Visualizing Rembrandt
An Artist's Data Visualization

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Abstract. Visualizing Rembrandt is a web application that helps users to view connections between Rembrandt and other artists with whom he had a professional relationship. These connections can be made by choosing from different criteria: teachers, pupils, influenced by, influenced on, human figure, landscape, drawing and paintings. The data for this project was provided by the RKD (Rijksbureau voor Kunsthistorische Documentatie) and an application built with Java and Javascript was used for its display. This application is an innovative tool that is helpful to display museums data in an efficient fashion, which can be a good support for visualizing and connecting data in museums and exhibitions (and can be used with different artists data).

Keywords: Rembrandt, data visualization, art, museum.

1 Introduction

Over the past few years museums professionals have strived to provide an interactive experience to visitors. This interest has been driven by the possibilities that new technologies can offer within an exhibition place, in order to enhance and expand the engagement and learnability that general public can gain. Interaction has become an important field within museums, no matter whether it is an art, science, natural or historical museum. But, what is this interaction all about? One of the most clear definition that can be find in this field is the one given by Joshua Noble in his book Programming Interactivity. He explains that interaction is an exchange of information between two or more active participants (Noble, 2012), where one party of this can be a computer and the other a human (the user).

Discussions regarding this exchange of information within museums must take into account the debates around them and their social role (Bell, 2002). These issues are addressed because they help to acknowledge the way museums share information, their intentions of doing so, and the target audience they seek to reach. The previous concerns mold the way technology can fit into an exhibition space, as new media and interaction can shift how a museum displays information in order to make it more accessible and appealing. Technology can then provide a breakthrough for paradigms in museums, as for instance the way data

is displayed. Spectators usually read the information concerning an artwork or an object through a fact sheet hanged in the wall. The visitor has no interaction and does not receive any kind of feedback from it, hence there is no exchange of information.

Visualizing Rembrandt is a web application that displays Rembrandt's data through an interactive graph, where the user is in charge of choosing and filtering the type of data he/she would like to learn. This application is thought to fit exhibitions that include artworks from the dutch painter, and it aims to make the learnability process regarding this artist easier through a friendly user interface.In this specific case the interactivity between the user and the computer is based on the decisions the individuals may take and the data that is returned to fulfill the spectators needs. This interactivity is understood as Information Delivery, which refers to the approach of an information corpus or repository that is presented to the visitor, whether adaptively or by user selection (Wakkary, 2008, p.372). Visualizing Rembrandt is then a graphical mean to learn deeper about this particular painter, by allowing connections that would not be possible within a traditional approach towards art exhibitions.

1.1 Related Work

Interactivity in museums has been pursued from different approaches, that are not only centered in an exhibitions physical space. Museums professionals have put effort in developing interactivity in the museums websites in order to integrate it to the visitors experiences and expectations. Because of this, several museums offer to users the chance to build their own collections, where they can connect and collect information in a personal meaningful way (Marty, 2011). However, these web-based interactivity have had some problems, as users do not usually update, or even look again, the collections they have made. For this reasons studies about how visitors browse and interact with museums websites are still being made (Marty, 2007).

There are web-based examples of sites that contain artists information and artworks, but these still provide a static visualization of the involved data. The Google Art Project (http://www.googleartproject.com), for instance, allows users to browse and choose information from a broad array of artists. However, there is no possibility of visualizing connections between artists. The Google Art Projects works as a library, where the retrieval of images is efficient. One specific website that displays information about Rembrandt's artworks is The Rembrandt Database (http://www.rembrandtdatabase.org/Rembrandt), which is managed by the RKD (Rijksbureau voor Kunsthistorische Documentatie). This database is still in a beta version, and it is helpful for browsing through Rembrandt's paintings with more information that the one presented within the Google Art Project. However, in this version there is still a lack of connectivity between Rembrandt artists and their relationships.

Interactive museums guides are another trend that has grown over the past couple of years, and since the advent of audio- based museum guides, much research and development has been placed on increasing the technological capacity

for augmenting the museum visit experience. (Wakkary, 2008). Nowadays, museums guides are drifting from an audio setup where visitors had to type a specific number into special devices. It is common that museums provide ipods, or similar touch screen devices, to users in order to provide them with information. Visualizing Rembrandt is an application that can be embedded in this guides, in order to allow users to handle and manage the information.

2   Connecting Rembrandt to the Web

The objective of browsing through Visualizing Rembrandt is to enhance the museums visitors learning experience by providing more information about the artist and those who were somehow connected to him in as little space as possible and in a more dynamic way. For this reason the application can be displayed within a museum, but it can also be incorporated into the museums website. In the latter case, users can search in Visualizing Rembrandt from their computer or laptops at home. One of the many benefits of using information technologies as a tool for communication is that it allows to provide bigger amounts of information in little space and in different formats which, at the same time adapt to visitors communication preferences and reinforces the content transmission (Pujol-Tost, 2011).

2.1   Technical Setup

The interface has educational purposes, hence the search and result of information should be efficient, effective and satisfactory. Users do not need to have experience with advanced technology, however they should be familiar with basic web navigation. This application was built under the Java Enterprise Edition platform using PrimeFaces, d3.js and jquery for the front-end. And it is easily customized to be used with a different data set of artists.

2.2   Data Set

The data visualization graph presents information obtained from a data set provided by the Rijksbureau voor Kunsthistorische Documentatie at the Netherlands Institute for Art History and it consists of a list of 89 artists relevant to Rembrandt along with information about themselves, their artistic work (around 142 paintings in total) and details of the paintings when available. A previous research on the use of information visualization in museums show that data needs to suffice short and long-term explorations (Hinrichs 2008). Therefore the names of the artists are presented in a Hierarchical Bundle Graph (Fig.1) to allow an easy and simple overview of all the spectrum of connections, and invites the visitors to explore an artist more deeply if desired.

After the user has chosen the type of information he wants to see the information is displayed as the following: At the canvas a connection between Rembrandt and the other artists will be shown depending on the selection made by the user.
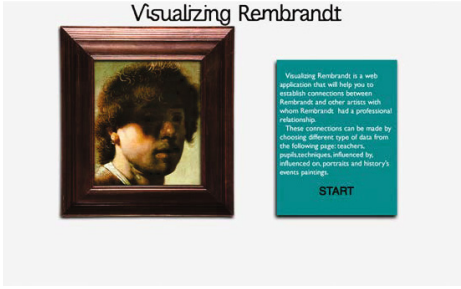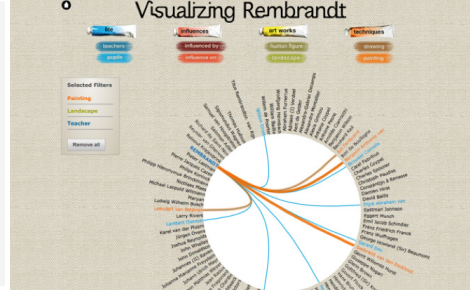
Fig. 1. Index

Fig. 2. Canvas

The connection is made with a line using the color of the selected sub-menu. For example, if a user wants to see who was a pupil of Rembrandt he/she should select the PUPIL submenu. This is light blue, a line starting from Rembrandt will end on the other artists that were his Pupils. The same principle is applied with the rest of the categories.

In order to ease the learnability of the system categories and colors are implemented. This is based on two concepts defined by David Benyon in his book Designing Interactive Systems: metaphors and blends. The categories are visualized with a painting metaphor with the use of oil tubes and paint strokes, as a Metaphor is generally seen as taking concepts from one domain and applying it to another(Benyon, 2010). However, metaphors are really blends in the interaction design, as explained by Benyon, because it takes input from at least two spaces, the characteristics of the domain described by the source and the characteristics of the target that we are applying it to (Benyon, 2010). The painting metaphor is blended with the graph in order to create a user friendly navigation. In addition of the graph and the visualization of data relationships, the user can learn more about specific artists with a pop up menu that shows after selecting a name (Fig. 3).
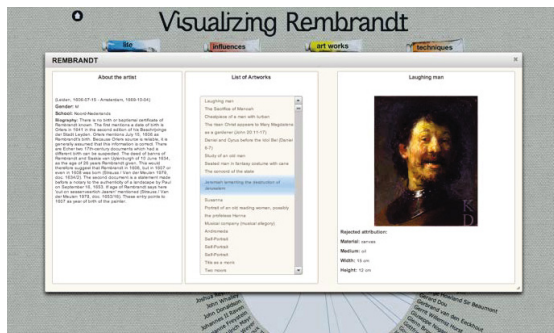

Fig. 3. Popup

For the sake of creating a satisfactory and effective experience the categories are easy to identify. The items that can be selected under each category have a clickable affordance and the action they trigger after being selected is instantly visible. The system was designed in order to make the tasks very easy, so there is a limited number of ways to complete tasks. It is intended to be a straightforward application.

2.3   Navigation

The interface has two main pages: one for the index (where instructions are explained - Fig. 1), and another for the canvas (where data is visualized -Fig. 2). The index resembles a painting hanging in a museum. Paintings of Rembrandt in a wooden frame change every time the page is open. Next to the frame there is a set of instructions of how to use the interface and a start button. After clicking the start button the user enters the navigation area which follows the painting metaphor. Here he finds a white canvas and four categories: LIFE (blue), INFLUENCES (red), ARTWORKS (yellow) and TECHNIQUES (orange). With their corresponding sub-menu items: LIFE : Teachers/ Pupils, INFLUENCES: Influenced by/ Influenced on, ARTWORKS: Human Figure / Landscape, TECHNIQUES: Drawing/ Painting

After the user clicks over the item the connections will be displayed at the canvas. A list of the selected items will be created at the left column, in order to remember the user the selected items. Beneath the list there is as well an erase all option.

3   Evaluation and Results

Three user evaluations were made during the developing process. A User Participation Evaluation and a SUS (System Usability Scale) was selected to measure the usability and experience. The first was made at a lo-Fi level, the second was a more functional prototype and the third a complete version of the application. From the lo-Fi prototype several technical suggestions were made to improve the prototype. The main goal of the second user evaluation was to evaluate the interface design, the navigability and the interactivity of Visualizing Rembrandt. Finally, the third evaluation was carried out with five users, the result showed a stronger positive feedback, as users comprehended better the application, its use and the role that it would have in a museum. The prototype at this stage incorporated the whole list of artists within the main circle, hence the new remarks made by the users for this were about the size of the circle and font size (in order to ease the readability). It is important to mention that in the last evaluation the users were more impressed with the application, for its novelty, its creativity and the way it can be implemented in museums in order to improve the visualization of data with the use of graphs. Users expressed their willingness to use the application when visiting an exhibition, as it would help them see and learn information by new means.

4   Conclusion and Discussion

One of the most important findings of the project was the acceptance of the idea to provide interactive means to display data at museums. Eventually this would make museums to be more aware of the data they own and the way they share it to the public. Initiatives like the Visualizing Rembrandt application can be of great importance in museums, because it will enable the spectators to approach the information in a different way. Users could make decisions of the type of information they would like to read. This will empower the museums visitors with decision making in an exhibition, where the common situation is that the spectator has no big participation.

5   Future Work

The process of developing Visualizing Rembrandt and its results showed that is a very appealing concept. Future developments of this project can be made for different exhibitions and museums. The project can be implemented in more exhibitions, and a new way of presenting data within museums could become popular. However, more tests need to be done, specifically in real contexts, to measure the way the application would be use in a real exhibitions. These would lead to make considerations about how the application can affect the visitors behaviours, or even if it would create a gap between the real objects and the digital information. On the other hand, improvements can be made in the system, by adapting it to other type of devices that would allow visitors to have an even more personal use, like with tablets and touch screens.

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