Framework for describing visual characteristics of websites

Estrutura para descrever as características visuais de websites

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Abstract

This paper proposes a framework for describing visual characteristics of websites. The framework is useful in classifying and categorising the main visual characteristics of websites. It can also be used to analyse and compare different websites. The framework is based on studies of approaches to describe graphic language, web guidelines, web surveys, and CSS specifications. The proposed framework is applied in three case studies. The results show that the framework can be used to identify how the visual characteristics of websites are displayed and their frequency of use. Furthermore, the framework can be used as a tool for web design development.

Keywords: *framework; visual characteristics; website.*

Resumo

Este artigo apresenta uma estrutura para descrever as características visuais de websites. A estrutura é útil para classificar e categorizar as principais características de websites. Ela também pode ser utilizada para analisar e comparar diferentes websites. A estrutura é baseada em abordagens para descrever a linguagem gráfica, linhas guias de websites, estudos de websites, e na linguagem CSS. A estrutura proposta é aplicada em três estudos de casos. Os resultados mostram que a estrutura pode ser usada para identificar quais características visuais de websites estão sendo mostradas e sua freqüência de uso. Além disso, a estrutura pode ser usada como ferramenta para o desenvolvimento de websites.

Palavras-Chave: *estrutura; características visuais; websites.*

Introduction

New technologies and services are constantly emerging on the Internet. In addition, websites frequently update and review both their content and design. There are many guidelines that aim to help designers to build effective web interfaces. However, the validity of such guidelines is questioned (e.g. Czerwinski and Larson, 2002; Dyson, 2004). Reasons for this questioning are the fact that many web guidelines are not based on research and have never been tested.

Apart from guidelines based on research, descriptive frameworks can also be useful in the web design field. A descriptive framework can be a means of categorising and classifying visual characteristics of websites. It can be used to analyse and compare visual characteristics of websites. Furthermore, it can be used as a tool for web design development. This is because a framework can give an overview of the main visual characteristics of a website.

The aim of this study is to develop a framework for describing visual characteristics of websites. The framework is based on a study of previous descriptions of visual characteristics, web guidelines, web surveys and Cascading Style Sheet specifications. Three case studies were set up in order to test the proposed framework. Government websites were used in the studies. The framework is applied to analyse and compare the visual characteristics of these websites.

The approach to develop the framework

The approach adopted to develop the framework for describing the visual characteristics of government websites was to analyse descriptions of visual characteristics, web guidelines about the visual characteristics of websites, surveys on visual characteristics of websites, and Cascading Style Sheets' (CSS) specifications. The material analysed is summarised below.

Previous approaches to describing visual characteristics

Different authors have described and classified graphic language in various ways. The schema for the study of graphic language proposed by Twyman (1979, 1982) divides graphic language into three subcategories: verbal, pictorial and schematic. Verbal language includes numbers and alphabetic letters; pictorial language includes images, photographs and illustrations; and schematic language is graphic characteristics that are neither verbal or pictorial. Twyman´s schema was developed based on printed material.

Walker (2003) developed a descriptive framework of the visual characteristics of children's reading and information books. Her framework is divided into three levels: micro, macro and artifact. Micro refers to letterforms and their articulation; macro refers to navigation, layout, and words versus pictures; and artifact is the material attributes of the books (e.g. binding, printing process, kind of paper). The framework was used as a tool to identify typical visual characteristics of reading books from a particular period and changes over periods of time. Walker concludes that the visual characteristics are influenced by context of use and production.

Elsewhere, Walker (2006) proposes a description of book design. In contrast to the previous framework described, this description places both the macro and micro levels under three categories: document structure and articulation of content, typography, and material attributes. Document structure and articulation of content covers navigation systems, configuration, rhetorical devices, and kinds of content in relation to information unit. Typography covers letterforms and their articulation (e.g. use of space, colour, italics). Material attributes covers size; format; kind of binding; paper type and colour; and printing process. As in the previous description Walker states that contextual factors (e.g. methods of teaching reading) should be discussed in relation to the descriptive characteristics.

Within the electronic media context, Souto (1997) developed a framework to be applied to language educational multimedia software. The framework is divided into three main categories: system requirements, global and operational characteristics. System requirement is composed of the minimum hardware and software needed (e.g. required Random Access Memory). Global characteristics are divided into title, content, and format. Operational characteristics are divided into four main components: visual components, auditory modes (e.g. speech, music), operation aids (e.g. instructions, and help), and navigational levels. Finally, visual components are divided into: grid, text, images, background, text buttons, menus, icons. Souto (1997) concludes that the framework is useful because it identifies the elements of the software and it can help the designers to develop and evaluate software of this nature.

Focusing on online material, Souto (2008) developed a descriptive framework to analyse and compare online language courses. The framework is divided into four main characteristics: audiovisual, content, visual and navigational. Audiovisual characteristics category refers to different types of media that can be used in these courses. Content characteristics category refers to the material displayed in the course, including the skills taught (e.g. reading, writing), the program's level of detail, and the type of activity delivered by the software. Navigational characteristics category is related to the way users navigate in the course. Four navigational characteristics related to the use of links are included in this framework: types, position, number of links, and number of groups of links. Visual characteristics category refers to the visual elements that compose a screen. They are sub-divided into grid, text, background, and images. According to the author, the findings show that the framework is useful for identifying and categorising different characteristics related to the interface.

Web guidelines about visual elements of websites

Lynch and Horton (2004) divided into two main topics the visual elements of websites: page design and typography. Under the page design topic are: visual hierarchy, page size, page length, page layout, page headers and footers, grid, and frames. Under the typographic topic are: text-alignment, line length, font, font size, font-case, font-decoration and font-weight.

Farkas and Farkas (2000) propose an analysis of the navigational interface by page levels: homepage, second page level and third page level. Among the elements analysed are: navigational bars, basic tabs, navigational columns, and drop-down list boxes. They also

create design principles for links, such as, "design web pages so that users will encounter and notice links".

Web design guidelines created by IBM (1999) explain, among other subjects, how to create the framework for the website. They created guidelines divided into five topics: structure, navigation, text, visual layout and elements, and media. An example of a visual layout is "design within boundaries of an "image-safe" area".

Accessibility guidelines were also studied. The Web Content Accessibility Guidelines 1.0 (WCAGs) published by W3C (1999) also refer to visual characteristics of websites. For example, the WCAG number 1 says "Provide equivalent alternatives to auditory and visual content". This means, for example, that for every non-text element a text equivalent should be provided. Another WCAG says that it is useful for users to group elements and provide contextual information about relationships between elements.

Previous analysis on visual characteristics of websites

Kangas (2001) investigated websites in order to find the common practices of layout and content and their conformity with usability guidelines. He analysed seven main topics: layout (centred, left, fluid); text (i.e. number of characters); file size; links (number of links); images (number of images); height; and script (number of characters appearing in inline scripts).

Using a different approach, de Cosio and Dyson (2002) analysed 50 websites with a range of activities (e.g. education, commerce). The features analysed were: the graphic organisation of the page, the elements to support navigation, and the structure of information. The graphic elements were divided into: window size, background, branding, images/pictures, text movement and sound, video, and audio. Sub-sections for text were: title/heading, subtitle/subheading, lists, paragraphs, credits, colour in text. The navigation tools were divided into: introductory page, menus, new windows, navigation buttons/bar, search tool, quick access tool or keyword index, and manipulation method. They found, among other things, that there are some common patterns in the type of text elements used. For example, the websites provided predominant use of list over prose.

Like de Cosio and Dyson (2002), Nielsen and Tahir (2001) also analysed 50 websites with a range of activities. They divided the visual elements of a website into five main topics: basic page layout (page width, page length, liquid versus frozen layout and frames), fundamental page design elements (logo and search feature), navigation (left-hand navigation rail, tabs, links across top of page, categories in middle of page, pull-down menus, right, bottom, upper centre, site map), graphics and multimedia (pictures, alt text, music, animation), and typography (body text and background colours, link formatting).

Souto (2007) analysed 50 government websites in order to describe how links are arranged in government websites. The analysis was divided into five link features: position of links on a web page, position of links in relation to web content, types of links, number of links, and number of groups of links. She found that there is a trend in relation to the arrangement of links in government websites across different countries.

Cascading Style Sheets

Cascading Style Sheets (CSS) is a mechanism developed to add style to Web documents (W3C). They were analysed in this study because the visual characteristics of websites are defined by these specifications. Therefore, this analysis show the possible technical ways of presenting the visual characteristics of a website. According to W3C, an important feature of CSS is to allow the users to 'have a personal style sheet to adjust for human or technological handicaps' and the designers to attach a preferred style sheet.

The CSS analysed was the one called CSS level 1. CSS level 2 and CCS level 3 (under development) have not been recommended by W3C yet. Text, font and boxes are examples of CCS properties. For example, the properties for text are: font matching, font-family, font-style, font-variant, font-weight, font-size, and font.

The framework

The proposed framework was based on the study summarised above. Therefore, the framework used some of the categories of the previous frameworks/ descriptions and adapted it to the context of websites. The analysis of web guidelines and surveys on visual elements of websites helped in the definition of the characteristics. Finally, the analysis of the CSS specifications showed the range of possibilities in which a website can be built. The proposed framework is divided into three main categories: navigational, graphic, and spatial characteristics. Figure 1 shows the proposed framework.

Navigational characteristics refer to methods of manipulation and links' characteristics. This category is similar to the one proposed by Souto (2008), since both frameworks were proposed to describe online material and they have similar navigational systems. Four methods of manipulation are considered in this framework: framing, linking, paging, and scrolling.

Like Souto (2008), the current framework proposes a subcategory for linking method of manipulation. This is due to the fact that links are one of the main ways of navigating in websites (Ling & van Schaik 2004). Four link characteristics are included in this framework: types, position, number of links, and number of groups of links. These characteristics are based on the analysis of websites proposed by Souto (2007).

The second category, Graphic Characteristics, refers to typographical aspects and the use of images (referring to both pictures and schematic elements). The terminology related to text characteristics is based on the CCS specifications. The Graphic Characteristics can be compared to a certain extent to the micro elements proposed by Walker (2003).

The last category, Spatial Characteristics, relates to the arrangement of visual elements on screen. It is divided into three sub-categories: placement of elements on a page, page size, and presence of grid. The sub-category 'placement of element on a page' refers to position and orientation of the visual elements on a page. Page size can depend on the user's screen resolution or can be previously fixed independently of the screen resolution. The presence or absence of a grid is an important characteristic that is related to whether there is consistency in the visual elements of a website.

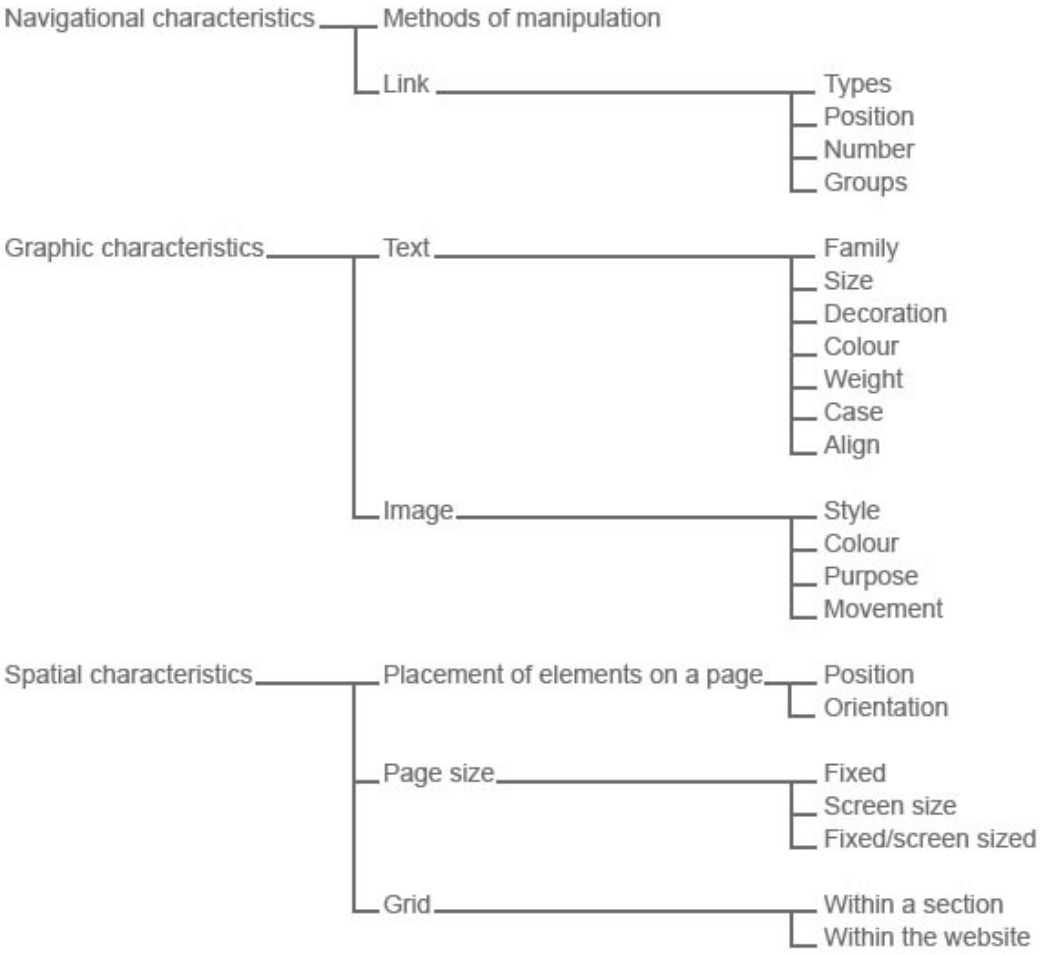

Figure 1: Framework for describing the visual characteristics of websites

Case Studies

Aims and choice of case studies

The case studies are set up in this study to test the proposed framework. Furthermore, the case studies can show some similarities and differences between the websites analysed. Government websites were chosen because they are an important source of information for citizens around the world. Apart from making available a huge amount of information online, government websites also provide services that can make citizens' lives easier. Most countries provide gateway websites in which citizens can find links for the main important local government websites. Apart from the links some portal websites provides information about specific subjects of interested for citizens. Three portal websites were chosen to apply the proposed framework. They were chosen from a list of ten countries that were considered the leading countries in providing information, products and services on the Internet, according to a survey carried out by the United Nations with 190 UN members (United Nations, 2005).

From these ten countries, three English-speaking countries from different continents were chosen. They are the portal of the Australian Government (http://www.australia.gov.au), Canadian Government (http://www.canada.gc.ca) and UK Government (http://www.direct.gov.uk). Figures 2, 3 and 4 show the homepages of these websites.

Figure 2: Illustration of the homepage of the Australian Government portal website

Figure 3: Illustration of the homepage of the Canadian Government portal website

Figure 4: Illustration of the homepage of the UK Government portal website

The analysis

The analysis of the case studies is divided into the three main categories of the framework. The analysis focused on the homepage, a second-level page, and a third-level page. Different web pages were also analysed in order to investigate whether there was consistency between different parts of the websites. The findings are commented on relation to guidelines and research findings on the visual aspects described.

Navigational characteristics

All three websites used both linking and scrolling methods of manipulation. As mentioned above, the most common method of manipulation in websites is linking. Scrolling is also required in order to see the whole web page when it does not fit on a screen. None of the websites investigated fitted on a screen resolution of 1024x768 (a common screen resolution). However, only vertical scroll was needed, not horizontal scroll with the same screen resolution. This finding is similar to Kangas' (2001) results. He found that for an 800x600 screen resolution the "average" home page is about two screen-fulls in scrollable length.

Methods of manipulation have been already studied. De Cosio and Dyson (2002b) studied the four methods of manipulation described and concluded that linking and paging are more easily used than framing and scrolling.

In relation to the types of links, the three websites used stable (i.e. links that appear on all or most of the web pages) and sequential (i.e. only the sub-links of the link chosen appear at a second page level) and expandable (i.e. sub-links expand below the topic selected on screen) links. In addition, the Australian website used breadcrumb links (i.e. links that provide information as to where the user is located within a website).

The other links' characteristics were similar in the three websites investigated. All websites displayed a huge number of links and groups of links and positioned their links in different areas of the screen. While the Australian and UK websites used the website name as

a link to the homepage, the Canadian website did not use this resource. Similarly, the three websites displayed search, contact, and help links in the top area of the screen.

Graphic characteristics

The three websites used a sans-serif typeface. The Australian website uses Arial and Helvetica typefaces as first and second font choice respectively, whereas the Canadian and UK websites use Verdana typeface as first font choice. Both Australian and UK used relative font-size (i.e. this may be regulated according to the users' preference), The Canadian website chose 10pt for the body of the text. In common, the three websites used font-weight in the headings and font-colour to differentiate some headings. Only the Canadian website made use of uppercase for some headings and the Australian made use of text-decoration for some links. All websites used left-aligned text. The use of relative font-size is recommended by some guidelines (e.g. W3C, 1999; Lynch and Horton, 2004). Table 1 shows a summary table with text attributes.

Table 1: Summarized table with text attributes used in the case studies

	Australia	**Canada**	**UK**
Family	Arial, Helvetica, sans-serif	Verdana, Arial, Helvetica, sans-serif	Verdana, Arial, Helvetica, sans-serif
Size	90%	10pt	80%
Decoration	For some links and ´hover´ links	For `hover´ links	For ´hover´ links
Colour	Black, blue (for links), white and red	Black (for text and links), blue (for links)and white (for headings and links)	Black (for links and text), red (for links) and white
Weight	Normal: body text Bold: headings	Normal: body text Bold: links and headings	Normal: text Bold: headings
Case	Sentence case: body text Title case: headings	Uppercase: some headings and links Sentence case: text and some links	Sentence case
Align	Left	Left	Left

Images were used in all three websites. Photographs, icons and drawings were used mostly to illustrate some topics. Most of the images had relatively small size. Icons were used together with text. Colour lines and bars were used to separate groups of information. While Australian and Canadian websites used mainly the colour blue and red in their website, the UK used a combination of hot and bright colours (yellow, orange and red). None of the websites used images in movement. This analysis shows that images were used in a limited way. They also included tag accessibility attributes in most pictures (missed some tags).

Spatial characteristics

The three websites spread the text and images on a single page. All of them included the name of the website in the upper left corner of the page. The content of both the Australian and Canadian websites was divided into three main columns on the homepage, whereas the UK website had four main columns. On the other hand, on a second-level page the Australian and UK had three main columns and the Canadian website only two. This type of arrangement is in disagreement with research findings. According to Dyson and Kipping (1997), users read text faster when it is displayed in one column rather than in three columns.

In relation to the page size, while the Canadian website kept the size of the page fixed (780 pixels horizontal), The Australian website used page size according to the screen resolution. This means that the size of the columns varies with the size of the screen. The variation in the size of the column has to be considered. On the one hand, the availability of different sizes of screen gives the user the possibility of adjusting their screen resolution at their convenience. On the other hand, flexibility in the size of the column may decrease the performance of the user in reading the text when a non-optimum line length is displayed. A possible solution to this problem may be the configuration of the UK government, which used columns that varied only to some extent, and then kept the size of the column.

Finally, all three websites used a grid to display the elements on the website. It can be said that there was a high level of consistency between the pages within each website. This characteristic is highly desirable for accessibility and usability reasons.

Conclusions

The findings of the case studies showed that the proposed framework can be used as a tool for analysing and comparing the visual characteristics of websites. The analyses showed similarities and differences between the websites investigated. For example, it showed that sequential and stable links were used in the three websites, but none used cascading links. On the other hand, all websites used different page size characteristics.

The framework can also be used to classify and categorise the visual characteristics of websites. Furthermore, it can be used in the development of websites, by providing the designer with a bigger picture of the decisions about visual characteristics that should be taken in account.

Like Walker (2003), this analysis also shows a relation between the visual characteristics and the context of use. Therefore, it is relevant to take into account, for instance, whether the layout of the website is subject to a regulation or accessibility law, and the available technologies.

In this study, the framework was tested using three government websites. Future studies should be done to apply the framework using different types of website (e.g. commercial, entertainment). This is because different types of website display visual characteristics in different ways (e.g. images and links to merchandise are more frequently used in entertainment websites). Therefore, future studies may find that the framework needs to be adjusted in order to include other categories related to different kinds of website.

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