

The historical-geographical correspondence method („Korrespondenzmethode“) in GIS



Thomas Gunzelmann

Lehrstuhl für Denkmalpflege – Heritage Sciences

Kick-Off-Workshop UrbanMetaMapping Transfer

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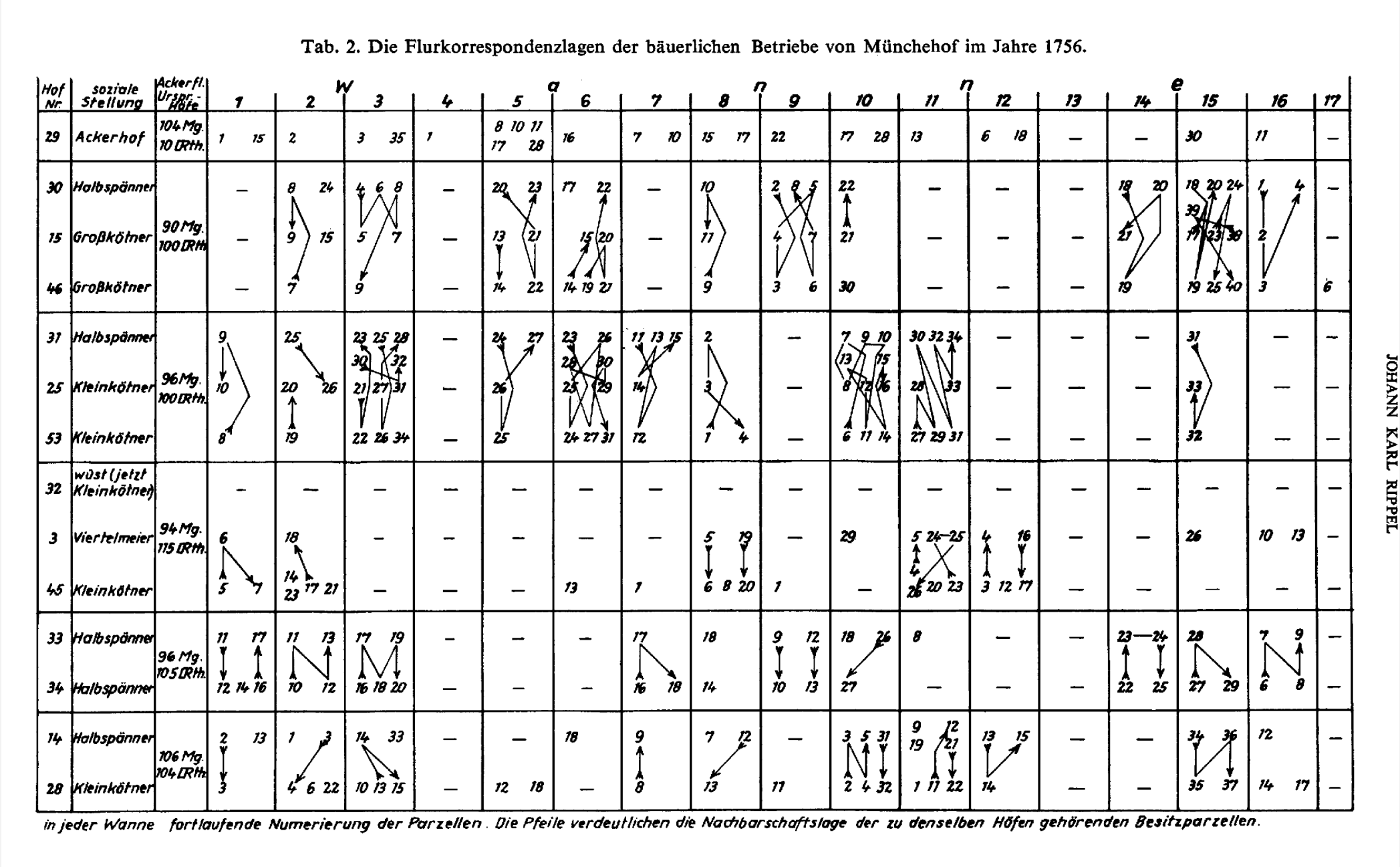
Neighborhood analysis in settlement research (simple correspondence method)



- The neighborhood analysis or correspondence method in settlement research (originally settlement geography) has been known for almost 100 years.¹
- It is based on the fact that frequently recurring neighborhood locations of property parcels in the field can indicate farmstead division in rural settlements (villages).
- This makes it possible to reconstruct settlement-historical developments in the settlement itself up to the late Middle Ages, in ideal cases even up to the High Middle Ages, initially without access to sources other than the original survey or extraction plan of the 19th century.
- The early method consisted of marking property parcels with the same colors for the respective farmstead.
- However, the method ran into difficulties when there were more than about 25 farmsteads.

Improvement through parcel tables: differentiated correspondence method

In 1961, Johann Karl Rippel presented his improved method in the *Geografiska Annaler* with the aid of parcel tables.¹ He distinguished between ‘fields correspondence’ and ‘farmstead correspondence’. The latter did not always occur, even if the former was present.



Die Flurkorrespondenzlagen der bäuerlichen Betriebe von Münchshof im Jahre 1756 (Rippel 1961, S. 254)

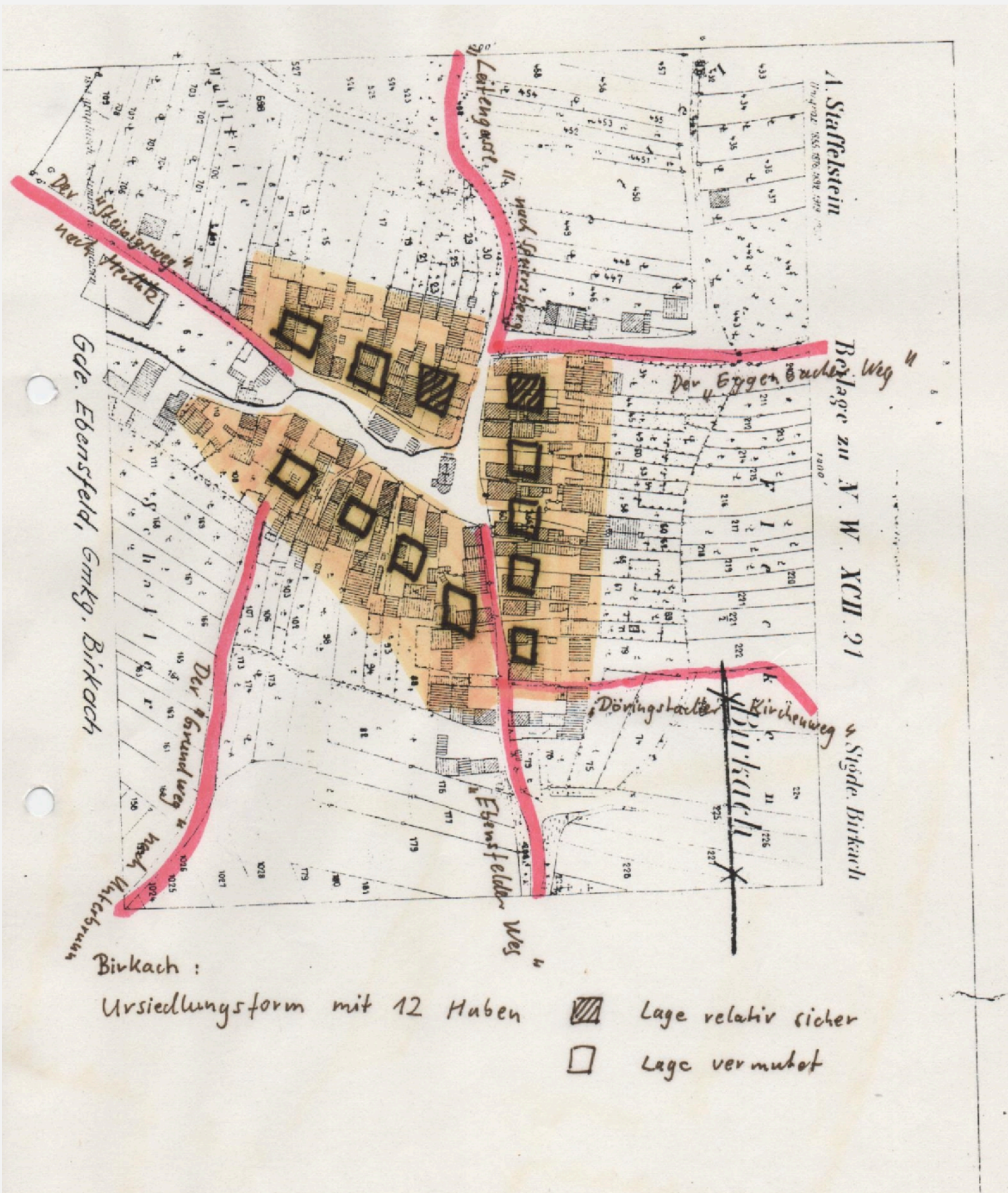
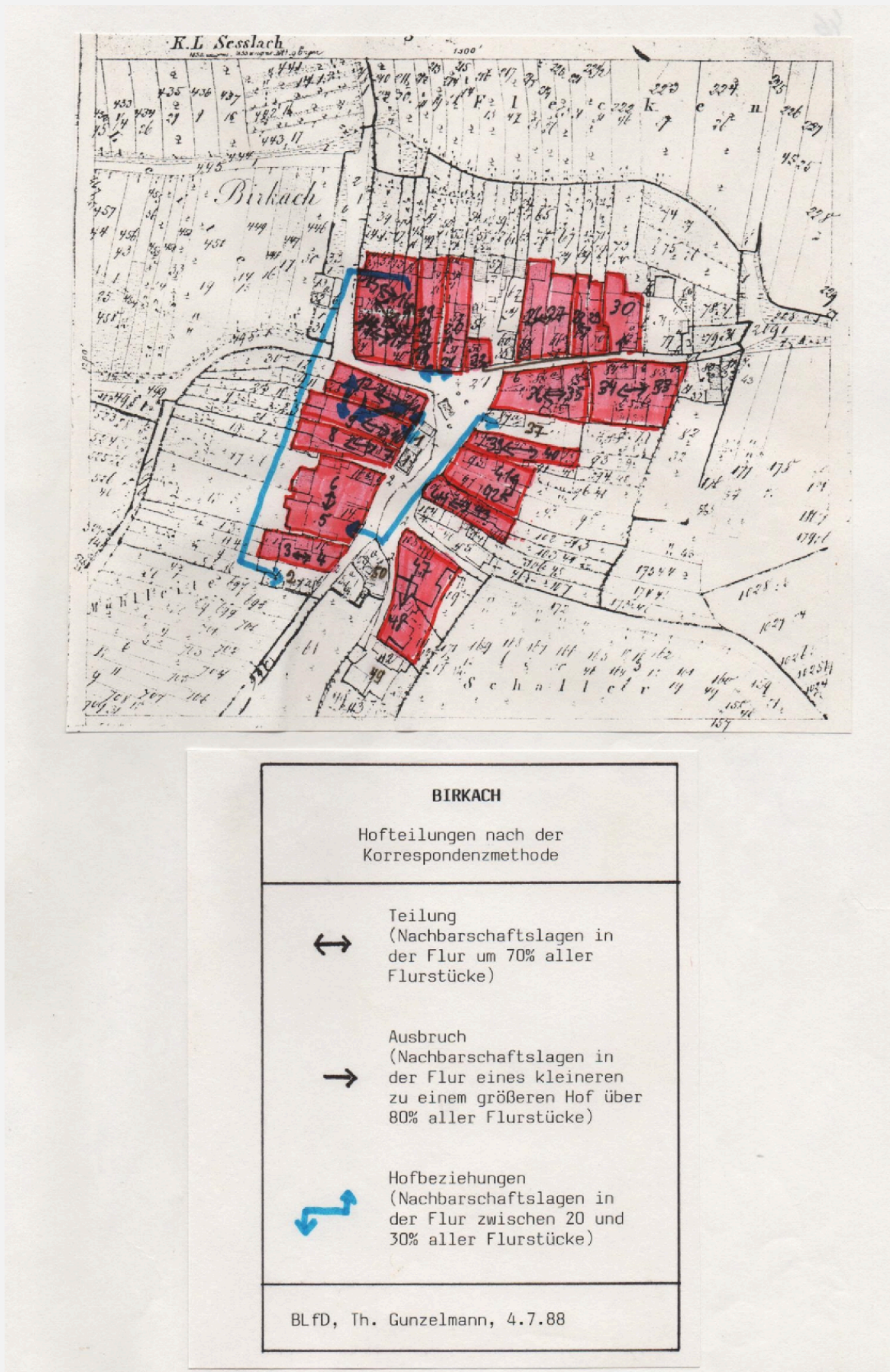
First approaches to digitising the correspondence method

- Rippel also only worked with his tabular system on rather manageable settlement units
- When the Bavarian State Office for the Preservation of Monuments initiated systematic village analyses for the whole of Bavaria at the end of the 1980s, the neighborhood analysis was also used at that time by coloring in the plots.¹
- Aware of the limitations of this method and, above all, its time-consuming nature, I attempted to digitize the method using the example of the Birkach (Lichtenfels district) monument preservation survey sheet in 1988.²

Early method of computational correspondence analysis

- This was based on the tabular evaluation of the land tax register. All parcels of land in the district were entered in a table with their parcel numbers and the respective house numbers. The evaluation was based on the assumption that parcel number 390 is located next to parcel number 391 and so on. This applies in about 90% of all cases.
- A DBase program was used to examine the table for such neighborhoods.¹
- As a result, divisions (more than 70% neighboring locations of all parcels), breakouts (neighboring locations in the parcel of a smaller farm to a larger one over 80%) and other relationships between farms were identified.

Computational correspondence analysis in 1988: example Birkach



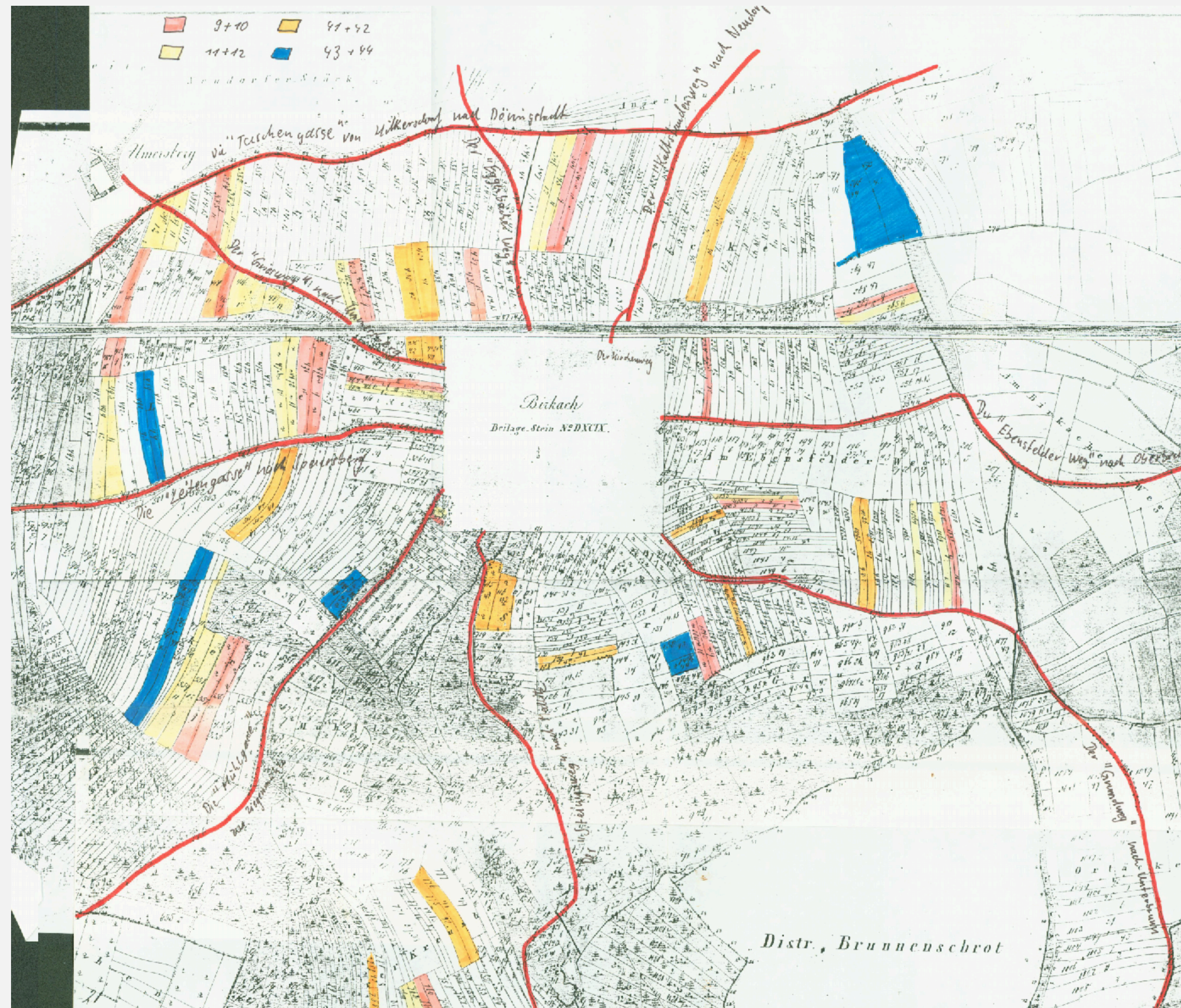
Farmstead divisions according to the computational correspondence analysis. Presumed high medieval settlement structure of Birkach

Refinement and validation of the method by analyzing historical sources (method of reverse transcription)



- The method of reverse transcription, i.e. supporting the correspondence method by evaluating all available archival sources from 19th century land registers to early modern stock ledgers or even late medieval urbaria, was perfected by Anneliese Krenzlin and Ludwig Reusch in the early 1960s.¹
- There has been no methodological progress since the mid-1960s. The method is still used in this way in the context of settlement history. Numerous examples, especially from Austria, were recently published by Hans Krawarik in 2016.²
- In 2004, the first digital approach from 1988 was tested and consolidated by analyzing all available urbarial sources. In the case of Birkach, they go back almost completely to the Urbarium A of the Bamberg Bishopric (1323).³
- The neighborhood analysis was confirmed by the time-consuming evaluation of all available archival sources.

„Urhof“ in Birkach



The farmsteads with the house numbers 9/10/11/12 from 1853 can be traced back to on Farmstead („Hube“ or in latin „mansus“) from 1323.

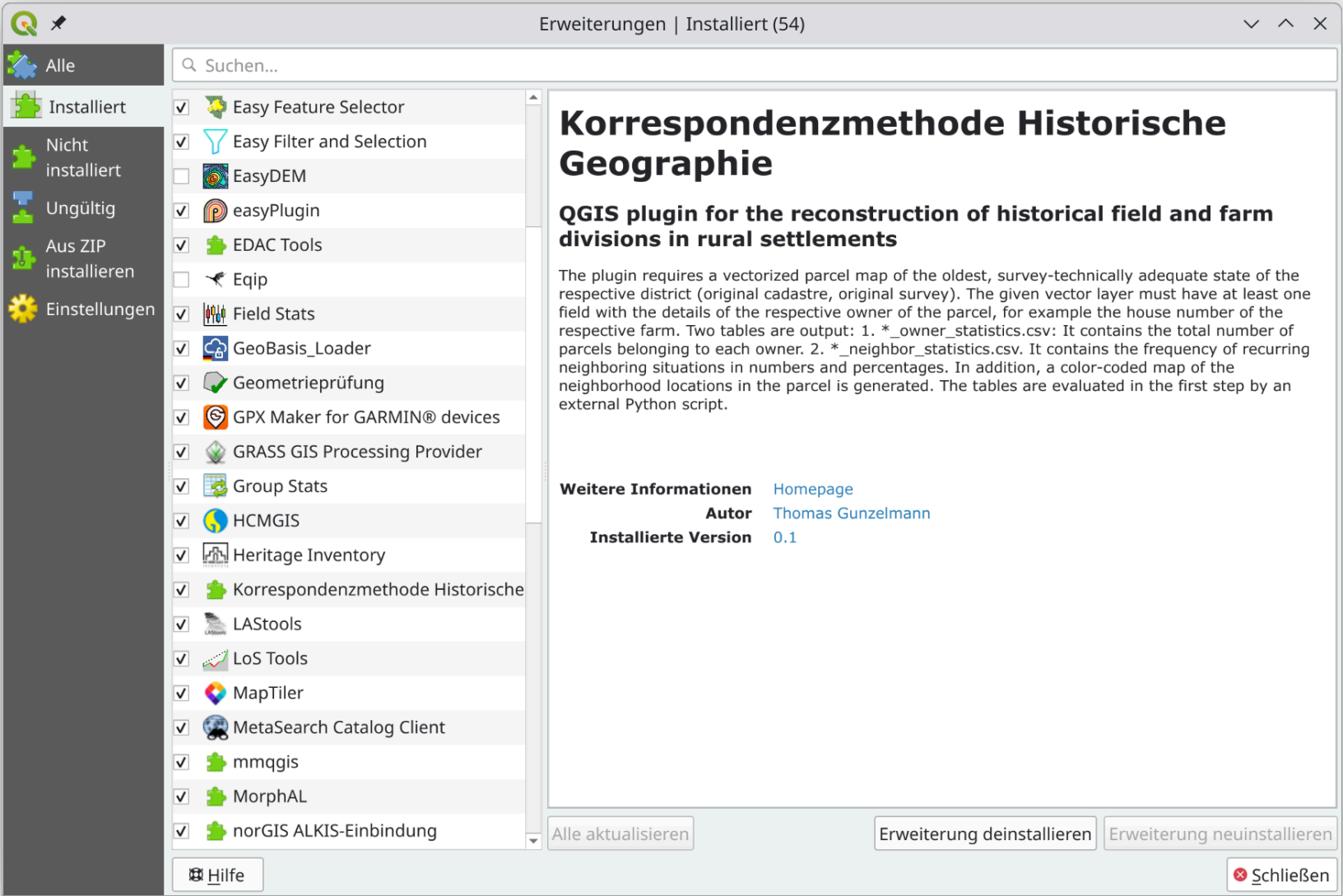
Considerations for implementation in GIS

- The prerequisite is the digitization of the oldest geodetically acceptable parcel map, in Bavaria usually the original survey from the first half of the 19th century.
- The original survey contains with a high degree of certainty the house number to which the respective parcel belongs.
- It is therefore sufficient to vectorize the original survey plan with only one data field containing the house number.
- The size and degree of fragmentation of the parcel fabric then no longer play a role.
- The time-consuming archival work for the computational correspondence analysis and the even more time-consuming manual coloring of the simple correspondence method can be significantly reduced.

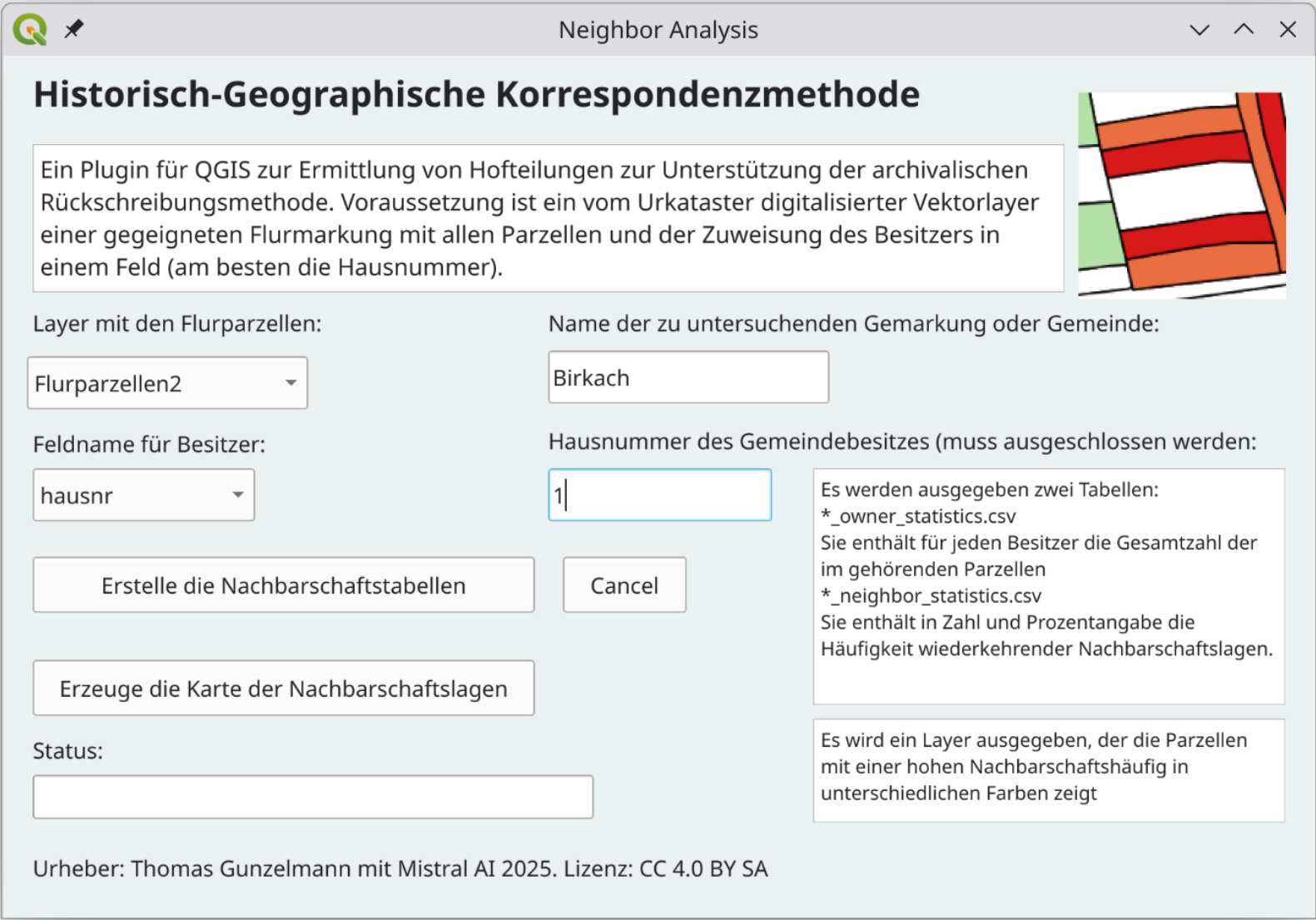
Implementation in QGIS

- A QGIS-Plugin was developed, which determines on the base layer of the vectorized parcel map all the neighborhood locations
- For the first time it is now based on the actual spatial location and no longer on the somewhat uncertain basis of the sequence of parcel numbers, which also have to be laboriously collected in the archive and on the non-digitally accessible extraction plan.
- Two tables are output:
 1. *_owner_statistics.csv: It contains the total number of parcels belonging to each owner.
 2. *_neighbor_statistics.csv. It contains the frequency of recurring neighboring situations in numbers and percentages.
- In addition, a color-coded map of the neighborhood locations in the parcel is generated.
- The tables are evaluated in next first step by an external Python script.

Plugin „Korrespondenzmethode Historische Geographie“



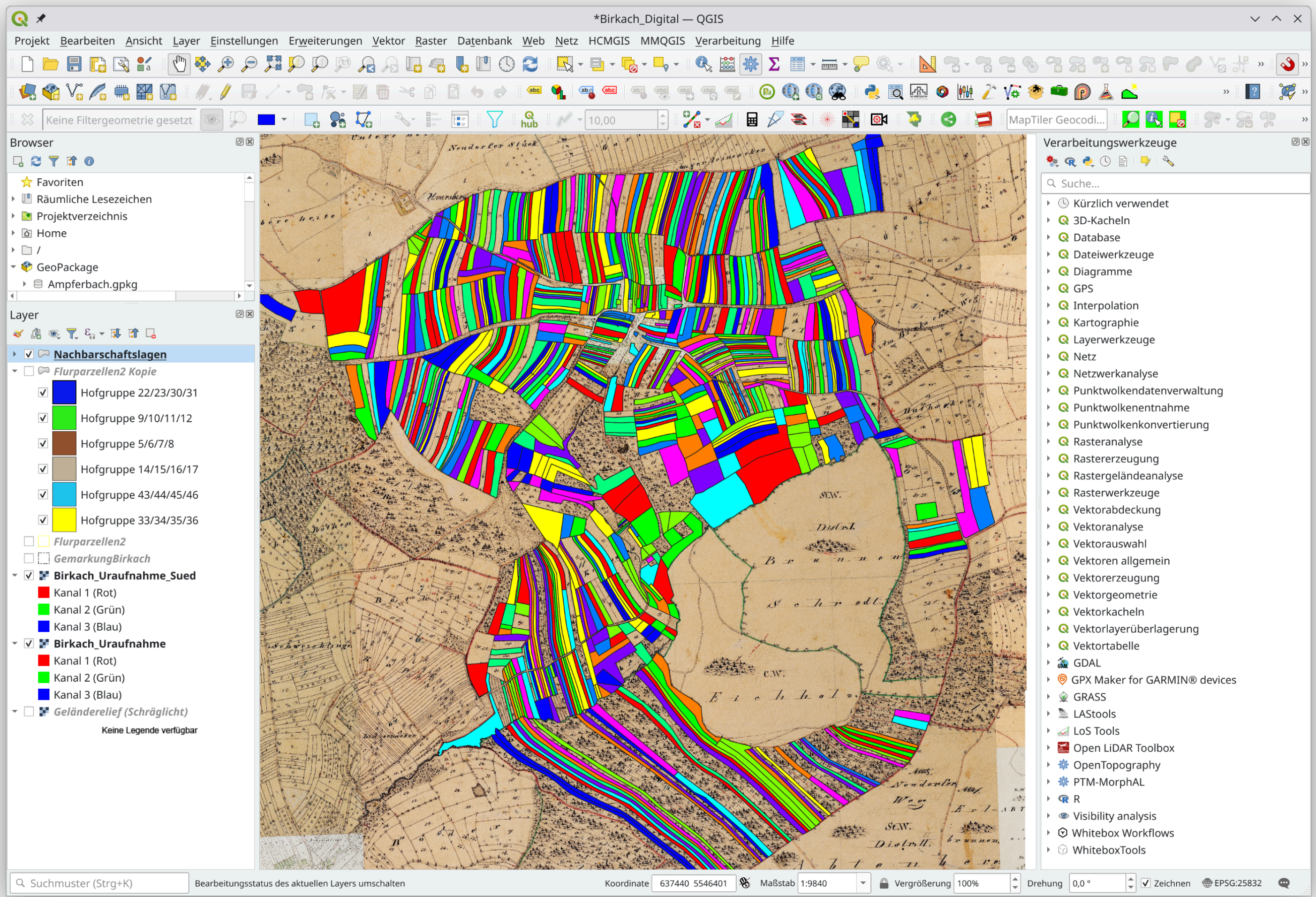
Plugin installation window



Plugin input window

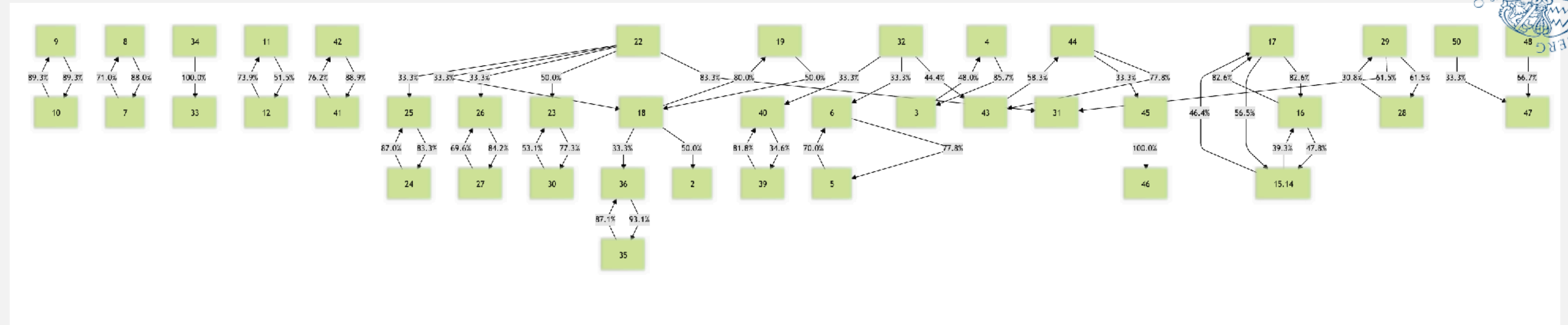
The table *_neighbor_statistics.csv shows the neighboring locations between two farmsteads both in absolute numbers and as a percentage. A farm division is very likely if there is a mutual neighborhood of 70%. A “breakout” of a smaller farm from a larger one is likely if more than 80% of the parcels of the smaller

Visualisation in QGIS



Map of neighborhood locations with more than 30% repeating neighborhoods between two farmstaeds. Basemap: Uraufnahme © Bayerische Vermessungsverwaltung

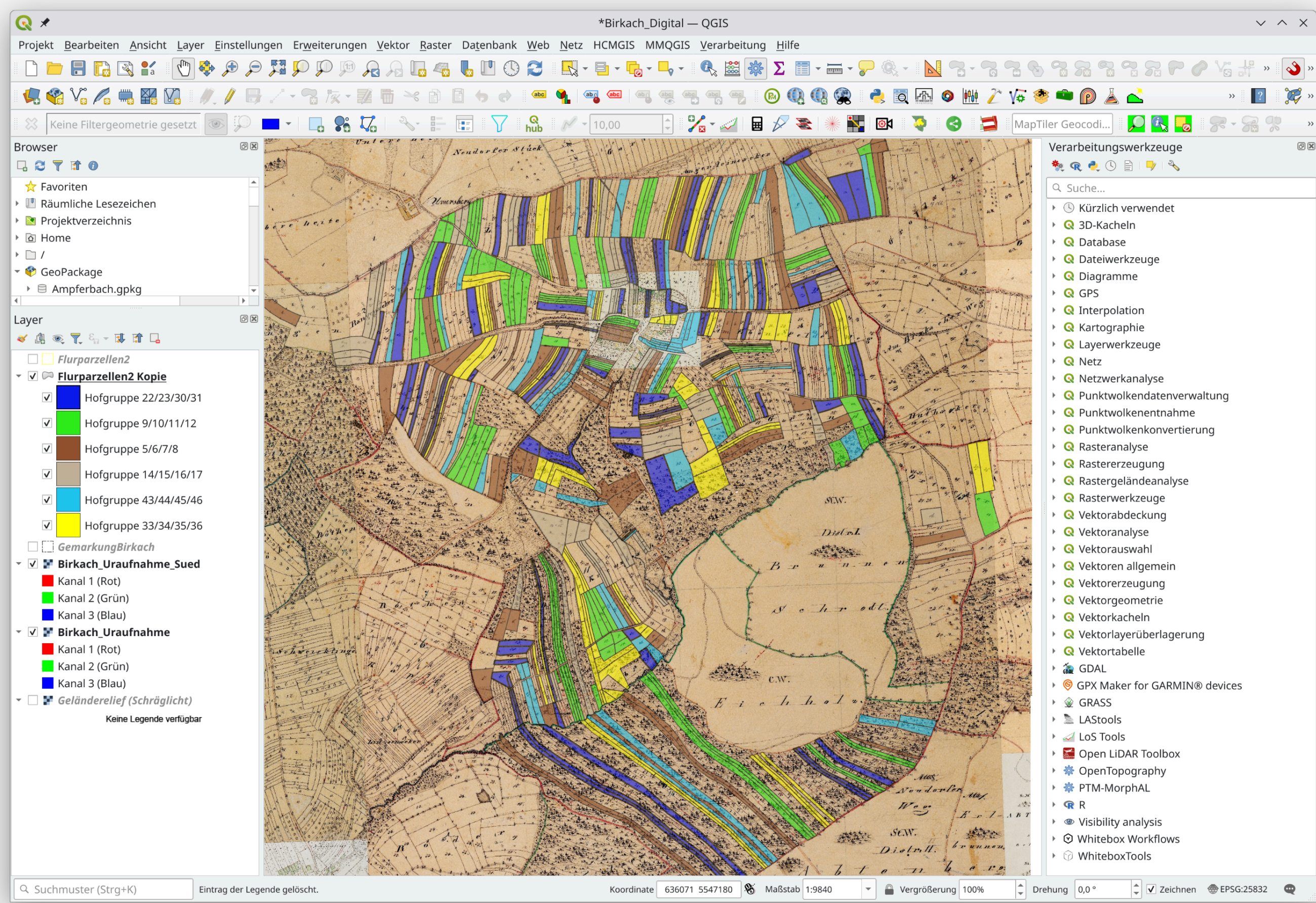
Diagram of the farmstead relationships with Python and Mermaid



Farmstead relationships und divisions in Birkach visualized. Visualisation: Thomas Gunzelmann 2025

- To reduce the total number of results, a filter is applied that only returns the relevant results. Farms with fewer than five individual plots are not taken into account, and the percentage of neighborhoods with another farm must be above 30
- Filtering the data in the Python script (values can currently only be adjusted manually)

Map of reconstructed farmsteads with the help of QGIS and the historical-geographical correspondence method



The step of combining farmstead groups into an “initial farmstead” must currently still be done manually in QGIS

Value of the method for the reconstruction of early modern and medieval rural settlements



- The historical-geographical correspondence method provides quick results by using GIS without having to go into archival research
- However, in order to obtain reliable results, it must be backed up by archival research
- Other factors must also be taken into account
 - natural area
 - different ownership qualities in the village and thus the social structure
 - type of manorial lordship
 - inheritance law
 - type of economy (three-field farming, single farmsteads)
 - Land use system

Literatur



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