

Web information system for a visualization and comparison of old city maps and views using map server and databases

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Old maps are important part of human heritage. They bring interesting information about history of cartography, landscape and human settlement in addition. Huge development can be seen all above in urban areas. Prague, the ancient capital of the Czech Kingdom was a subject of interest of many cartographers. Comparison of their works can show us changes which had influenced face of Prague. The project is focused on a creation of the web information system for a visualization and comparison of old city maps and views of Prague. The important part of the project is the research of significant Jüttner's plan of Prague, which is the main map layer of the map server.

The web information system about old city plans is based on popular open source UMN MapServer and its JavaScript interface. This application allows: publish georeferenced old map raster images, connect data published through the Web Map Services by other institutions, query of layers, etc. Georeferencing significantly improves possibilities of comparing a map with other one or with the present situation. As a base old map layer was chosen Jüttner's plan of Prague (see below). Data from geoportals of the Czech Environmental Information Agency and the Czech Office for Surveying, Mapping and Cadastre were joined through WMS. Semi-transparent layers of present orthophotomap and cadastral map offer very easy comparison of the historical and present situation on maps. For example dramatic urban changes behind the city borders can be seen. Jüttner's plan was probable pattern for the older Pinases' plan. This plan was researched and georeferenced earlier, but it was added to the application as well. Comparison of map drawing of both plans proves their dependence. There are many of old views of Prague. Several of them were added to the application. Their relation data are saved in a database. The new queryable layer displaying location and orientation of views was created and added to the mapserver. Views and information about them can be displayed. Present photo made from similar place as view allows see differences between historic and present appearance of Prague.

Jüttner's map is famous and revolutionary map of Prague. It is the first plan of the Czech capital based on trigonometric frame and geodetic survey. Plan of scale of 1 : 4,320 is a very detailed depiction of town from 1816. Thanks to the year of its creation the map depicts image of the town short time before the vehement expansion changed its face forever. The plan was chosen as main old map for web map application due to its importance and accuracy. Digitizing, processing, georeferencing and cartometric analysis of Jüttner's map was a part of this project. Two map sheets of black-white print of plan were scanned with resolution of 400 DPI and 24 bit colour depth. Both map sheets were merged together into the one raster image. Spatial localization is necessary for map publication. Method of georeferencing using network of identical points was chosen because map doesn't have any frame corner coordinates or exact geographical grid. Identical points were represented by well

recognizable corners of important buildings which have preserved up to the present days. Some Prague districts have been preserved without large changes. There was no problem to find out enough identical points. On the other hand there are some areas, especially behind the city walls, which have been totally changed. It was almost impossible to find there any point. About 80 points were taken and some problematic points were locked out. Final set of 69 identical points was used for a transformation into the S-JTSK. Affine transformation, the most suitable one for this purpose was used and its RMS error was 7.21 m. The map scale was determined by three various methods. First one, simple count from text scale description resulted to the map scale of 1 : 4,320. Next method of a measuring of the graphic map scale resulted to the value of 1 : 4,400. Last method based on measurement of 20 distances between well indicated points of topographical content of the map concluded to mean value of map scale of 1 : 4,426. The Jüttner's map displays all important topographic objects of Prague city. All buildings are displayed and completed by house numbers. Differently oriented hatches of buildings were used for a distinction of city boroughs. Different hatches were used for various land types as well. Terrain was depicted using hachuring. Map drawing is ended very closely behind city borders. The Prague's fortification was displayed just schematically. Most of the streets are entitled. Gates in fortification, main roads outside the city and all city districts are entitled as well. With no doubt Jüttner's map is exceptional work of Prague cartography.

Modern digital methods bring new possibilities of cartographic analyses and processing of old maps. Publishing of maps on the Internet makes them accessible to academics and to the general public. Moreover, georeferencing allows synoptic comparison of the map with the present situation. The project will be developed onward in the future. Works will be focused on improvement of information system functionality and on its enrichment by more old maps and views.

Works on this project are based on the successful cooperation with the Historical Institute of the Czech Academy of Sciences, which will continue.

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