The interactive gazetteer of a 150-year-old-globe

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Abstract. A 150-year-old-globe was digitized with the method developed in the Virtual Globes Museum. The aim of the digital restoration of the manuscript globe project was to save its content from further decay. The compilation of the place name gazetteer of the globe belonged to the restoration work. The interactive gazetteer serves a good example of how to create a database and visualize various geographical names.

Keywords: interactive gazetteer, virtual globe, Google Earth

1. Introduction

This work was a part of a project to digitize a 150-year-old manuscript globe and to re-draw it for saving it from further decay. The 132 cm diameter globe was created by László Perczel in a village in Hungary in 1862. It became internationally recognized when it won a medal at the third International Geographic Congress in Venice, 1881. This manuscript globe is currently owned by the Hungarian National Széchényi Library. The project of the Department of Cartography and Geoinformatics at Eötvös Loránd University is going on within the framework of the Virtual Globes Museum (VGM 2013), but now our digital reconstruction project of the one of the largest globes in Central Europe is going to reach the end. A highlight part of the project was saving the names to the posterity. It was not easy work, because the globe surface is badly damaged. The globe was “restored” in the 1970’s: it got a lacquer layer, and this layer began turning to yellow soon and dissolving some of the red ink, making a part of the names illegible (Márton 2008). Unfortunately, when this globe was moved to shelter during World War II, parts of the globe map tore around the Equator. Despite, the names are of huge cultural value. Using of modern technologies made the contemporary names become available for examination (Márton, Gercsák 2011).

Figure 1. The globe in the Map Room of the Hungarian National Library (Photo by Zoltán Nemes)

2. The cultural value of names

After the examination of names, about 14 000 names were counted on the globe. These old names are a huge cultural heritage, and the participants of this project feel it important to save them from further decay. Before the lacquering, Zoltán Ambrus-Fallenbüchl described the colour and geometry of the globe (Ambrus-Fallenbüchl 1963). As mentioned earlier, the place names are illegible in some cases, while other names are easily legible on the undamaged part. Some conclusions on the spelling are as follows:

- In the middle of the 19th century, there were no conventional transcription systems, therefore Perczel wrote the names after pronunciation in many cases.
- At this time, people used Cyrillic alphabet in the Russian Empire
- He did not translate the generic term into Hungarian sometimes. For example: “Jesi Irmak” (Turkish: ırmak /river/), “R. Blanco” (Spanish: río /river/) “Lob-noor” (noor /lake/).
- He made unconventional abbreviations. “Taytao f.sz.” or “S. Jose f. ” (“f.sz.” and “f.” is the abbreviation of Hungarian “félsziget” /peninsula/).
- The use of hyphen is not consistent either. The rules of the Hungarian orthography just began to be formed in his time.

László Perczel used the most recent sources of his time to create the globe map, which is proved by the detailed and mostly correct geometry as well as the rich collection of names (Zubán 2013).

The next captions represent how to save the content of this damaged globe from further decay.

Figure 2. The legibility of names (e.g., Tunis is fully legible)

3. Digitizing techniques

Some earlier papers gave a summary of the digitizing techniques of globes at the Department of Cartography and Geoinformatics at ELTE (Gede, Ungvári 2012, Gede 2009). We took more than 700 photographs of the globe surface systematically (Figure 3).

Figure 3. The image on the left shows a georeferenced photo and the right-side represent the photo mosaic about Africa

After georeferencing of photographs with Global Mapper, the authors compiled the virtual globe. There are two types of virtual globes: a VRML model (the VGM 2.0 contains X3D models, the new version of VRML), and an overlay in Google Earth (Gede, Ungvári 2013). This globe map, which one was created from high resolution photos of this manuscript globe, was prepared with projection transformations for further processing to digitize the content of the map.

As the prime meridian of the globe goes through Ferro (El Hierro), the coordinates of globe had to be transformed to the new system of Greenwich (Timár 2007).

After creating the virtual globe, several students joined the globe restoration project. The goal was to save the globe's content, re-draw the readable parts of the map, and to try to reconstruct the content on the damaged areas with the using of contemporary sources. The final part of this project will be the reconstruction of the globe in real size (Gede, Márton, Ungvári 2011).

The identification of geographical names was a major part of this project. The authors decided to create an online database to inform the public about the result of this project, and to give the opportunity of examining the contemporary names to the experts of cartography and linguistics.

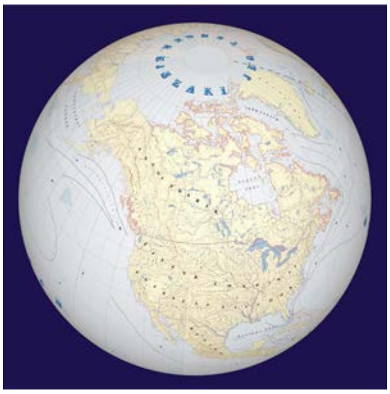

Figure 4. The restored virtual globe

4. Defining the search grid

There are many names on this manuscript globe; hence, the building of the name database was not a "one person" work. Those students who were involved in the project collected every name including also the partially legible names, and created a geo-database in MapInfo.

Afterwards, the names were classified in two major categories: settlement names and other geographical names like the name of rivers, lands, or seas. The principle of this classification was that the settlements could be represented by one coordinate pair in small scale, while the names of other features showed up as polylines or polygon objects. In the latter case, another solution was needed. In a gazetteer to a map, the users search for names, and they find the geographical objects by grids. Therefore, for searching the network, the globe's geographical grid by 5 degrees was chosen. Each square was numbered from 1 to 72 by five degrees between the longitudes; the squares between latitudes moving away from the Equator to the poles were lettered A, B, C etc. by five degrees. To avoid the similar lettering on the globe, the squares on the northern hemisphere got an "N" prefix, and an "S" prefix on the southern one (e.g. NA or SE).

Another aspect was to reconstruct the legibility of names at the time of collecting. Several partially illegible names could be concluded from current maps or atlases. In many cases, it was necessary to use contemporary sources. The examined contemporary globe was the Hungarian 31.5 cm diameter globe made by Károly Nagy in 1840. As the difference between the map scale of the two globes was quite big, the students had to identify the names in other atlases like Schrämblischer Atlass printed in Vienna in 1800. If the contemporary and the present Hungarian names were different, the students registered the changes.

Figure 5. The searching grid based on the geographic grid

5. Building the homepage

After every name was entered into the list, a MySQL database was built based on the earlier mentioned classification method. The visualization and searching in this database on the net needed an HTML page. The HTML page was written in PHP because of the excellent functions of this scripting language. However, this is not enough to visualize spatial data. The best choice was to let the names and places be seen in the Google Earth, because the manuscript “map” was originally a globe, and the Google Earth plug-in offers several potentials to developers (Figure 7). The switchable layers of the original Perczel globe, the reconstructed one and the satellite photos give the chance of comparing the contemporary content with the current state. Furthermore, the users can set the transparency of the overlays with a slider (Tokai 2011).

The Google Earth API gives an interactive frame to the homepage, where the result of the search can be visualized. Before the search, the users can choose from the two major categories of names from the database. Accordingly, the names were divided into different listboxes, but the asynchronous searching works on both of lists. Additionally, the placenames can be displayed with placemarks, which help to open the InfoWindow, where the users can find information about the selected contemporary name, the current name (if known), the object type, the coordinates and the code in the developed searching grid. However, the geographical names cannot be represented as a point feature in several cases; therefore, the spatial extension had to be used in the MySQL database. In view of the two coordinate pairs, the algorithm sets the focus on the whole object (Figure 6).

Due to the large number of names, the users can select from categories to filter the result. They can choose among various types of geographical object, for instance names of rivers, seas and oceans, mountains, nationalities and countries. It is also possible to reduce the result by the area of the continents.

Figure 6. Asynchronous searching in the categories of geographical names (object type above, place names below)

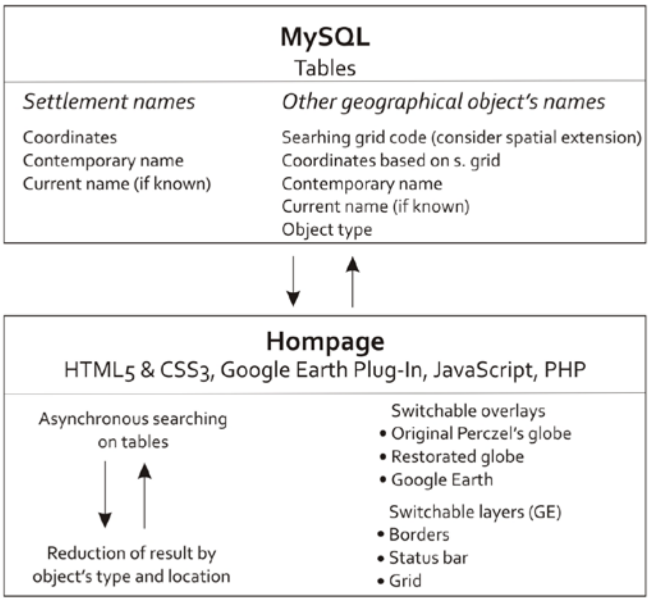

Figure 7. The structure of homepage's operation

6. Conclusions

The authors present the preparation of a name database. The searching grid is similar to that of a map. The users can search in the interactive gazetteer by categories and location. The classification of names is based on the geographical object type. This database is suitable for further research in cartography and linguistics (Figure 8).

Figure 8. The website of the 150-year-old-globe’s interactive gazetteer

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