

Visual information seeking on palmtop devices

Mark D Dunlop¹ and Neil Davidson²

¹ Centre for Human Machine Interaction
Risø National Laboratory
PO Box 49, DK4000 Roskilde, Denmark

² Computing Science Department
University of Glasgow
Glasgow G12 8QQ, Scotland

mark.dunlop@risoe.dk

Now at: Neil.Davidson@barclayscapital.com

ABSTRACT

Ahlberg and Shneiderman's Starfield displays have been shown to provide fast and convenient access to large collections of data. However, the standard design requires a large, high-resolution, colour screen. This paper presents the results of a short project investigating this visual information seeking technique on a monochrome palmtop.

KEYWORDS: Visualisation, palmtop, Starfield, information seeking

INTRODUCTION

Starfield displays [1] present large collections of data points on a 2D plot. Using tight coupling of controls with this display, large data sets can be searched quickly and effectively on high-resolution large colour displays. With the increasing prevalence of small hand held computers and more complex services on mobile phones, access to large amounts of data on pocket devices will become increasingly common. This short paper reports on an investigation into the use of Starfield displays on a small palmtop computer: the 3Com Palm III (using a 160-pixel square black and white screen).

DESIGN

The experiments were based on Ahlberg and Shneiderman's FilmFinder [1] example. A PalmOS version of the FilmFinder was developed: *PalmMovieFinder*. Coloured blocks from the original were replaced by monochrome 8x8 icons depicting the different film categories (comedy, thriller, action or sci-fi) with a full block-icon (■) representing more than one film on a display cell. Films were also categorised by rating certificate (using the UK scheme: U, PG, 12, 15, 18), these categories were not mapped onto the main display. Finally, the movies' year of release and current popularity rating [3] were used as X- and Y-axes. Figure 1 shows a sample screen with all non-18 certificate non-comedies selected. To open an item the user taps on the icon, if a block-icon is selected the information for all movies in that cell is shown. To allow users to focus on a subset of the data, a simple zooming strategy was adopted: on pressing the scroll button, the display is split into 4 zones with a subsequent tap zooming into that zone.



Figure 1: Sample screen

EXPERIMENTAL SETUP

16 users were used in a comparative study looking at how fast and accurately a set of predefined tasks could be performed on *PalmMovieFinder* and a comparative system. The users were all final year students of a four-year degree in Computing Science who had similar computing experience and had all taken a level-3 course on databases. Performance on the Palm was compared with the Open Ingres SQL relational database

system on a workstation, which all users had all previously used. The users were asked to answer 3 training questions followed by 12 experimental questions. The experimental questions were split into two groups of 6 questions, with users balanced on first-use system. Typical tasks were to name the film with the highest rating released in 1990, name the directors of U-films and count the 18 certificate thrillers.

EXPERIMENTAL RESULTS

The time taken to complete each group of test queries showed a significant difference, with SQL users taking approximately twice as long to complete the tasks (Starfield 4.45 mins, SQL 9.18). This increase in speed was met with no less accuracy in answers (6 errors for Starfield, 7 for SQL). To assess how hard users felt they were working and to gain some impression of preference, users were asked to complete a NASA Task Load Index [4] questionnaire at the end of each

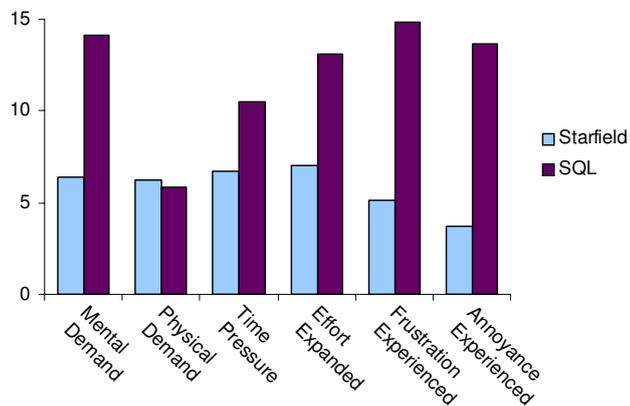


Figure 2: TLX Workload Results

group of six queries. A significant result was found in favour of the Starfield display for all parameters except physical demand (which showed a non-significant preference towards SQL). Overall, this showed a clear preference for using the Starfield display. This was confirmed with a direct question on preference yielding 15:1 in favour of the Starfield display.

DISCUSSION

Although these studies were carried out in a constrained domain using fixed questions, the results are very positive. The monochrome version of the Starfield does appear to work well and to be easy to use to search on a collection of 71 movies. The design of the interface needs to be improved to support higher number of movies, in particular a hierarchical zooming method, possibly based on gesture commands, would be required. Although some users commented on the abstract icons being difficult to learn the tight coupling with the display clearly worked as users quickly learned the main categories.

While larger studies, in both the laboratory and “workplace”, would be required to justify the use of any particular application of Starfields on palmtops, we feel this experiment has shown that they are a potential solution to accessing large collections of data – even on small monochrome displays.

ACKNOWLEDGEMENTS: This work was conducted at Glasgow University Computing Science: we wish to thank our subjects and the CS staff for their support.

REFERENCES

Ahlberg, C., and Shneiderman, B, "Visual Information Seeking: Tight Coupling of dynamic query filters with Starfield displays", *Proceedings of CHI '94*, ACM Press, 313-317 & 479-480, 1994.

The Internet Movie Database UK, available at <http://uk.imdb.com/>

Hart, S. & Staveland, L.E., "Development of NASA-TLX (Task Load Index) ", in *Human Mental Workload*, Hancock, P.A. & Meshkati, N. (eds.), Elsevier Science, 139-183, 1988.