

ON IMPROVEMENT OF THE WEB MAP PORTALS FOR TOURISM: THE USE OF ADAPTIVE CARTOGRAPHY

JANATA T., ZIMOVA R.

Czech Technical University in Prague, Faculty of Civil Engineering, PRAGUE, CZECH REPUBLIC

1. INTRODUCTION

The development of computer technologies together with new methods of spatial data acquisition and raising challenges of web potential substantially affects the nature of cartography. New technologies and trends of nowadays' cartography bring up the question how to make maps and cartographic products closer to their users. Thanks to continuing advancements in the above mentioned spheres the process of map creation may and should reflect the situation, preferences and skills of map users.

The project presented within this paper is focused on the possibilities how to develop and enhance the web map portals for tourism by use of adaptive cartography. The aim of this ongoing work is to identify strengths and weaknesses of current state of art of the tourist web map portals, to consider the options for map portal enhancements and finally to design a pilot web tourist map portal including the tools for user specific maps compilation and visualization.

2. ADAPTIVE PRINCIPLES IN CARTOGRAPHY AND TOURISM

Basic concepts of adaptation and its use in cartography were presented several years ago in association with maps for mobile devices (Reichenbacher 2003). The issues of adaptive map compilation are becoming more and more important in increasing number of fields of interest – besides the branch of maps and map services for tourism (Zipf 2002) the principles of adaptive cartography can be used for example in crisis management (Konečný, Bandrova, Kubíček 2008) or for education in geography (Staněk, Konečný 2009) etc.

The changing role of maps users and their interaction with the process of map creation and geographic data visualization are stated also in the ICA Research Agenda (Virrantaus, Fairbairn, Kraak 2009) where the issue of "adaptive maps", especially related to the "location based services" has been emphasized.

It is necessary to clarify what tourism means in this context. Generally, the term "tourism" is very broad and it may involve many various items and activities: from booking the flight tickets or accommodation to remote viewing sights on the web etc. In the context of adaptive cartography we would consider mostly an "active tourism" connected with physical motion, nature and cognition, because there is the major area for cartography to be beneficial.

3. TOURIST MAP PORTALS AND WEB SERVICES

3.1 The Current State in the Czech Republic

The Czech Republic, although not being ranked among the leaders in informatics and digital technologies, represents a significant basis for tourist events and has a very long tradition in undertaking various types of tourist activities. The first tourist maps of the Czech Lands were issued in the seventies of the 19th century, related to raising activities of the organized tourist groups (Janata 2007). The printed tourist maps have been traditionally of mostly high quality and precision. The community of active tourists involves at present numerous groups of maybe sometimes less cartographically experienced but all the more enthusiastic users (fans of hiking, cycling, skiing, mountain trekking and many others).

The use of map servers and interactive maps in internet applications has become widespread especially within the younger users web-based and skilled communities. Czech tourists may use several tourist maps portals as listed in the Table 1.

Table 1

Review of Czech servers oriented to tourism.

Server	(Background) Map	Additional services
mapy.cz	semi-tourist map	tourist trails, biking routes, hillshading, photographs; selected points as hyperlinks
idnes.cz	base map	tourist trails, biking routes, ski trails;

		as hyperlinks with description: sights, monuments, accommodation, train stations etc.
cykloservcer.cz	classic tourist map	hillshading; all other content directly in the map; full-value tourist map with several levels of zoom
mapy.1188.cz	classic tourist map	all the content directly in the map; two differently detailed levels of full-value tourist map
turistik.cz	Google Maps	as hyperlinks with description: accommodation, selected sites of interest

The tourist web portals usually offer some functional overlay beyond the standard topographic or thematic map layers. The overlay is mostly limited to the layers of the tourist marked trails, the places of interest etc. These maps are often compiled with a tourist element tightly connected with the rest of the map content – a classic map as known from the paper version, here digitally processed.

Table 1 mentions Web sites, which are the most important representatives of web mapping. In the current environment of the Czech web, however, there is no noticeable trend in the creation of portals and web applications oriented the adaptive way – which would allow the users to utilize the products to their needs. The number of current portals is relatively large and naturally limits the number of their users. Data for tourist maps displaying (which are out of date and become uninteresting for active tourists quite quickly) are expensive. Therefore, in the last few years, many websites offering content of a map with a tourist theme switched to use Google Maps (or other) as its underlying layer. These servers (such as turistik.cz, turistika.cz, vyletnik.cz etc.) usually provide locations and descriptions of sights and other places of interest displayed on a non-tourist map layer of an external producer – such an approach seems to be easier and less expensive for them.

The state can also be easily understood through the development and release of use of API interface of large map portals, which essentially allow customizing the underlying map layer or even the whole map application to own needs. Somewhat surprising, however, remains why only non-tourist maps (Google Maps, Amapy.cz etc.) for these purposes are being used.

3.2 A Short Comparison with the Situation in Europe

Czech map servers represent a good starting point how to gear the displaying of tourist-oriented geodata. The goal of this paper isn't to compare web map servers in the Czech Republic and in Europe. Nevertheless, whether it is a recency, complexity, user intuitiveness or quality of processing – the servers in the Czech Republic offer data in a very high level, minimally as it is usual in other countries. The same situation also applies to Slovakia, which has – thanks to the long time belonging to the Czech Republic – a very similar tourist heritage.

The state probably coheres with the denseness of the sights and interesting sites in the landscape and with a very long tradition of building of the tourist trails network and the related infrastructure in the Czech lands. In some countries, marked hiking trails in the Czech concept don't exist or have a completely different character. Eventually they connect only isolated significant sites and perform more the function of cruise circuits or paths. This also results in the tourist map work on paper, as already mentioned at the beginning of the chapter. The map servers abroad very often result from maps of Google or Virtual Earth (now Bing Maps). The composition of these maps is very well managed; nevertheless the content is not sufficiently adapted for the tourist needs. Moreover, these maps are generated from spatial databases and do not represent a product designed by an expert-cartographer. Furthermore, in many regions of the world, such global world maps have serious problems with accuracy and timeliness of data and contain blunders.

4. FURTHER STEPS OF THE PROJECT - THE WMS PORTAL

A possibility how the users-tourists can become more involved in the process of using cartographic work is to let them make their own map by compounding various map layers together. The work on this project would comprise consideration of options for map portal enhancements and finally a design of pilot web tourist map portal with a large amount of various layers (or legend items) which would allow the users to compile their own map depending on their current needs.

There are already online projects that allow constructing the maps in an interactive manner and to a large extent apply adaptive cartography concepts in practice. These projects, however, are not geared to tourism

and in particular those aren't operated in the Czech environment. Furthermore, there are now – and in large amount also in the Czech Republic – projects that allow compiling complete map composition provided via WMS standard. Web Map Service standard is already very common and popular data transfer model in the Czech environment and this way of providing data is used by local authorities and specialized institutions as well as universities, research institutes and private companies. WMS standard is modern, easy implementable and relatively user-friendly. Moreover, there are several freely usable web viewers available for users who do not want to connect layers through robust thick-client applications, whether commercial or open source.

The downside, however, is that even among those servers providing data in the form of WMS layers there are no such ones used primarily by tourists. Apart from several data layers of road communications, protected areas, vegetation cover, small topographic features of type wells, sacred sites, power lines, etc., there are any freely usable data layers do not exist in the Czech environment, representing the mentioned tourist-historical content usable to convert topographic map to the tourist. Moreover, these types of data sets cannot be modified.

The project brings up a map portal, allowing the connection of predefined or other data sets in the form of WMS. These could be even any third-party data. Predefined sets are mainly filled with data emerging from the internal geodatabase of Department of Mapping and Cartography, Faculty of Civil Engineering of CTU in Prague, and secondarily from other freely available sources or other sources agreed. These data sets include topographic and tourist and local history themed subsets, divided up into individual sub-items in the form of particular WMS services. Examples of data layers of the geodatabase are shown in the Table 2. This is a way to achieve the desired variability of the map output. The reference scale of the data sets is 1 : 25 000, because such a measure closely meets the requirements of accuracy and visual form of tourist maps while taking into account the limited size of digital imaging devices (especially mobile) against the area of a paper map.

Table 2

Examples of legend entries in the predefined feature classes

Group	Examples of layers
Topographic basis	II. class road Culvert under II. class road Alley Height point Hop-garden Watercourse of width \leq 5 m
Tourist/historic component	Cafeteria, kiosk Post office Biking route – blue stripe marking Border of area of natural protection Chateau, castle accessible Protected tree

When creating the legend entries it is strived for the maximal variability of the generated map. In accordance with the principles of adaptive cartography, users will be able to create a map corresponding at the highest possible level to their demands. This feature is currently not supported by any map portal. For users who do not want to deal with creating the whole map by individual items there will be available a predefined group of layers with prepared styling (eg. 'communication network', 'development', 'restaurants and accommodation' etc.) so as the creation of a map is simple, quick and still flexible at the same time. The styling of layers is achieved by extending the SLD standard. Particular WMS services of legend items are possible to colour and style in their sole discretion. Building an own customized map is intuitive and very comfortable.

Another feature of the portal is the ability to modify its own data sets, from which the WMS services are drawing data for display. A large infirmity of paper tourist maps is their rapid obsolescence, and the number of small blunders, which, despite of all the effort expended, appear in the final form of the map. An example might be a small chapel at the intersection of field paths, which has been not standing there for six years due to terrain modifications; newly established restaurant in the village, misplaced post office

which is in fact four blocks of houses farther etc. One of the easiest and the most effective ways to at least partially keep up to date data and reduce errors in the map is enabling the users to edit the data – i.e. to fix non-existent, newly created or just misplaced objects.

Technically, the main feature of the site is a map window connected with fields that turn on or off map layers and allow them to style and use various cartographic representations. A variety of tools allows users to work with actual vector data and their presentation. In the initial phase it is expected only to alter and edit the selected layers of thematic folders, rather than the underlying topography.

One of the important functions of the portal is to export the result to an image file. The users can print it and take it with them on a trip as a traditional map or convert it to a map useable on mobile devices. One solution is the option of exporting a MAP file which defines the georeferencing of maps for mobile applications OziExplorer and TrekBuddy that are mostly spread among users of mobile devices. MAP file states here as a definition schema associated with the classical image file.

Naturally, a very accurate basis of topographic features would be needed – divided into proper layers to enable composition of well-depicted map in the most intuitive way.

The portal should serve as an option to strong and wide-spread GIS applications without the necessity to purchase and install any other software.

CONCLUSION

Web sites offering a tourist component are very rigid in terms of adaptability of the provided data – usually limited to images of the trails, shaded relief etc. which are directly displayed in the map layer. Editing options of visual aspects of displayed tourist maps are very limited.

The map portal designed as part of this project offers solutions of selected problems of tourist map servers. Users can not only assemble the layers of a map based on their choice and apply an own style, but can also directly modify the geometry and help the others to keep the data up to date and without unnecessary mistakes. The data without errors and mistakes, which are current and accurate, represent the greatest asset of detailed hiking maps, but also the most difficult and most expensively achievable one.

The whole portal is designed as an alternative to massive and widespread GIS applications and it can work without having to purchase and install any software. Moreover, with the possibility of use of data sets that are currently not available anywhere.

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