Georeferencing, Annotation and Analysis Tools for Old Maps: An Overview

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I. Introduction

Early maps are valuable sources as they not only contain geographic information but are also a political and cultural mirror of their time. Nowadays becoming more and more available in a digital format, such digitized early maps are a way of getting evidence and detecting novelties in the field of historic research. Thus software systems are developed or classical GIS systems are used to support users in receiving answers to research questions, for example in following areas:

- Landscape dynamics [1], [2], [3]
- Flood mapping [1]
- Forest cover change [1], [4]
- Map accuracy [5], [1], [6], [7]
- Assessing geodetic knowledge [8], [9]
- Toponym changes [10], [11]
- Urban model reconstruction [12]

II. Software systems

As shown in the introduction there is a big variety of research areas that can profit from data contained in old maps. But these maps where not created with a standardized style and also have a different level of accuracy than modern maps. Following the big interest in the old maps and their unique problems there were many tools created to analyze them and this paper will give an overview over a diverse selection of these tools:

MapAnalyst is a desktop tool to analyze the accuracy of old maps. It can calculate statistics for the distortions in a map and visualize them (see Fig. 2). [6], [13]

Georeferencer is a commercial tool to georeference old maps, for defining the area containing the mapping data and display them as overlay on a modern map. The accuracy analysis features of MapAnalyst are also available in the Georeferencer interface using the control points defined in the georeferncing process. [14]

LEMO is an annotation framework and was developed with the main goals of annotating multimedia documents, allow end-users to contribute annotations and to be open and interoperable. [15]

YUMA Universal Media Annotator was developed for Europeana as annotation framework for multimedia objects on the Web. It also includes the semantic annotation of images, including maps. [16]

Annotorious has its roots in YUMA and is also a tool for semantic annotations, which can be extended by plugins. [17]

Maphub is also based on YUMA and allows georeferncing and free text annotations for regions, for which then tags from Wikipedia are suggested. [18], [19]

Histograph wants to simplify geographic search. To reach this, Histograph allows to collect and link place names and uses these to georeference and standardize place names in time (see Fig. 3). [11]

LODUM Historic map georeferencer. LODUM is the Linked Open Data initiative of the University of Mnster, the portal aims at sharing scientific data organized in space, time and semantics. A subproject, the Historic map georeferencer, is concerned with annotating historic maps (see Fig. 1). [20]

Recogito is a tool that makes it easy to identify, record and export the places referred to in historical texts, maps and tables as Linked Open Data (see Fig. 4). [21], [22]

GIS and Historical GIS. A Historical GIS is as Geographic Information System that also tracks changes over time. Two major projects in this area are the Great Britain Historical Geographical Information System [23] and the China Historical GIS [24].

III. Conclusion

For many research topics there are already support tools available but these tools where often developed for a special project and are unmaintained since its end. This costs much time for recreating similar tools after one was abandoned.

A solution could be a framework that implements a common core and can be extended with special tools for different areas. If the framework gains enough momentum the burden of maintaining it could be distributed over many shoulders and it can outlive single projects.

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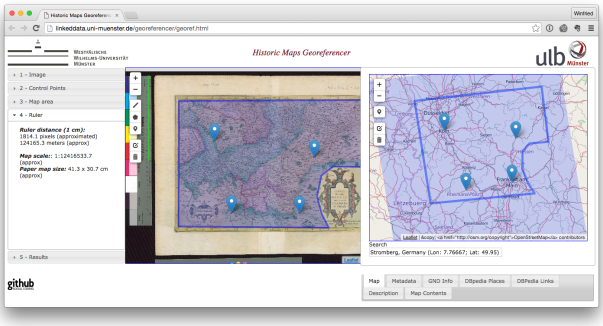

Fig. 1. Interface of the Historic Maps Georeferencer with annotations. Source http://linkeddata.uni-muenster.de/georeferencer/georef.html

Fig. 4. Recogito Image Annotation Editor. Source http://pelagios.org/recogito/static/documentation/index.html

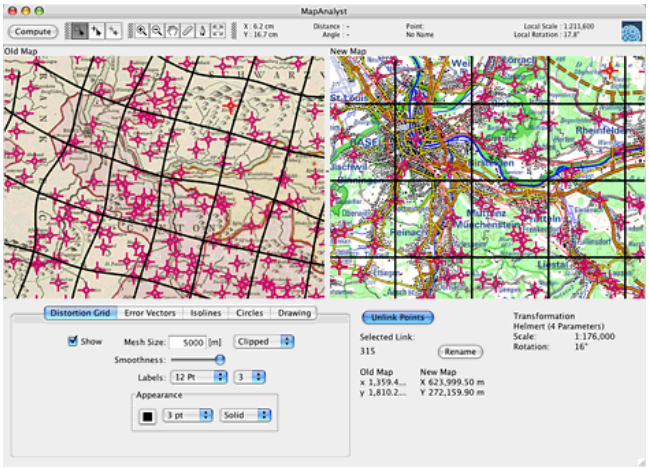

Fig. 2. Screenshot of the MapAnalyst interface. Source http://mapanalyst.org/screenshot/screenshot.html

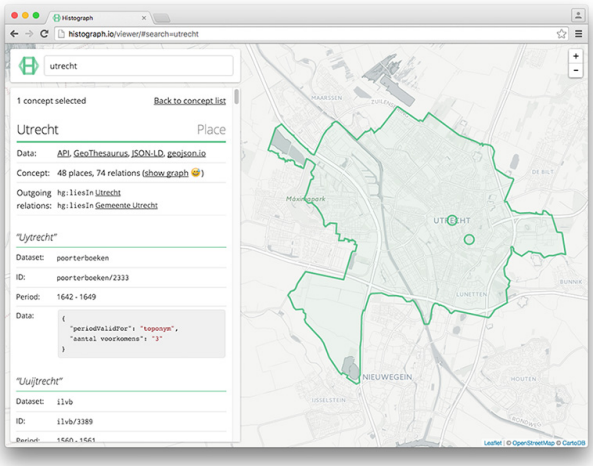

Fig. 3. Histograph screenshot for "utrecht". Source [11]

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