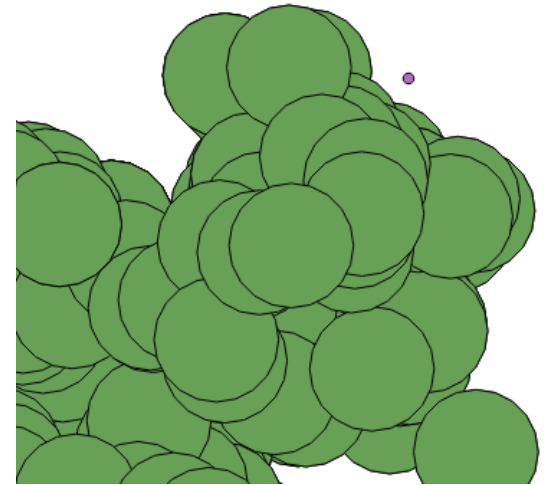


„Presentation and Analysis of Spatial Data“

(4) Manipulation of Spatial Data



Thomas Wöhler, Universität Konstanz

Kiev, October, 2016

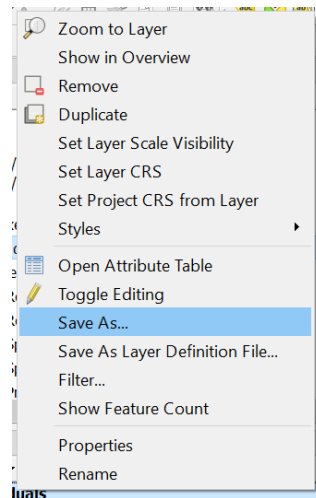
Agenda

1. **Change the coordinate system**
 2. **Data manipulation – The field calculator**
 3. **Combine tables and shapefiles**
 4. **Calculate distances**
 5. **Spatial aggregation**
 6. **Export your data**
- General Tipps und Tricks as Conclusion-**

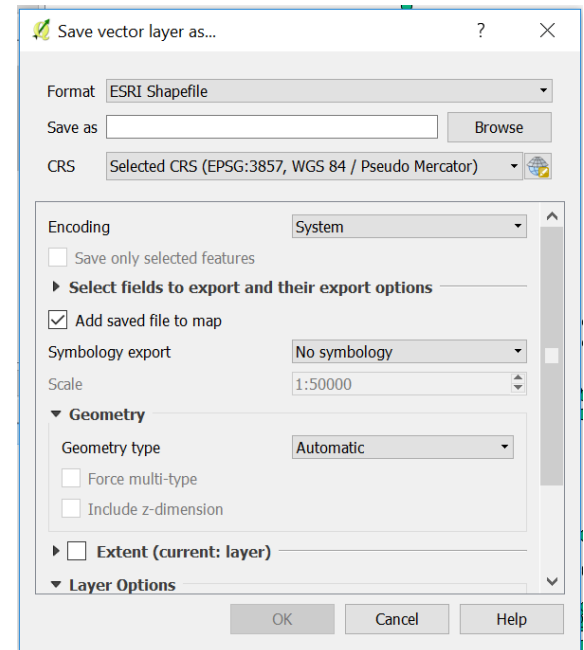
1. Change the coordinate system

- For all data manipulations and analyses, the GIS has to know about the coordinate system of the shapefile. In case several coordinate systems are present in one project, QGIS will transform them on-the-fly in the coordinate system of the first shapefile you added.
- Better: transform all shapefiles in the same standard
- Better: projected coordinate system (two-dimensional)
- Save as new shapefile and specify the standard coordinate system

1.



2.



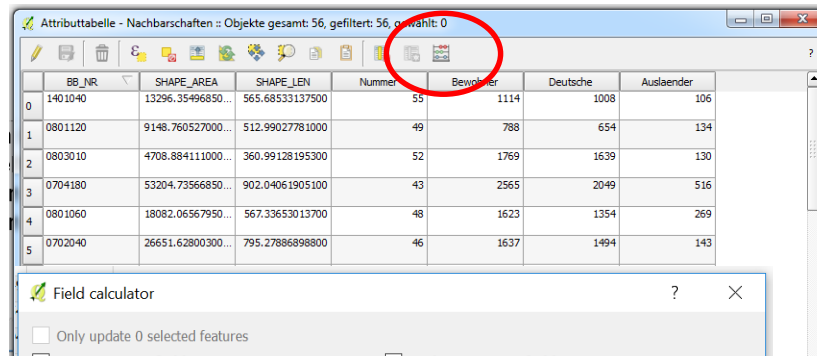
2. Data manipulation– Field calculator

You can manipulate data directly in the GIS program. You can generate calculate variables (fields).

→ Open the „Attribute Table“

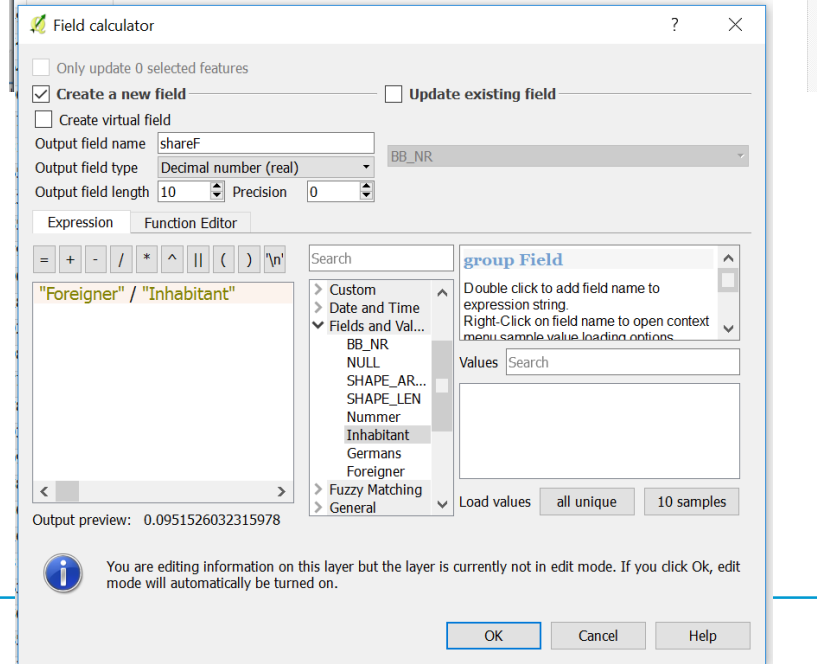
→ Open the „Field calculator“

2.



	BB_NR	SHAPE_AREA	SHAPE_LEN	Nummer	Bewohner	Deutsche	Auslaender
0	1401040	13296.35496850...	565.68533137500	55	1114	1008	106
1	0801120	9148.760527000...	512.99027781000	49	788	654	134
2	0803010	4708.884111000...	360.99128195300	52	1769	1639	130
3	0704180	53204.73566850...	902.04061905100	43	2565	2049	516
4	0801060	18082.06567950...	567.33653013700	48	1623	1354	269
5	0702040	26651.62800300...	795.27886898800	46	1637	1494	143

3.



Field calculator

Only update 0 selected features

Create a new field Update existing field

Create virtual field

Output field name: shareF

Output field type: Decimal number (real)

Output field length: 10 Precision: 0

Expression: "Foreigner" / "Inhabitant"

Fields and Values:

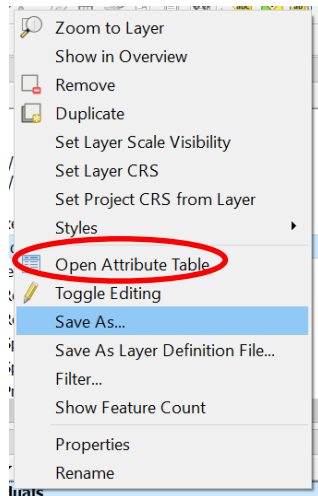
- Custom
- Date and Time
- Fields and Values
 - BB_NR
 - NULL
 - SHAPE_AR...
 - SHAPE_LEN
 - Nummer
 - Inhabitant
 - Germans
 - Foreigner
- Fuzzy Matching
- General

Output preview: 0.0951526032315978

You are editing information on this layer but the layer is currently not in edit mode. If you click Ok, edit mode will automatically be turned on.

OK Cancel Help

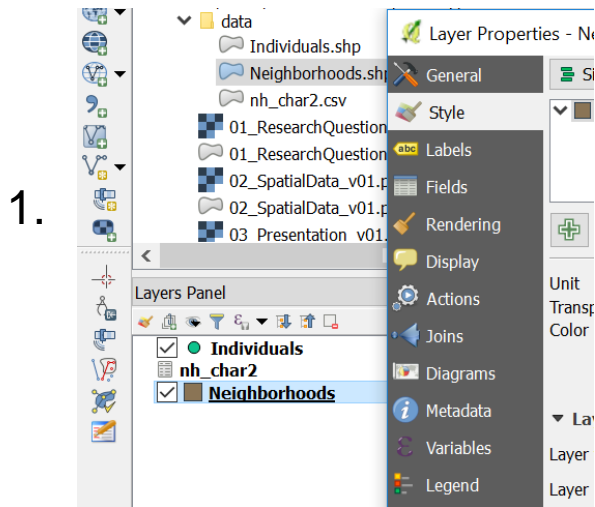
1.



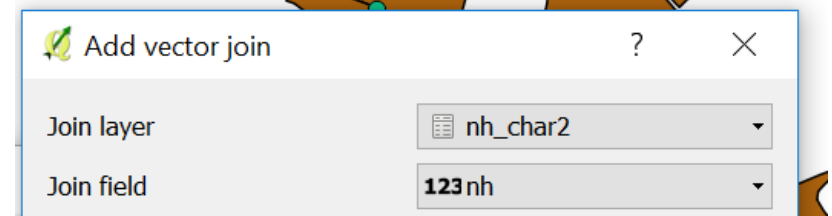
- Zoom to Layer
- Show in Overview
- Remove
- Duplicate
- Set Layer Scale Visibility
- Set Layer CRS
- Set Project CRS from Layer
- Styles
- Open Attribute Table**
- Toggle Editing
- Save As...
- Save As Layer Definition File...
- Filter...
- Show Feature Count
- Properties
- Rename

3. Joining Tables and Shapefile

- Fields of a Table can be combined with Shapefiles.
- This requires an Identifier.
- Add Table as Layer (→ „Layer“, → „Add Layer...“, → „Add delimited text layer...“)
- Add Shapefile
- „Properties“ of the Shapefile, „Join“ with Table (+)



2.



- The Join is not permanent. Save Shapefile to make it permanent.
- You can manipulate the field names with the extension „TableManager“.

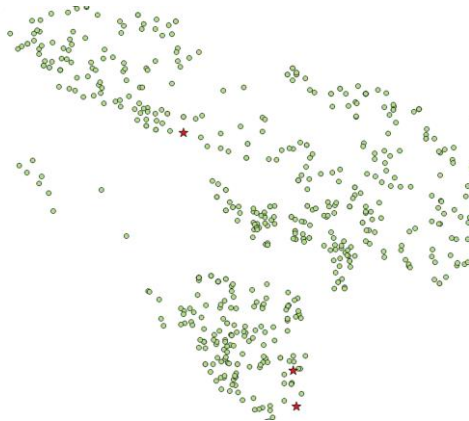
4. Calculate distances

Distances are an important determinant of social action and can be calculated with a GIS.

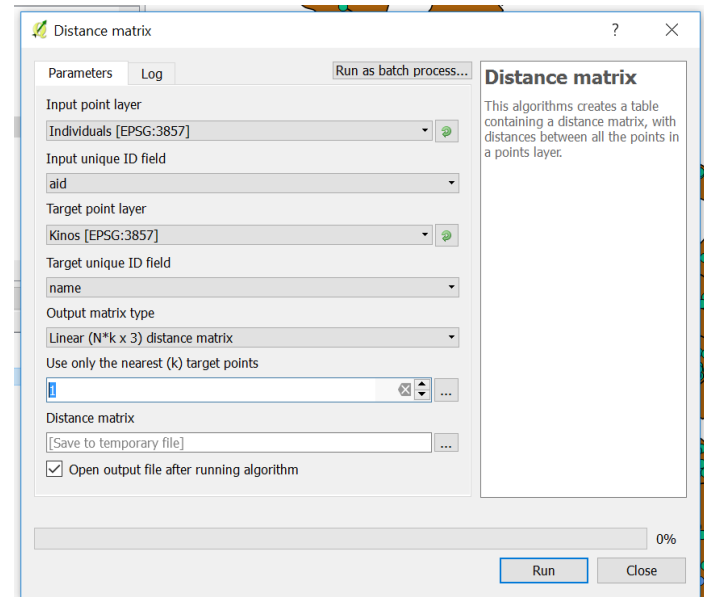
Example: How far do the respondents live away from the next cinema (Kino)?

→ „Vector“, → „Analysis Tools“, → „Distance Matrix“

1.



2.



→ You can merge the resulting distance matrix to the shapefile

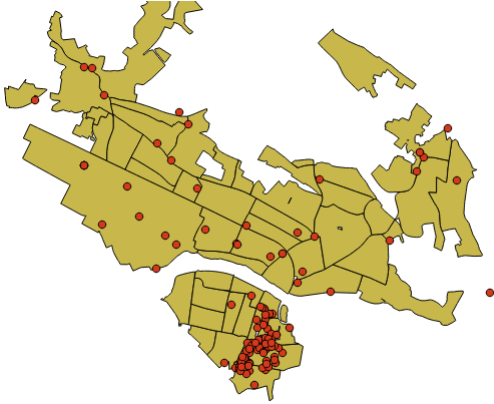
5. Spatial aggregation

1. A GIS can aggregate point-data. The units are defined by a Polygon-Shapefile.

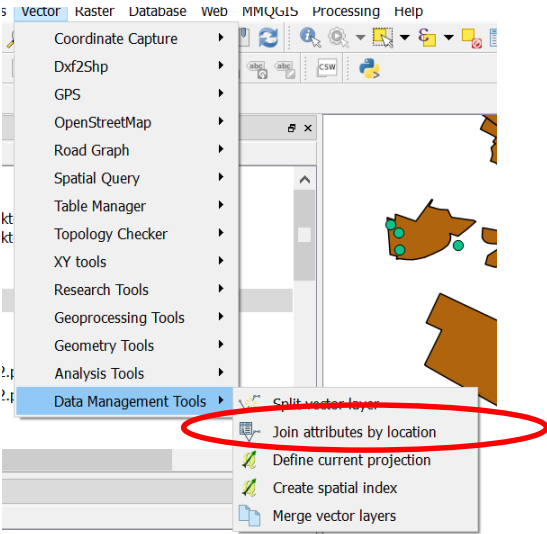
Example: How many respondents are in each neighborhood?

(How many crimes in each district? How many schools in each city? ...)

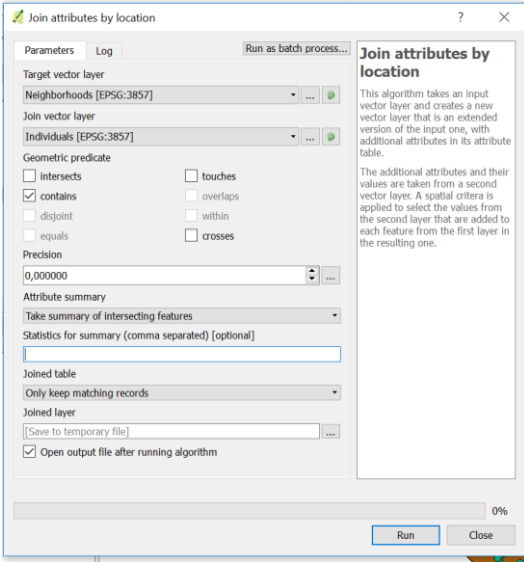
1



2



3



The dialog box shows the following configuration:

- Target vector layer: Neighborhoods [EPSG:3857]
- Join vector layer: Individuals [EPSG:3857]
- Geometric predicate: contains, intersects, overlaps, touches, disjoint, within, equals, crosses
- Precision: 0,000000
- Attribute summary: Take summary of intersecting features
- Statistics for summary (comma separated) [optional]:
- Joined table: Only keep matching records
- Joined layer: [Save to temporary file]
- Open output file after running algorithm

– Use „TableManager“ again to rename the field

5. Spatial aggregation

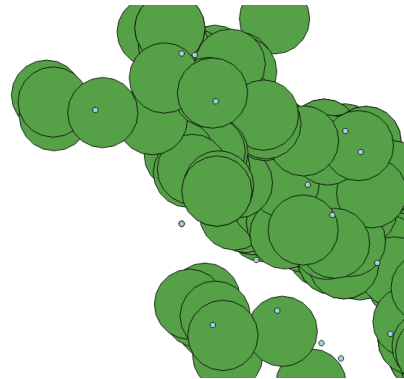
2. You can use this kind of aggregation to generate individual neighborhoods.

Example: How many pubs are within a maximal distance of 200m of any respondent?

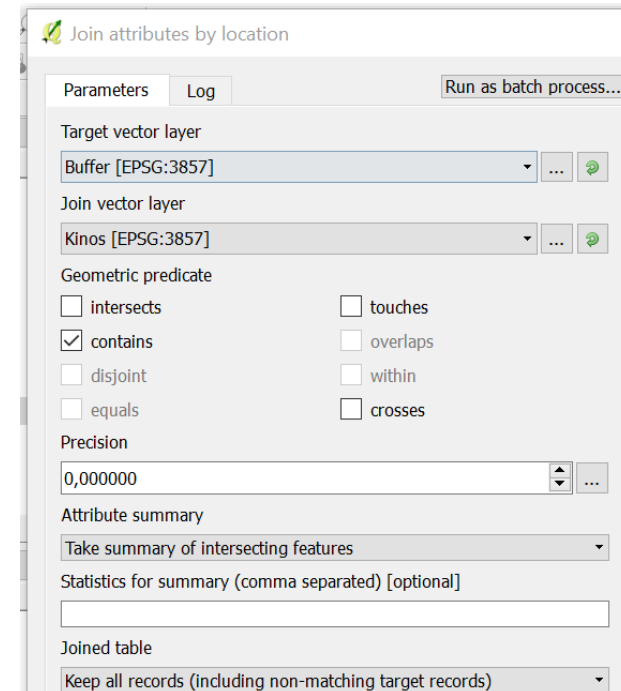
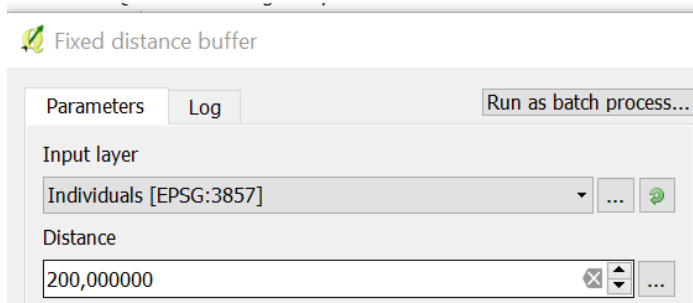
→ „Vector“, → „Geoprocessing Tools“, → Fixed distance buffer“

1.

2.



3.



6. Export your data

Export your data for further analysis:

- Usually as csv-file
- Also possible as Excel-file (with the extension „XY-Tools“)

- Right-click on the shapefile you wish to export
- „Save as ...“
- Select „Format“ CSV
- Choose the folder where to save the file

(in order to be able to use polygons in spatial statistical analyses you need to calculate the centroids, → „Vector“, → „Geometry Tools“, → „Polygon centroids“)
(GeoDA, Stata und R can also read Shapefiles)

- General Tipps und Tricks as Conclusion-

- Non-english characters can lead to problems
- Missing values can lead to problem
- Having not all Layers in the same coordinate system can lead to problems
- Always check your results on a random basis
- Learn Python if you are interested in geodata

- Sources of Shapefiles -

The screenshot displays the 'OSM Boundaries Map 4.0' web application. The browser address bar shows the URL <https://osm.wno-edv-service.de/boundaries/>. The page title is 'OSM Boundaries Map 4.0' with a timestamp of '2016-10-04 12:28:02+02'. A search bar contains the text 'boundaries download shapefile'. The main map area shows a satellite view of Kyiv, Ukraine, with a brown semi-transparent boundary overlay. The sidebar on the left lists Ukrainian regions: Ivano-Frankivsk Oblast (4), Kharkiv Oblast (4), Kherson Oblast (4), Khmelnytskyi Oblast (4), Kirovohrad Oblast (4), **Kyiv (4)**, Darnytskyi district (7), Desnianskyi district (7), Dniprovskyi district (7), Golosiivskyi district (7), Obolonskyi district (7), Pecherskyi district (7), Podilskyi district (7), Shevchenkivskyi distri, Solomianskyi district (7), Sviatoshynskyi district, Kyiv Oblast (4), Luhansk Oblast (4), Lviv Oblast (4), and Mykolaiv Oblast (4). The 'Kyiv (4)' entry is selected. The map interface includes a 'Base Layer' menu with options for 'OSM Mapnik' and 'OSM Mapnik Black & White', and an 'Overlays' section with a checked 'boundaries' option. A scale bar indicates 10 km and 5 miles. The bottom of the page features a control bar with options for file formats (shp, json, poly, svg, bpoly), units (km), and map styles (union, single, split, levels, water, land). An 'Export' button is visible on the right. The system tray at the bottom shows the time as 07:45 on 06.10.2016.

- Sources of Shapefiles-

<https://osm.wno-edv-service.de/boundaries/>

<http://www.statsilk.com/maps/download-free-shapefile-maps>

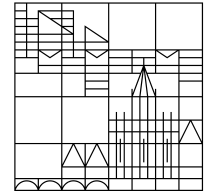
<https://mapzen.com/data/borders/>

<https://osm.wno-edv-service.de/boundaries/>

www.gadm.org

<http://www.igismap.com/download-free-shapefile-maps/>

Universität
Konstanz



Thanks
for Your Attention!

Thomas Wöhler

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