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Legend design based on map samples

Catherine Domingues, Bénédicte Bucher

COGIT Laboratory – Institut Géographique National
{catherine.domingues, benedicte.bucher}@ign.fr

INTRODUCTION

Legend design once was left to cartographic experts only. It is now possible for anyone to build a map thanks to widely available software. They can also query WMS servers and use the SLD model to specify their legend. In the future, two possible drawbacks could stem from this. The first drawback is the growing number of stereotyped maps because of people heavily relying on default styles. The second drawback is the production of inefficient maps by users who lack cartographic expertness.

The work presented in this paper aims at assisting users in designing innovative legends that on the one hand fit their objective and taste and on the other hand comply with cartographic rules.

A DIALOGUE BASED ON MAP SAMPLES

The main principle of our approach is to establish a dialog between a user and a server that may query a database of precalculated map samples. The objective of this dialog is to define a legend adapted to the user data, taste and objective, and that complies with cartographic rules.

[Hubert 02] has introduced the use of cartographic samples to organise a dialog between a user and a server of geographic information of whatever kind that can be mapped. In his work, he applies this principle to assist a user in specifying the parameterisation of a generalisation operation.

The main lines of the dialogue we want to organise are illustrated on figure 1:

- The user initiates the dialogue and specifies some properties of the map he wants to build. These properties will be described later in the paper.
- The server selects a set of map samples in its database, which underlying data are representative of user data and which visual properties complies with user specification. It displays them on the dialogue interface.
• The user expresses statements related to the displayed map samples, e.g. ‘I don’t like this combination of colours’, ‘I like this sample’.

• The server selects a new set of map samples and presents them to the user.

• The dialogue ends when the server has no more relevant map samples to present or when the user has been able to build his own legend thanks to the legends of the map samples.

1 ‘I want a large scale map, my data are on a town’

3 The server displays the selected map samples

2 The server selects 4 samples corresponding to large scale, town area, with various tones

4 ‘I like sample2’, ‘I want this color’

5 The server selects samples with the wanted color and keeps one sample similar to the sample2.

6 The server displays the selected map samples

7 ‘Apply legend of sample5 to my data’

Fig. 1: An example of dialogue based on map samples in our application.

A very difficult step is the server selecting a set of map samples to display to the user. The server cannot present all the map samples at once to the user because there would be too many of them. Thus it must perform two tasks:

• The retrieval: the server interprets the user statements to retrieve map samples that are possibly relevant. If the user has said ‘I want this colour’, samples that don’t contain this colour will not be retrieved.

• The selection: the server selects, among the retrieved samples, a limited set of samples that will be displayed on the interface. Two concerns rule this selection. The first is that selected samples should be some of the most relevant ones according to the user statements. The second is that selected samples form a set as varied as possible in order not to
limit the user choice. This step is called ‘ranking and clustering’ in Information Retrieval.

Obviously, the server needs to rely on a description of the map samples to perform efficiently these tasks; gif objects are not enough. A preliminary work was to design a database of qualified samples, i.e. images associated with properties. This work is described in the following section.

**CONCEPTION OF A STRUCTURED DATABASE OF MAP SAMPLES**

What do the words ‘relevant’ and ‘varied’ mean when applied to maps? This question is not easy to answer. Maps relevance depends not only on the respect of cartographic rules but also on contextual elements and on the user personal taste. Maps variety can be of scale, of data and also of other properties like colour tones and luminosity. We have asked several users to comment on a set of maps. The words they used have been clustered. For each cluster, we selected a representative term (the less ambiguous one). This led to the following list: warm, luminous, pastel, sober, rich, realistic, and innovative.

The next step was to build a database of map samples. A map sample consists of gif images (the map) and a set of properties for this image. We used the numbers 1 to 5 to value the properties ‘warm, luminous...’. Samples images were created by applying legends to the same dataset. Legends were created based on selecting colours from colour ranges defined in a colour book. These legends were aesthetic and with various colour tones. 102 samples have been produced that way. User sessions have been organised to qualify these samples, i.e. to value the properties ‘warm, luminous,’ on a scale from 1 to 5. 12 users participated to these sessions. For each property and sample, a mean value has been calculated.

During this experiment, it appeared that for a given sample some properties are most relevant than others. For each sample, we highlighted the properties with a value that on the one hand made a statistically significant consensus and on the other hand was near 1 or 5. Besides, two important properties were pointed out by users: the first dominant tone and the second dominant tone.

Last, users were also asked to give a score to each sample between ‘I like’ and ‘I dislike’. We could then observe a correlation between these scores and the values for the other properties.
**Prototype**

A prototype of our application has been implemented. The user may see and comment on samples. Current selection strategy relies on selecting samples with various dominant tones.

![Prototype Image]

**Fig. 1.** Snapshot of our prototype.

Some on-going work focuses on the qualification of maps and the design of the qualified map samples database.

Other work is dedicated to the selection of relevant and varied map samples possibly combined with the on-the-fly generation of new samples.

**References**

Hubert F. (2002) Map samples to help GI users specify their needs - 10th International Symposium on Spatial Data Handling, D.E. Richardson et P. van Oosterom 533-543