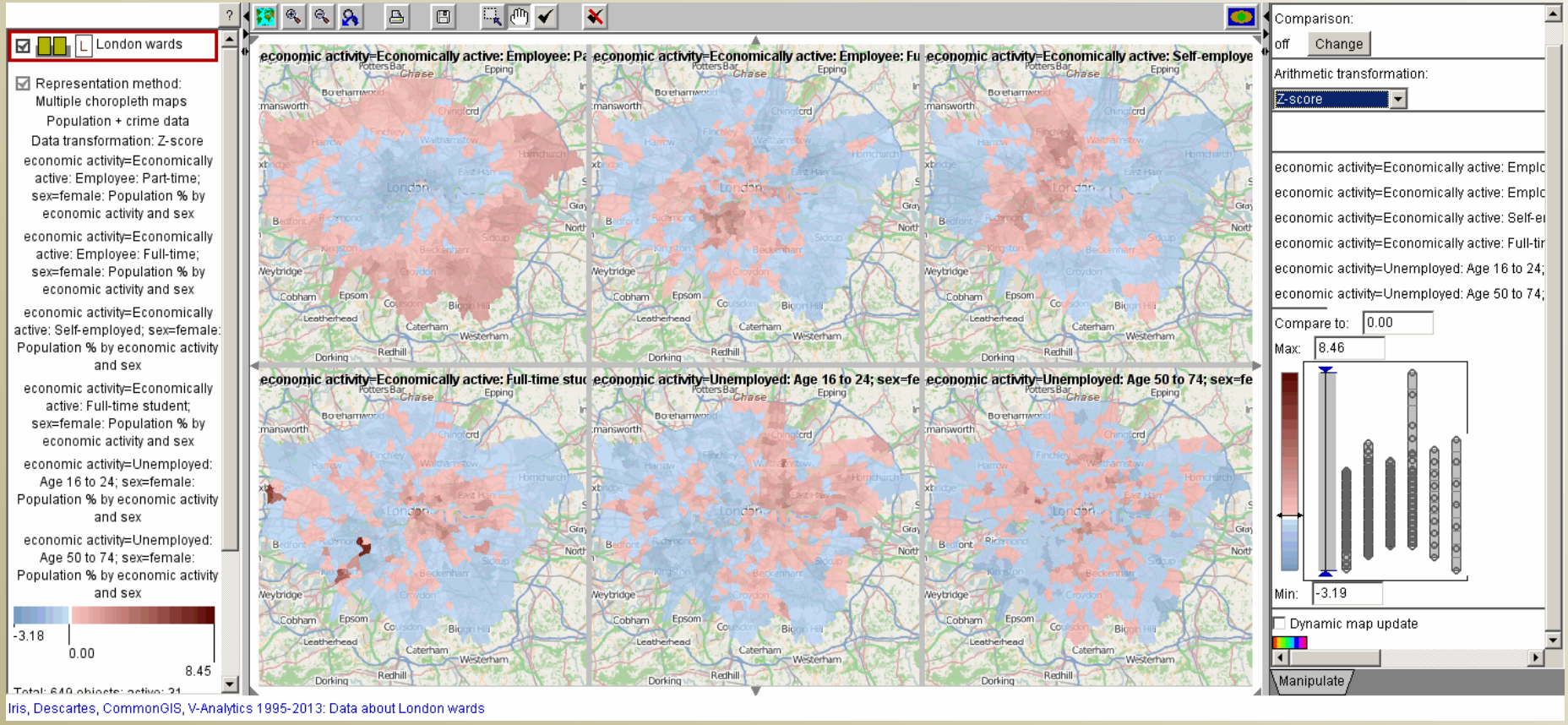
Visual comparison



Data transformation: before

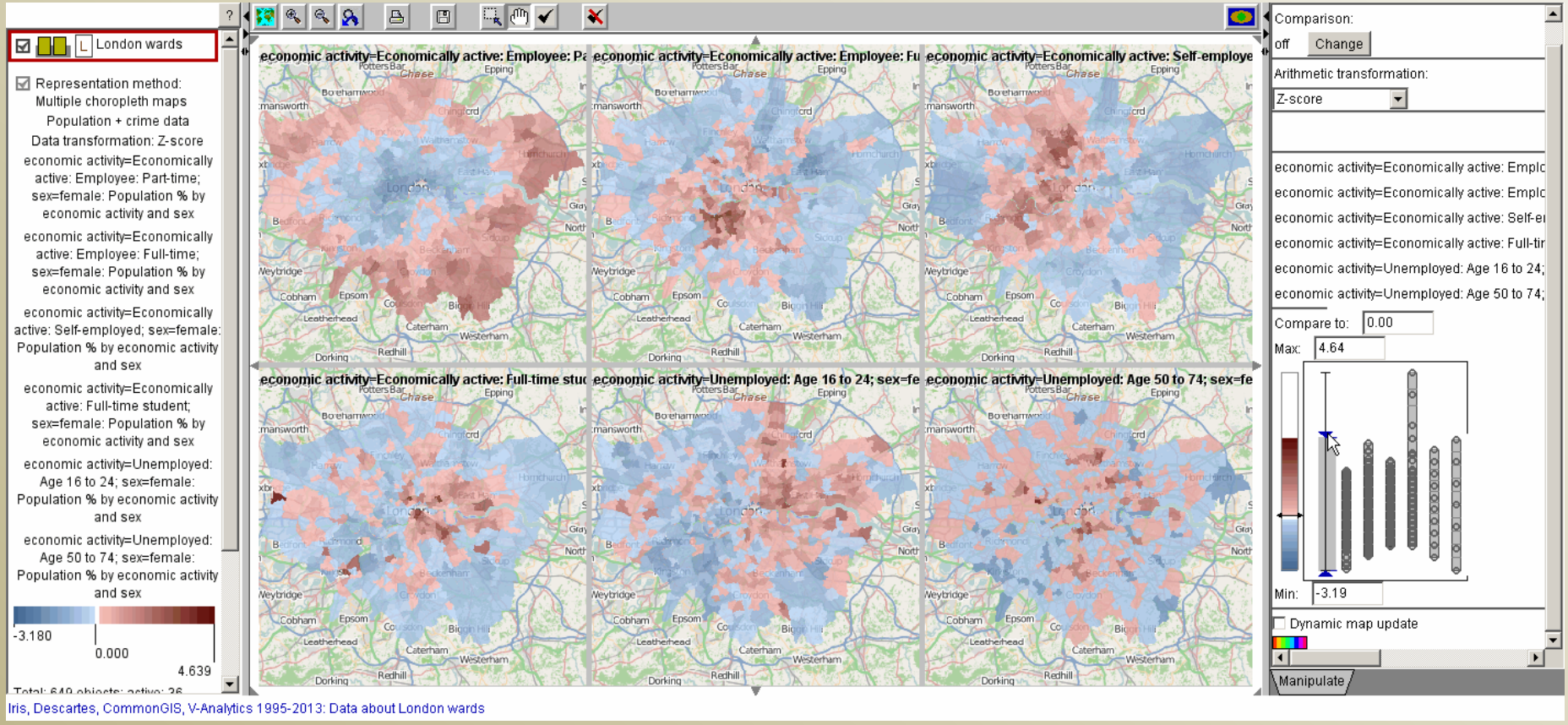


Data transformation: after



Transformation example: z-score. Each attribute value is transformed to normalized difference from the attribute's mean.

… + a bit of focusing



Display interaction: a summary

- Main purposes (support of synoptic tasks):
  - Make data representations more expressive
    - Colour scale modification (particularly, diverging colour scale)
    - Outlier removal (by focusing)
    - Data transformations (comparison to mean and median, z-score, logarithmic transformation, …)
  - Combine information from two or more complementary displays
    - Display linking by selection
    - Display linking by classification
    - Filtering (all displays represent the same selected data records)
- Other purposes (support of elementary tasks):
  - Access individual values
  - Find particular values
  - Compare attribute values corresponding to different references

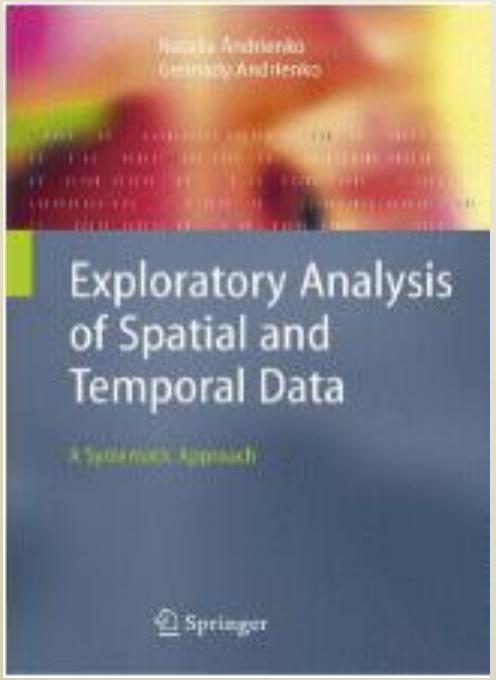
Reading:

http://0-dx.doi.org.wam.city.ac.uk/10.1007/3-540-31190-4

Natalia and Gennady Andrienko

Exploratory Analysis of Spatial and Temporal Data
A Systematic Approach

Springer-Verlag, 2005, ISBN 3-540-25994-5



Section 4.4
Display Manipulation

Questions?

Display interaction