

AN INITIAL STUDY IN USING AUDIO-VISUAL STIMULI IN E-COMMERCE

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Abstract: - This paper investigates the role of multi-modal metaphors for e-commerce applications. More specifically, the use of textual representations (including tabular representations and tables), graphical representations (including dynamically formed graphs) in the presence and absence of speech are investigated. The paper describes the initial study performed prior to the development of an experimental platform that was used to investigate these issues. In this study, 40 users were used to obtain an overall understanding of the approach taken and to determine the viability of the approach prior to further experiments. The results indicated that the approach of dynamically created graphs in the presence and absence of speech was usable and enable the development of the experimental platform for further experiments.

Key-Words: - Graphs, Speech-base graphs, E-Commerce, Interface design, Multi-modal, E-shopping, Internet-based software design.

1 Introduction

This paper makes an attempt to create an online e-commerce application which uses graphics and speech representational methods in order to help the user browse among the products. The visual channel has a large capacity to convey information. Therefore an experimental attempt to combine visual (e.g., graphs) and auditory metaphors (e.g., speech) in e-commerce was considered important. Many e-commerce websites often use tabular structures and text to present information about a product. Graphical and speech enhanced graphical presentations will be evaluated in terms of efficient presentation of product information and usability aspects of the interface of the e-commerce application.. The experiments conducted determined the usefulness of the graphical only and speech enhanced graphical approach for e-commerce usage. The aim of this paper was to investigate the use of textual, graphical and speech output representations in interfaces for e-commerce applications. Textual representations include tabular and table formats of text and the graphical representation include dynamically created graphs of products in an e-commerce application. The aim was also to produce experimental results that contribute to forming an initial set of guidelines for the use of these representations in interfaces for e-commerce.

The initial survey: it was conducted to get a user viewpoint for the use of graphical representations, speech and tabular content. The main objective was also to obtain users' views about the proposed experimental platform. In the initial survey 40 users participated (most of them were students from the University of Bradford, University of Leeds and University of Huddersfield).

2 Literature Survey

The field of visualisation has been researched for years. One of the most important researchers is Shneiderman, B. He conducted research in many areas of visualisation like starfield display (scatter graphs) for dynamic queries filters, visual information management system for network configuration, data structures in dynamic queries, visual information seeking using the FilmFinder and graphical filter for representing boolean queries [172, 174, 173, 175, 176, 177, 178]. Visualisation can be used in such a way that it can simplify the use of many applications. For example, Shneiderman and Young performed an experiment where they used a graphical filter for representing Boolean queries [173]. According to research most people find it difficult to use Boolean queries, so an interface was designed that visually conveys functions like AND, OR and NOT. The sample used was inexperienced users and they had to complete 5 tasks with each interface. There were two interfaces,

one with the user graphical interface and one text only SQL interface. The results showed that the users had more successful tasks by using the graphical interface rather with the textual interface. Another experiment was to create and evaluate the FilmFinder [175]. This application filtered the data of a large movie database and displayed the results in a scatter graph. The results showed that the FilmFinder assisted the user to perform a more incremental and exploratory search, another example that visualisation can improve performance if applied properly.

3 Problem Formulation

The graphical approach should give the user the ability to browse among products in a way that is not currently used in e-commerce interfaces. In theory it would be easier for the user to sort the available products by the, according to the user's preferences, two most important characteristics. A graph has the advantage that can represent many products and on the same time and sort them according to their attributes. For example, if the user has to choose among 60 products, the user will have to face a large tabular catalogue enhanced with a sort function. Additionally, another disadvantage of textual or tabular representation is that the user examines the product list by using the sorting function which enables him to select one attribute and find the product with the highest value but in order to examine the differences of the first product with the, for example the 16th, he will require more time and effort. On this experimental approach, the user will select two important attributes, hypothetically say price and performance, and a graph will be presented with all the 60 products. The user can locate which products are closer to his expectations. The graph needs to be dynamically created and facilities are also needed to display the rest of the attributes of any product the user selects within the graph. An alternative approach was to enhance the graphical representation with speech in order to communicate a larger volume of information. These approaches are expected to be faster and more efficient. The experimental study in this paper will provide some additional understanding about the viability and usability of these approaches.

4 The Experimental Procedure

The Main Experiment: it was conducted to investigate and study the interaction between the

experimental platform and the users. We created 3 different presentations (graphs, graphs enhanced with speech and text). The graphical presentation included dynamically created graphs, the speech presentation included speech enhanced graphs, and the textual presentation used a tabular method to present the products available on the platform. The total number of users in the sample was 60. This sample was divided into three groups. Each group had 20 users. One group was presented with dynamically created graphs, another group was presented with speech enhanced graphs and the final group was presented with textual and tabular representations of products. The experimental platform handled all these representations. Each user had to complete 30 tasks. The tasks were the same for all users. This experiment measured the performance of the user in pursuing tasks in the presence of different representational methods as output. The experimental platform was therefore an E-Commerce simulator with 3 different approaches. Finally, an overall analysis of the collected results by the three groups will take place along with statistics in order to determine the significance of the results. This paper describes the results of the initial study only.

5 The Initial Study

In order to estimate the applications first impression to the user sample, an initial survey was conducted. In the initial survey participated in total 40 users. The main objective of this initial experiment was to get some feedback for our platform before we finish the implementation stage. This way we would be able to make any additions to the platform more efficiently. The users answered questions related to some personal details, education level, and internet experience. They were also asked some particular information related to the electronic commerce (EC). In this paper the term rarely means approximately once a month, the term occasionally means once a week, casually means once every two days and the term daily means every day. The information gathered included:

- Gender?, Age? And education level.
- How often do you use the internet?
- How often do you shop online?
- Have you visited these online stores?
- Have you ever used graphs?
- Have you ever used a speech enhanced application?
- Have you used an online application with speech or non-speech sounds?

- Do you find online shops complicating or distracting?
- Which approach appears more convenient?
- Have you seen an online shopping site which was using graphs?
- Would you like dynamically enhanced graphs?
- Would you like speech enhanced graphs?

The data gathered was examined and ensured for its integrity and totality prior to further analysis. Figures 1, 2 and 3 display the results from the survey. Among the users a 80% (or 32 out of 40 users) were between 22 and 30 years old, another 10% (or 4 out of 40 users) was between 18 and 21, group of 5% (or 2 out of 40 users) was between 30-40 and another group of 5% (or 2 out of 40 users) was over 40 (see Figure 1). The 80% (or 32 out of 40 users) of our sample was male and only the 20% (or 8 out of 40 users) was female. Figure 1 also shows that the education level of our sample was interestingly high. 42% (or 17 out of 40 users) had a college degree, 29% (or 12 out of 40 users) an undergraduate degree, 13% (or 5 out of 40 users) a postgraduate degree and another 13% (or 5 out of 40 users) Doctorate degree. Only a 3% (or 1 out of 40 users) had secondary education. Figure 2 shows some additional information about our sample. The 69% (or 28 out of 40 users) of the sample used the internet daily, an 8% (or 3 out of 40 users) rarely, a 13% (or 5 out of 40 users) occasionally and 10% (or 4 out of 40 users) used the internet casually. Additionally the sample was asked how often they complete online purchases. The 52% (or 21 out of 40 users) answered occasionally, a 24% (or 10 out of 40 users) rarely, a 3% (or 1 out of 40 users) casually, an 8% (or 3 out of 40 users) daily and a 13% (or 5 out of 40 users) never. On the question "Have you visited these stores?" the 54% (or 22 out of 40 users) has visited Amazon and the 36% (or 14 out of 40 users) has visited eBay. The rest of the percentages are somehow equally distributed to the rest of the choices. The users were asked if they had ever used graphs. The 57% (or 23 out of 40 users) was familiar with graphs, the 30% (or 12 out of 40 users) was not and the 13% (or 5 out of 40 users) did not know. In the last question (see Figure 2), if users were familiar with any speech enhanced applications, 59% (or 24 out of 40 users) answered negatively, 23% (or 9 out of 40 users) positively and 18% (or 7 out of 40 users) could not answer the question.

Figure 3 shows that the 49% (or 20 out of 40 users) was not familiar with any sound online application.

Only an 18% (or 7 out of 40 users) was familiar and a 33% (or 13 out of 40 users) could not answer. The users were asked if they find the online shops complicating or distracting. Most of the users by 42% (or 17 out of 40 users) answered positively, another 35% (or 14 out of 40 users) answered negatively and a 23% (or 9 out of 40 users) could not decide. The questionnaire had a graph and a table and the users were asked which approach appears to them more usable. The 62% (or 25 out of 40 users) of the sample selected the graph and the rest 38% (or 15 out of 40 users) the table.

Additionally, on the question "Have you seen an online shopping site which was using graphs?" the 67% (or 27 out of 40 users) of the sample answered negatively, another 30% (or 12 out of 40 users) could not answer and only a 3% (or 1 out of 40 users) answered positively. On the questions "Would you like dynamically enhanced graphs?" and "Would you like speech enhanced graphs?", the users answered positively by 79% (or 32 out of 40 users) and 74% (or 30 out of 40 users) respectively.

6 Discussion

The initial survey had as a main objective to find the users opinion and attitudes towards the experimental platform and the approach of dynamically created graphs and speech. It is important to mention that the largest part of the sample was drawn from the university which justifies the overall high level of education as well as the increased familiarity with graphical representation and with speech applications. These first results were positive and encouraging. The results showed that regardless the fact that most of the users did not regularly used e-commerce applications, they were all familiar with these types of applications. They were interested about the approach taken the experimental platform. Most of the users were familiar with graphical representation. In addition, the largest percentage of the sample used (25 out of 40 users), considered the graphical image more usable than the tabular one in the absence of experiencing any application that was actually using graphs instead of text or tabular representation. Another observation was that the largest part of the sample preferred dynamically enhanced graphs rather than static ones and speech enhanced graphs rather than non-speech ones. This was expected because the largest part of the sample was students who were interested in interactivity and for the latest technological enhancements.

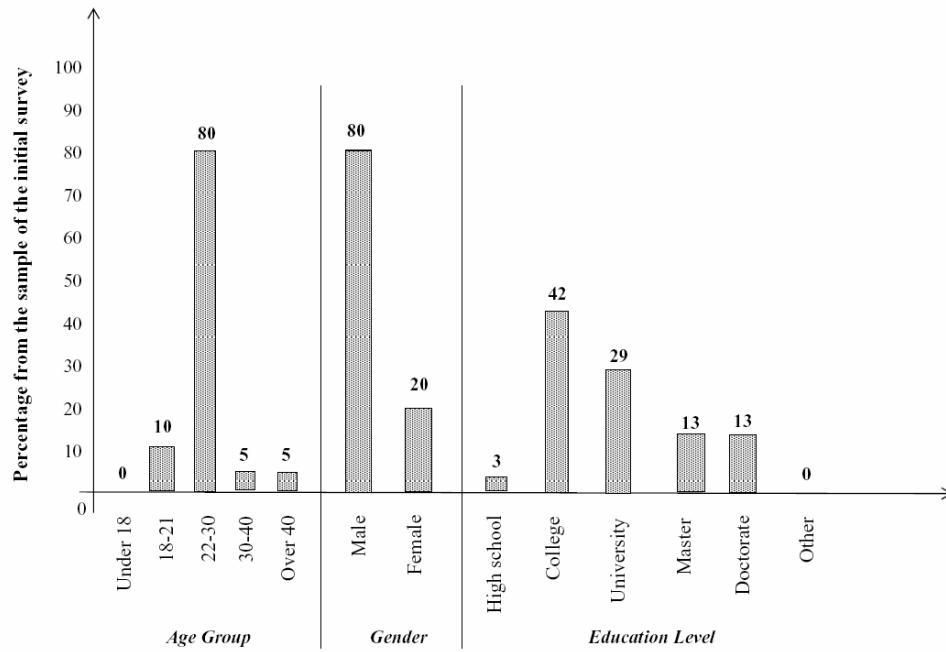


Figure 1: The profile of the sample in terms of the age, gender and education level.

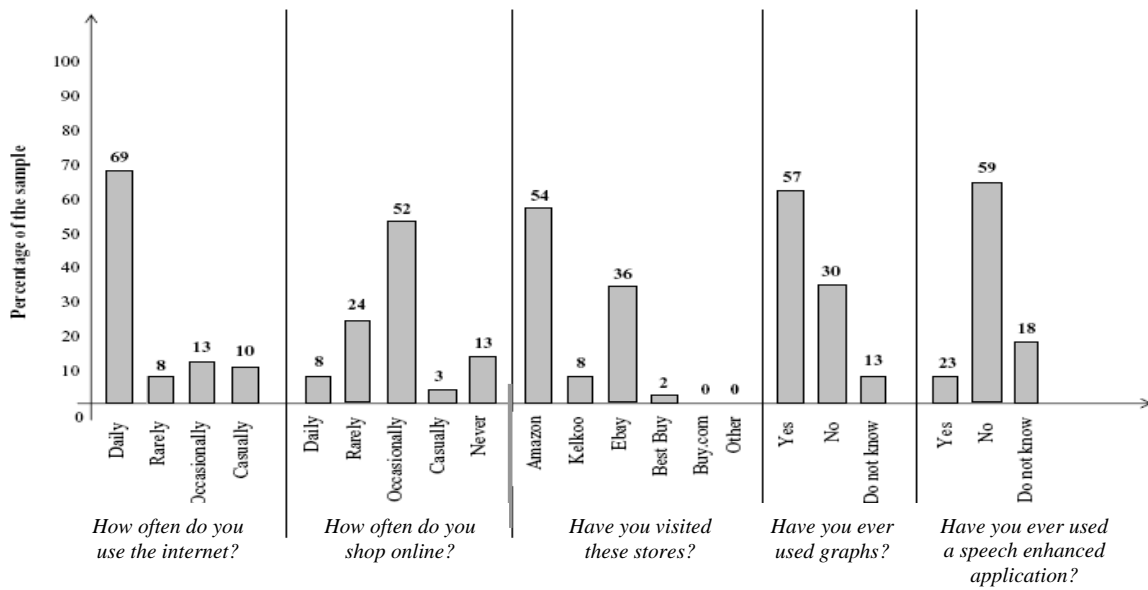


Figure 2: The sample's internet usage and its familiarisation with graphical representations and speech applications.

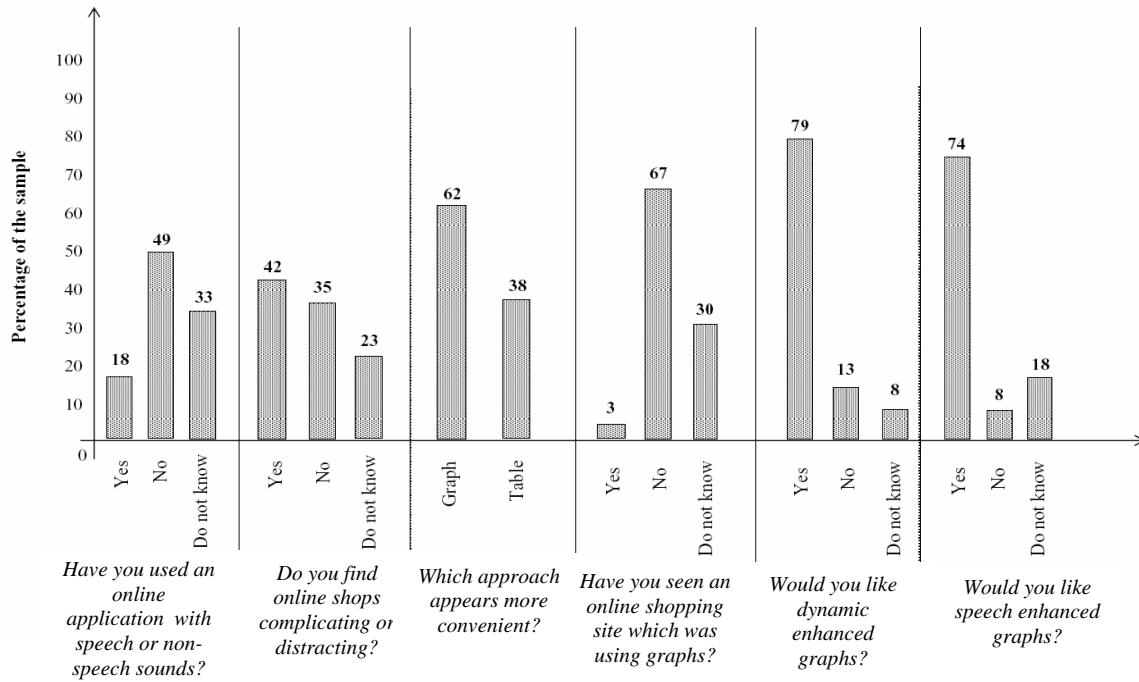


Figure 3: Additional results of the sample’s internet usage and its familiarisation with graphical representations and speech applications.

7 Conclusions

The main objective of this initial survey was to identify an overall viewpoint of the ideas implemented in the experimental platform. The initial survey showed that the users were clearly interested by the idea of graph browsing for products. Most of them claimed that they had never seen a similar application and they showed a great interest in taking part to the main experiment. The main principles and characteristics of the platform were embraced by most of the sample and therefore the main experiment was initiated.

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