Good 50x70 Project: A portal for Cultural And Social Campaigns

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Abstract

In this paper we present some innovative tools developed while designing a new portal for the promotion of a database of campaigns of social communication. We focus on strategies for querying and browsing the digital materials in new, engaging ways, with a particular attention to younger generations accustomed to the digital medium. To this end, we have developed innovative tools able to query and browse the database, and display the results using information automatically extracted from both images and texts.

Introduction

The advent of new technologies provides the museums new communication methods, which allow the visitors (or users) to explore the available collections on their own. Among the others, museums need methods and tools to navigate their catalogues and to provide facilities for searching, browsing, clustering and visualizing different kinds of visual data and related information. This can be achieved, for example, by using creative web sites, applications or installations to support the user in the discovery process.

One of the way that museums communicate with the public is through advertising materials and marketing campaigns and publications such as books, CD-ROMs, brochures, flyers, posters. Moreover, visitors like to take souvenirs from the museum which remind them of the experience and that can also be used to advertise to other possible audience the museums exhibitions. From the marketing perspective all these materials could play a central role in collecting directly or indirectly more incomes to sustain all the activities and should be therefore promoted. For example, posters and photos can easily be made available in digital forms to a vaster audience on the museums website. The digital materials can be certainly sold but it can also be made available under a fair use licence or creative commons one. The last ones seem to be in contradiction looking at the sustainability but if we wish to establish a more direct relationship between the museum and the public, and increase its popularity and thus attendees, these modalities should be taken into account as well.

In this paper we present some innovative tools developed within a project aimed at designing a new portal for the promotion of a database of campaigns of social communication, related to briefs on different topics. We focused on strategies for querying and browsing the digital materials in new, attractive ways, with a particular attention to younger generations accustomed to the digital medium. To this end, we have developed innovative tools able to query and browse the database, and display the results using information automatically extracted from both images and texts. As in the case of a museum where digital materials are usually stored in database with images and textual descriptions, the principal items used here for social communications are in the forms of 15,000 digital posters subdivided into 20 briefs. The posters have been specifically created by professional designers and artists to be freely distributed, modified and used as a base for other communication campaigns.

Literature review

Museums need methods and tools to navigate their catalogues and to provide facilities for searching, browsing, clustering and visualizing different kinds of visual data and related information. This can be achieved, for example, by using creative web sites, applications or installations to support the user in the discovery process [12].

A number of collections of art objects are made available on the web with the purpose of making the contents of museums and other public or private organizations accessible to the general public, in preparation for, or in place of an actual visit. The museum itself is accurately reproduced with the opportunity for the user to virtually visit its rooms, showcases and bookshops such as the Metropolitan Museum of art[1], the National Gallery of Art[2], the British Museum[3] and the Louvre[4]. Sometimes objects collected on the web are not visible in single museums or galleries, but are spread in many places (e,g, the WEB Gallery of Art[5] or the Kress Foundation[6]); some others are gathered and preserved in archives, libraries, collections available only for a few, usually experts and researchers of the domain (e.g. the Hairpin Museum[7]). Usually these sites just offer standard navigation and search functionality: collection and temporary exhibition browsing and search by author, date, collections, etc... In some case, virtual navigation and specific paths for kids are also offered to users.

Regarding applications designed to query and browse the museums archives, innovative tools can be exploited to manage different type of data. For example, in the case of image data, we can borrow from the fields of image analysis and the content based image retrieval to design applications with advanced functionalities. As an example, image indexing is the process of automatically computing a compact representation (numerical or alphanumerical) of some attribute or feature of digital im-

[1] http://www.metmuseum.org/
[2] http://www.nga.gov/content/ngaweb.html
[3] http://www.britishmuseum.org
[4] http://www.louvre.fr/
[5] http://www.wga.hu/index1.html
[6] http://www.kressfoundation.org/
[7] http://www.hairpinmuseum.org/

ages, to be used to derive information about the image contents. One of the pioneering examples on image feature extraction is the work by [26] where the concept of colour histogram is introduced for image indexing. Since then, more complex and sophisticated general purpose and domain dependent indexing methods are being developed coping with different image attributes. Some examples of low level and high level features can be found in [20, 23, 8, 1, 4, 7, 13, 14] . All these features can be used and integrated into a retrieval system allowing to perform advanced searches on the digital archives.

Analysis and design

The Good 50x70 portal has been designed keeping in mind that a design methodology is a crucial element in the creation of efficient, effective and usable web sites [11, 9, 10, 2, 15, 21]. Requirements analysis has focused on a grid of features such as aims, users, data, devices, places of use, etc. Our web site offers a standard retrieval interface, the yield is more immediate for a user using a simple but powerful interface that allows to cross different key searches and different ways to show results. We have designed the portal to easily guide users in the discovery of the materials of their interest through the use of a hierarchical filtering paradigm of the relevant information.

The database

The database of campaigns of social communication is Good 50x70, based on an international social communication project which addresses some of the critical issues in todays world, such as Aids, child mortality, environmental damage, violation of human rights, underdevelopment, war, violence against women, etc. The name of the initiative comes from the size of the media (50x70 cm posters); at the heart of the project the collaboration with international charities such as LILA, WWF, Greenpeace, and so on.

Good 50x70 launches an annual "call for participation" in which he asks designers and creative artists to participate in context on specific social topics (briefs), sponsored by charities who decide them, in order to raise awareness of those problems and to promote change. An international jury identifies the best and rewards them. The posters can then be re-used, for example on bags or t-shirts, in non-profit activities. The database is at the disposal of endorsing charities, with the goal of making a real contribution to society and truly making a difference. The ultimate aim of Good 50x70 is to shake up the current state of the market by pushing professionals to work ethically, in order to create a new synergy between the non-profit and spontaneous and radical creativity, reaching with its posters a wider audience making it sensitive to ethical culture and educating it.

Currently, the available data is composed of 15,000 digital files containing poster images, grouped by year and brief, associated with some textual information, such as poster description, author name, country, brief, tags, and so on. These data are uploaded by the poster author directly, to participate to the brief chosen. Data model is very simple because each poster is completed by few textual data, stored in a MySql database structure completed by mood features data, as detailed below, and special indexes studied to increase data retrieval speedy.

Figure 1. *From left to right, examples of images with increasing colorfulness values.*

Users

The portal have been designed with different user categories in mind each one with a different usage pattern of the site. Specifically, we considered: poster authors, the 50x70 team, members of the jury, institutions,and generic public. The portal requirements for each user's category are:

- allow authors to upload the posters and the associated information in a simple way;
- allow Good 50x70 team to create new contests and manage old ones;
- give the jury a tool to browse all poster uploaded to have them evaluated;
- allow designers, creative artists and in general institutions, to download posters to reuse them;
- support users that want to discover the material of interest, raising the awareness about ethical and critical themes, by giving easy searching keys, able to search both among text and image features as well.

We paid particular attention to provide facilities that allow all users to query the database successfully, even if they are not expert in the field, or are unfamiliar with the database contents or with the language in which database terms are expressed. To this end, the web site offers a standard two steps search interface, that allows to cross different key searches, to refine the results and to show the retrieved posters in different and innovative ways. We have designed the portal to easily guide the target users in the discovery of the materials of their interest through the use of a hierarchical filtering paradigm of the relevant information. We also developed tools for the automatic indexing of images according to pictorial, emotional and aesthetic characteristics.

Advanced indexing of images

For the purpose of our work, we need to index images with features that can be understood by users for content filtering and querying. So, among the available features in the literature, we have considered colourfulness, dominant colours, mood features, and colour harmony.

Colorfullness

The colourfulness feature is represented by the number of unique RGB (Red, Green, Blue) colour pixels present in the image. To this end, RGB values are first quantized by removing the least significant bits, then these values are indexed and the number of unique index values counted represent the feature. Figure 1 show examples of images with increasing colorfulness values.

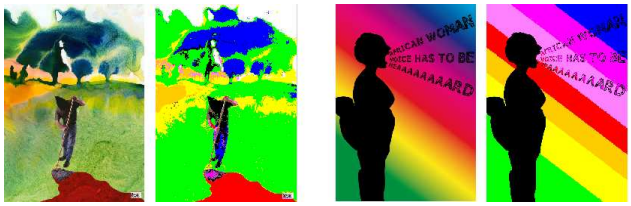

Figure 2. *Images segmented using the color naming schema.*

Dominant Colors

The dominant colours feature is computed by using the colour naming scheme proposed by [27]. Each pixel in the image is classified into one of the 11 colour categories: black, blue, brown, grey, green, orange, pink, purple, red, white, yellow). The three most frequent colour categories are retained as the dominant colours feature for the image. Figure 2 show two examples of images whose pixels are classified using the color naming schema.

Color Mood

Mood features are used to capture some aspects of colour emotions. The mood features are extracted using the computational model proposed by Solli et. al [24] which is an extension to images of the model devised by Out et. al [17, 18, 19] for single colors. For single colors, Ou et. al identified three color emotion factors: activity, weight, and heat. For these three factors, the corresponding equations are defined as:

$$activity = -2.1 + 0.06 \times \times \left[(L^* - 50)^2 + (a^* - 3)^2 + \left(\frac{b^* - 17}{1.4} \right)^2 \right]^{\frac{1}{2}} \quad (1)$$

$$weight = -1.8 + 0.04 \times (100 - L^*) + 0.45 \times \cos(h - 100^\circ) \quad (2)$$

$$heat = -0.5 + 0.02 \times (C^*)^{1.07} \times \cos(h - 50^\circ) \quad (3)$$

where L^*, a^*, and b^* are the CIELAB coordinates of the RGB values; h and $C*$ are the CIELAB angle and chroma respectively, and are defined as:

$$h = \arctan\left(\frac{a^*}{b^*}\right) \quad (4)$$

$$C^* = \sqrt{a^{*2} + b^{*2}} \quad (5)$$

Solli et. al proposed to apply the above equations to RGB-histograms. Given an n-bins histogram an emotion matrix E is computed by applying the above equations to each representative $L^*a^*b^*$ value of each of the n bins. The obtained $3 \times n$ emotion matrix is then multiplied by the normalized histogram H representing a probability distribution ($M = E \times H$) obtaining the mean score for each emotion factors of the image. Figure 3 shows some examples of emotion factors computed on the images in our dataset.

Figure 3. *Examples of activity, weight, and heat emotion factors.*

Color Harmony

Colour harmony is another colour emotion factor that can be used to describe how an image is emotionally perceived. The computational model used in our work is based on the work by [25] that extends the computational model on colour swatches introduced by [16] to image colour regions. Given two $L^*a^*b^*$ colors, the harmony score (CH) is composed of three parts: the chromatic effect (H_C), the luminance effect (H_L), and the hue effect (H_H). The color harmony is thus defined as:

$$CH = H_C + H_L + H_H \quad (6)$$

with

$$H_C = 0.04 + 0.53 \times \times \tanh\left(0.8 - 0.045 \times \left[(\Delta H^*_{ab})^2 + \left(\frac{\Delta C^*_{ab}}{1.46} \right)^2 \right]^{\frac{1}{2}}\right) \quad (7)$$

$$H_L = 0.28 + 0.54 \times \tanh(-3.88 + 0.029 \times (L^*_1 + L^*_2)) + + 0.14 + 0.15 \times \tanh(-2 + 0.2 \times |L^*_1 - L^*_2|) \quad (8)$$

$$\begin{aligned} H_H &= H_{SY1} + H_{SY2} \\ H_{SY} &= E_C \times (E_S + E_Y) \\ E_C &= 0.5 + 0.5 \times \tanh(-2 + 0.5 \times C^*_{ab}) \\ H_S &= -0.08 - 0.14 \sin(h_{ab} + 50^\circ) - \\ &\quad - 0.07 \times \sin(2 \times h_{ab} + 90^\circ) \\ E_Y &= \frac{22 \times L^* - 12.8}{10} \exp\left[\frac{90^\circ - h_{ab}}{10} - \exp\left(\frac{90^\circ - h_{ab}}{10} \right) \right] \end{aligned} \quad (9)$$

To extend the above equations to images, Solli et. al, exploited image segmentation to identify color image regions. Two set of regions are created depending on their size: large regions and small regions. On each set, the harmony score is computed

-3.749 -1.784 0.603 2.641

Figure 4. *Examples of color harmony scores. Higher scores means an harmonic colors combination.*

from pair of representative colors of the regions. The final score is then computed as a weighted combination of the harmony score computed on large regions, the harmony score computed on small regions, and the variance of the harmony scores on the small regions [25]. Figure 4 shows some examples of color harmony scores computed on images following the aforementioned procedure.

Automatic poster category

Uploaded posters are automatically characterized into one of the following three styles: "Photographical", "Illustration", "Typographical". A photographical poster is a poster characterized mainly by photo content. An illustration poster is characterized mainly by graphical contents. A typographical poster is mainly composed of text. This information can be used as another index to describe the image content. As a preliminary study, we have used the previous features coupled with geometrical statistics about the image colour regions extracted using the Mean Shift segmentation algorithm [5]. A supervised learning algorithm based on Support Vector Machine [6] is used as a classification algorithm. The classification of an image poster into one of the three categories is a multi-class problem. To solve this problem we have used the implementation of the multi-class SVM classifier that is found in the LIBSVM software developed by [3].

Preliminary results on a small subset of annotated posters give an overall accuracy of 62.50%. The corresponding confusion matrix is as follows:

Confusion matrix of the classification of the images into the "Photographical (P)","Illustration" (I); and "Typographical" (T) categories.

	P	I	T
P	0.8750	0.0750	0.0500
I	0.1000	0.2250	0.6750
T	0.0750	0.1500	0.7750

By analyzing the errors, it can be seen that the photographic images are the easiest to classify followed by the typographical ones. The illustration category is by far the most difficult to classify. This is probably due to the heterogeneous content of this category with images that contain at the same time, illustration, texts and photos. Further study is necessary to devise more efficient image features.

The Good 50x70 portal

The innovative tools to query and browse the database, and to display the results using information automatically extracted from both images and texts have been integrated in the portal. The system offers a two steps search mode, with a faceted query refinements. Faceted search [22] aims to combine navigational and direct search to leverage the best of both approaches. In a typical faceted search interface, users start by entering a query into a search box. The system uses this query to perform a search, and then permits navigational refinement on the results of that search. In the first step the user can perform searches:

- By textual query, based on the content associated to the poster, and catalogue browsing;
- By "styles", automatically associated during the upload;
- By dominant colour;
- By mood features (as colour harmony, or colour emotion factors as activity, weight and heat).

In the second step, the results of the query are shown as described below. On the left, the indexes used in documents are shown and, like a faceted query, it is possible, by selecting one or more options, to refine the current search, and to specialize it further by narrowing the set of documents retrieved. Figure 5 reports the results of the query "Brief=Play for Africa", in which the posters retrieved are shown as thumbnails. On the left the indexes to be used as faceted query. Results can be shown using mood features associated to each poster, in graph mode using a Cartesian space where both x and y axis can be selected by the user among colour harmony, colour emotion factors as activity, weight and heat. Figure 6 shows the query results drawn as graph where the x axis is weight and the y axis is heat.

Designers can use the posters for no-profit activities: figure 7 shows the details of a poster together with the marketing use of it, made by a designer who re-used this digital image for non-profit activities: a bag and a t-shirt.

Conclusion

In this paper we present a portal for the promotion of a database of social campaign posters, which integrates innovative tools for querying, browsing and displaying the digital materials in new, engaging ways, with a particular attention to younger generations accustomed to the digital medium. By providing the users with new search and browsing modalities and by giving the possibility to users to acquire, manipulate and share digital materials, a more strong link between digital libraries and the intended users can be established. We believe that these interaction modalities can be successfully applied to other contexts such as advertising, marketing campaigns, professional photo archiving, and museums.

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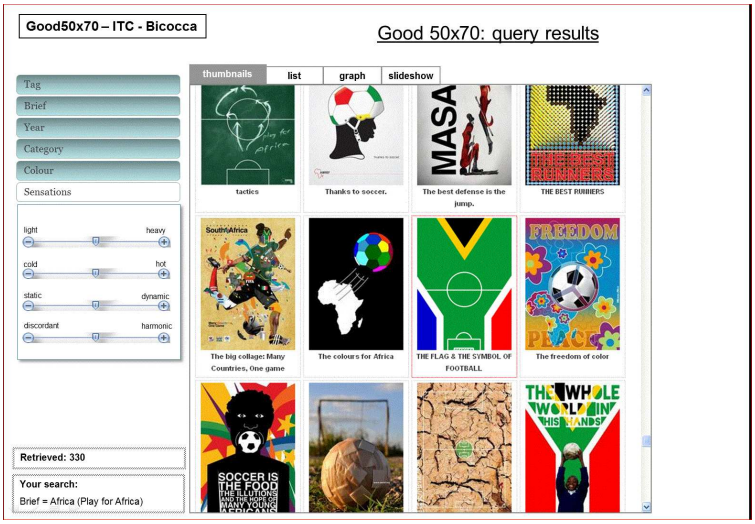

Figure 5. *Query results shown as thumbnail.*

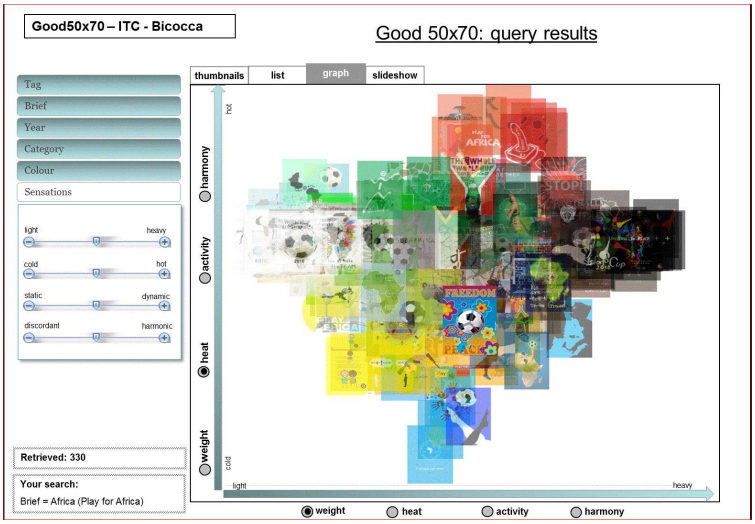

Figure 6. *Query results shown using mood features, in a "graph" mode.*

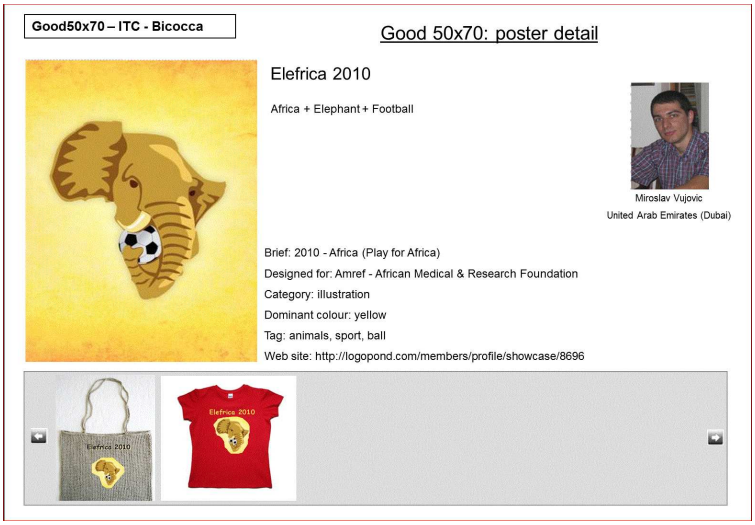

Figure 7. *Details of a poster, with its use for no-profit activities*

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Isabella Gagliardi works at ITC Multimedia Information Technologies section (ITC - TIM). Her major areas of re-search include Hypermedia Information Retrieval models and methodologies, automatic generation of hypertextual links between text/audio/image, dynamic web based database design and implementation, and clustering algorithms. Recently he has focused his research on the development of multimedia information systems available on the web. On these topics she has several national and international publications, and she has been working in national and international research projects.