

CultureCam: Exploring Europeana Images to Inspire Creative Design

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ABSTRACT

This paper presents an online tool that offers designers, artists and all creative people, the possibility of exploring and accessing Europeana in a funny, playful and intuitive way. By using the webcam to take a photo of any object or texture, users can invoke the Culture Cam tool for accessing a set of images that are similar in color, shape or pattern. It is used to stimulate the inspiration of creative designers by diving into common cultural heritage and providing access to beautiful content available to be used as source for new derivative designs and art artefacts. The collection of items used by Culture Cam are accessible under public domain licence.

Keywords

Creative Design, Image Similarity Search, Cultural Heritage

1. INTRODUCTION

The European digital library aggregates information from cultural heritage institutions from the whole *old* continent. Among those, there are more than 23 million images representing for example traditional or modern artwork, photographs of buildings and landscapes, scans of biodiversity material or images from old manuscripts¹.

The aim of the CultureCam application is to connect the digital cultural heritage made available by Europeana to the open communities of craft and media designers. The designers may use cultural heritage objects as sources for new derivative designs such as embroidery, textile patterns, 3D printed objects, media art, etc. However, there are important constraints with regard to the reusability of digital content in new designs. The primary concerns are related to the copyright protection and the quality of the content. While Europeana has made efforts to assign usage rights to all objects, only a small part of them are freely available for reuse. From the reusable ones, some do not present objects that raise the interest of creative designers. Typically, they are only interested to use fascinating shapes, patterns and/or color-rich content.

The second challenge is related to the provision of efficient and effective ways for accessing inspiring images relevant for

the task at hand. Often in their work, the designers are using copper wires, paper forms or existing objects to sketch or model new artifacts. They produce several versions of their designs until the desired work is created. The Europeana artifacts have a great potential to help and inspire designers in their daily work; however, their concrete requirements are hard to be described in words and the classic text-based search engines are often not able to satisfy them. From designer's point of view, accessing inspiring and reusable content through Europeana portal² is a complex and time consuming task.

The main motivation behind the development of CultureCam is the need to address content accessibility issues synthesized within the following questions:

- How to access and reuse Europeana content in an interactive and playful way?
- What kind of content can I find in Europeana?
- How can one find object with particular visual characteristics?
- How to get motivated for exploring more image content?
- How to access inspirational content for creative reuse?

In order to address these challenges, CultureCam employs the search by example approach and interactive browsing of a curated dataset. With the assistance of professional designers we selected a set of reusable images from the featured collections in Europeana Labs³, which is accessible through CultureCam, both from desktop and mobile devices.

The rest of the paper describes the steps followed to implement the CultureCam application and is organized as follows: Section 2 places the current work within the related research context of the cultural heritage domain. The architecture and the process of building the CultureCam prototype and the image processing and search functionality is described in Section 3, while the graphical user interface is presented in Section 4 followed by the discussion of weaknesses and open issues in Section 5. The conclusion and directions for future work are summarized in the final part of the paper.

¹<http://europeana.eu/portal/search.html?query=TYPE:IMAGE&rows=24>

²see <http://www.europeana.eu/portal>

³<http://labs.europeana.eu/data/>

2. RELATED WORK

The work presented in this paper is carried out within the scope of Europeana Creative⁴ project. The project follows a co-creation approach for developing five pilot applications empowered by the cultural heritage content accessible through Europeana. A similar approach was employed for the development of the CoDICE (COdesigning DIgital Cultural Encounters) tool, as reported by Diaz et al in [2]. This has the goal to support co-designing activities for building smart objects for enhanced encounters with cultural heritage. The key functionalities of this tool are related to the management and tracking co-design activities, enhancement and documentation of design products.

An important issue related to the reuse of cultural heritage content in creative designs is caused by the copyright restrictions. Many of the digitized cultural objects are not freely reusable or they are available in low quality. Martilla and Hyyppä show how copyrights become a driver of the design process and override goals of human-centered and participatory design [4]. Rights clearance is extremely hard in the case of audio-visual content. However, in the case of image content, the identification of right owners is less complicated, and the rights statements are available in the metadata of Europeana objects. Still, less than ten percent of image content is marked as public domain, and most of it doesn't present much value for designers (i.e. large part of public domain content are grayscale photographs of regular landscapes, persons or objects).

The core of the image similarity search engine used in this paper was described by Amato et al in [1]. A preliminary evaluation of the service using a controlled dataset selected from Europeana was presented in [3]. The previous work aimed at evaluating to which extent the search engine may satisfy the expectations of the regular users or creative design professionals. In contrast to the previous work, the CultureCam dataset aggregates items with a large variation of objects, patterns and shapes. There are only a few images being very close to each example in terms of visual similarity.

3. CULTURECAM PROTOTYPE

The main goal of the Culture Cam prototype is to provide easy and intuitive access to cultural heritage content for designer communities. Therefore, the design goal of the application is to provide a simple and intuitive mechanism for accessing image content, based on a word free search and a tactile interaction with the GUI. It invites the designers to take a closer look into Europeana content by facilitating easy access to the archive through provision of inspirational and "unexpected" search results. Therefore, the search module makes a tradeoff between the similarity and serendipity of the retrieved image content.

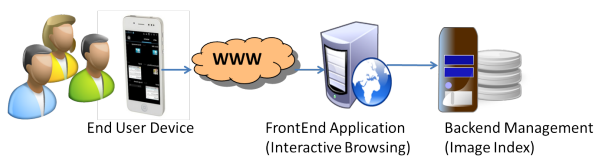


Figure 1: System Architecture

⁴<http://pro.europeana.eu/web/europeana-creative>

From the user perspective, CultureCam is a digital "live" tool that facilitates the access to images containing similar colors, shapes and patterns by using a web camera. One may take a snapshot of an object in front of his/hers computer or mobile device and submit it to Culture Cam, which analyzes the given picture and comes up with a result set of similar content.

Figure 1 presents the architecture of the proposed system, which allows end users to use their favorite mobile devices (phones or tablets) or computers (notebooks or desktops) for accessing the frontend (web) application. The interactive access and browsing of images is empowered by the search functionality provided by the backend service in charge of managing the image index.

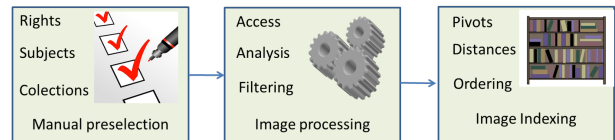


Figure 2: Content selection and indexing process

The process of selecting and indexing appropriate materials for being reused by designers is not a straight-forward one. The approach used for accomplishing this goal is presented in Figure 2, following a three-step workflow. In the first step, a manual pre-selection of available collections and items is performed. This makes use of expert knowledge to search content basing on existing metadata followed by a brief visual inspection of the given selection. For the CultureCam prototype we primarily investigated collections containing public domain content, which are available also with good resolution and a wide variation of colors, patterns and shapes. The visual inspection is made directly within the Europeana Portal⁵. In the second step, the targeted images are accessed through the Europeana API⁶, the image features are extracted and images that doesn't pass a certain level of quality are filtered out (including placeholders, small resolution, grayscale or monochromatic images). Finally, the images are evaluated by their visual features and placed in an image index. A nearest neighborhood algorithm is used here for reducing the search space and improve the execution performance at runtime. This is achieved by selecting a so called pivot set and computing the distances between each image and each pivot. At runtime, the search results are ordered by their similarity relative to the pivot set. A detailed description of the feature extraction and indexing process is available in [1].

4. GRAPHICAL USER INTERFACE

Due to the complexity of accessing and browsing the Europeana repository, a clear goal of Culture Cam is to make the interaction with the graphical user interface as simple intuitive and engaging as possible. Consequently, the graphical user interface is remarkably simple, the number of interaction possibilities and features in the tool being reduced to a minimum. The understated design aims to create a subtle frame for accessing beautiful Europeana content, highlighting images and thus presenting the search result as nice

⁵see <http://www.europeana.eu/portal/>

⁶see <http://labs.europeana.eu/api/>

gallery pages. Additionally, it has been the intention all the way through to keep the user journey short. There are no conventional menu/sub menus structures except from the menu icon, borrowed from the iPhone interface with the clear purpose of creating a simple, intuitive and “familiar” user interface.



Figure 3: GUI: Capture and search screen

The first screen of the application invites the user to capture a photo that will automatically trigger a search in the image repository as shown in Figure 3. Therefore, the GUI uses no more than three control elements for taking the picture and for back and forth navigation through the search results. Recently, new functionality for sharing the links to the current search results on Facebook and Twitter has been added to this screen. The latest version of the CultureCam can be accessed on the official website⁷.

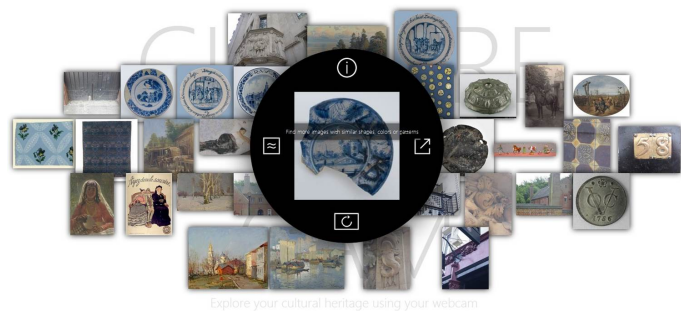


Figure 4: GUI: View results and search screen

When users choose to take a close look at an image retrieved from the Europeana repository, four more controls are displayed. One of them is used to display basic metadata of the image (i.e. title, rights, provider) and another represents the direct link to Europeana page providing complete information about the given image. The other two possibilities are to go back and take a new picture or dig further into Europeana content by searching similars to the current selection.

5. OPEN ISSUES

The success of the CultureCam application is completely dependent on the quality and the amount of content made exposed through its image search service. Selecting the appropriate items for being included in the CultureCam collection is a complex process, as described in Section 3. Manual curation is not an option when the size of the collection increases to thousands of objects or more. It is also not an

⁷<http://culturecam.eu>

scalable or repeatable/reproducible process. Therefore, we employed several heuristics for semi-automatic content selection by using the resolution, color distributions and shape descriptions in order to identify the most interesting content items. Another important policy in the content selection process was introduced by the need of including only content that is freely reusable for design purposes. Currently we only included public domain⁸ content, in the next versions we plan to include also images released under the CC0⁹ license.

Capturing photos with the webcams integrated in computers or mobile devices is the core functionality of the CultureCam prototype. Webcams are available in the great majority of notebooks and mobile phones, however, their heterogeneity is transposed in the technical and visual characteristics of the captured photos. In the most of the cases, the images are not captured under optimal illumination conditions and as a consequence they are undersaturated, grainy or dark. In contrast, the Europeana images are created by scanning with professional devices. Often, the objects are placed on background surfaces of different colors. An additional step for processing the input images might be implemented in the future to overcome the systematic differences between the captured images and Europeana content and thus, further improve the search results.

6. CONCLUSIONS AND FUTURE WORK

This paper presents a tool that makes the visual navigation through the selected image content available in Europeana as simple and intuitive as possible. The current version of the CultureCam uses a collection of 2600 items, that were curated to be freely reusable and also inspiring for creative designers. When being focused on simplifying the browsing and stimulating the interest for cultural heritage items, the search algorithm was designed to make a trade-off between the similarity of the retrieved results and their serendipity. At the submission date, the CultureCam tool is in an pre-release version. Future work will investigate the possibility to provide access to whole image content of Europeana and to evaluate the acceptance of the CultureCam application within the designer communities.

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⁹<http://creativecommons.org/publicdomain/zero/1.0/>

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