Assessment, Sorting and Collecting of a Thousand Drawings

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ABSTRACT
This paper presents a study of an interactive prototype software tool for assessment, sorting and collecting of over a thousand drawings in greyscale and of one motive theme; the shape of the letter X. The research goal is the design of graphical user interfaces for creative activities, creation of music, illustration, animation, and video. The idea is to visualise all the users' content on an infinitely large two-dimensional data surface. Users navigate through three generic interaction techniques: Panning, Zoom and Search. The main research question here is: Will we find breakdowns in the interaction for this approach for content of over a thousand drawings. We found that the infinitely large two-dimensional data surface approach does not breakdown for navigation and inspection, but we are not very for from its limit.

Author Keywords
Zooming and Panning, Creative activities, Data Surface Interaction.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
We have studied an interactive prototype software tool for assessment, sorting and collecting of over a thousand drawings (1250), through method of articulation. The research goal and what we wish to explore is the design of graphical user interfaces for interactive systems for creative activities such as creation of music, illustration, animation, and video. The users we have in mind can be described as reflective practitioners [1]. Imagine that information content is the base for all interaction between users and the systems. The inherent characteristic of content affords what actions are available and what actions users can perform. How should one design such systems and how do users response to them?

We have built a working prototype to investigate this issue. The idea is to visualise all the users' content - images, video, animations, text, sounds, music, etc. - on an infinitely large two-dimensional data surface. One can think of this surface as a magic paper. The content is always open and remains static at its location. We have previously investigated this concept in the domain of electronic music improvisation [2].

Contextualisation of content allows combinations of all different types of content into a work. A song may contain an image mood board or combine video clips with music sequences. Content may have different scale, thus, users can create hierarchies by convention, for instance marking a region with a big label and let the content in smaller scale go under it. Users may also mark old content and scale it down to use size of clusters of content as indicator of time or significance.

Users navigate the surface through three generic interaction techniques: Panning, Zoom and Incremental search. Users do panning by press the right mouse button to grab the surface and move it to desirable position.

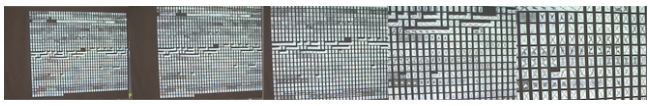

Fig 1. Vidoe frames of how a user zooms into a deposit of images with increasing render scale from left to right.

Zoom is done with the mouse scroll-wheel, wheel upwards map to increase of zoom factor and vice versa. The zoom is smooth and follows along the trajectory through the cursor position. The incremental search allows the users to type short substrings and get immediate feedback for search hits for each key-press. Zoom based interfaces have its roots in Perlin and Fox's Pad system [3]. Fig 1. shows how the zoom action looks in our research prototype.

The system we have implemented and tested for this paper show many similarities with Keller's Cabinet [4], but we have concentrated on the digital domain, and our aim is to develop and verify an interaction technique for graphical user interfaces.

RESEARCH QUESTIONS

The research questions for this study were: Will we find interaction breakdowns when working with only a two-dimensional surface and with the generic navigation techniques panning and zoom when the magnitude of content elements exceed a thousand and when the perception threshold of the images is low? Will the system support the creative work with these drawings?

THE TEST

The artist and I used a video projector at the resolution 1024x768 pixels - shooting the image on the wall 2 meters wide and 1.5 meters high - to get a large screen to examine the drawings. The size of the display made it easier to collaboratively discuss the quality of the drawings compared to working around a computer monitor. A video camera recorded our activities and how we were working with the images.

The Drawings

The images are all drawings and all are in greyscale and of but one motive theme; the shape of the letter X. Fig 2 shows four examples of theses drawings. The X-theme drawings contain a broad range of expressions, from patterns of different materials - water, wood, stone - to images of people from different cultures as well as vulgarities.

The tool normalized image size and put them into a matrix grid. Fig 3. shows an overview of the deposit matrix grid of the drawings. Most of the images were in portrait format. We started with two different ordering, random and scanning order, i.e. in the order the drawings were scanned into the digital domain. The later inherited ordering from the physical domain on aspects such as size, and quality of paper, chronological creation order, and position portfolio folders.

Task: Sorting Categories for Video Exhibition

The use of the tool was to find categories that mapped to dimensions of affect in this rich deposit of images. These drawings will be key-frames in image transition video animations combined with music in an interactive exhibition where the visitors interact through gestures. The affective value of the visitors gesture will select a video sequence build on our collected categories.

The task was a simple "put-that-there" task, where we were sorting images according to adjectives. The task was collaborative, one of us was sitting by the controls and the other one - indirect user - sitting to the next.

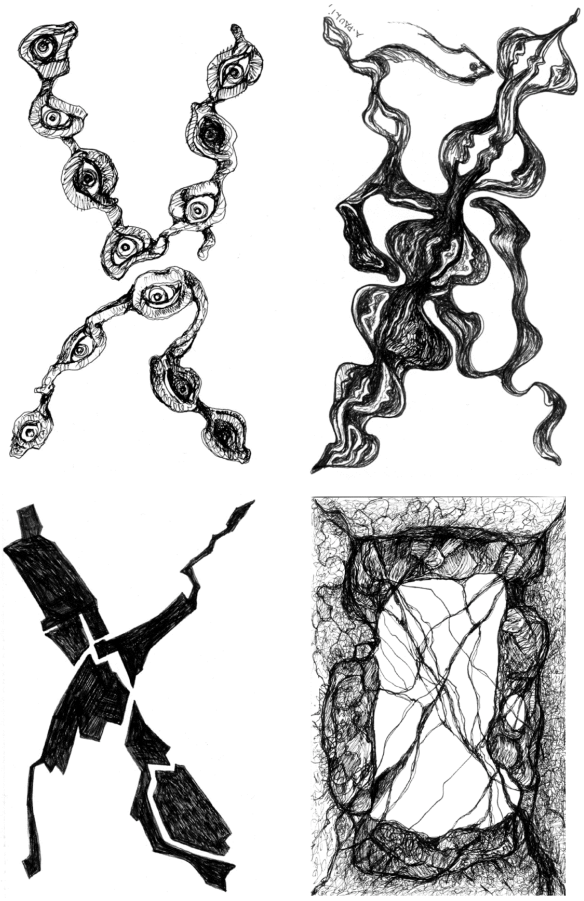

Fig 2. Four examples from the deposit of drawings.

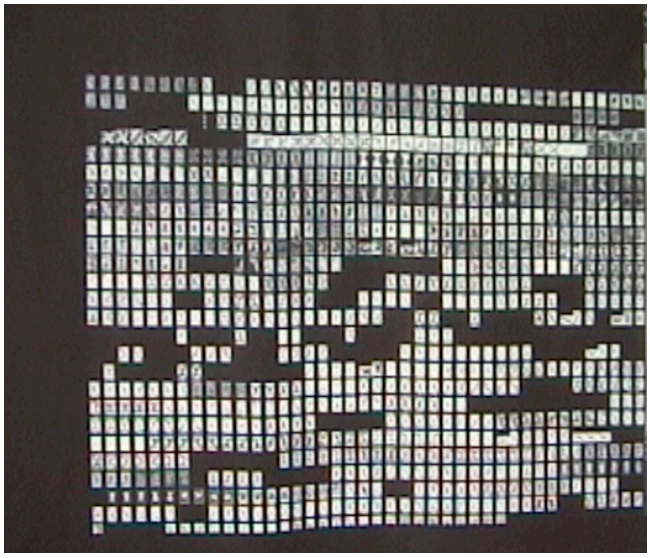

Fig 3. Overview of the deposit of drawings. The "holes" are images we have moved into clusters. Even with tiny images like these, we could still single out a drawing of interest.

To navigate we had to use our perception of the quality of the images using adjectives as external referent and geometrical relations among the images.

For instant the indirect user could utter phrases like: "Look at the right of the curvy image in the middle."

The original idea for the exhibition was to dimensionalise the affect of the drawings according to the circumplex model of affect described by Russell [5]. However, we found by exploring drawings with the tool that it was easier to dimensionalise adjectives of the drawings, for instance sharp/smooth, hard/soft, wet/dry, etc., and then map those adjectives to affect.

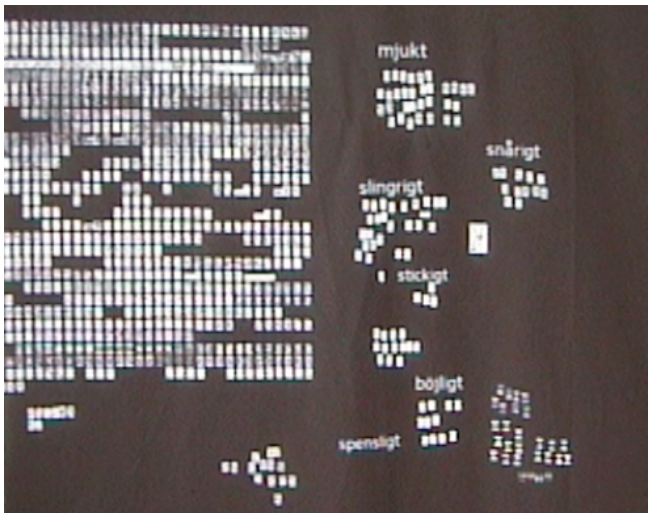

Fig 4. Overview of the deposit and some of the clusters.

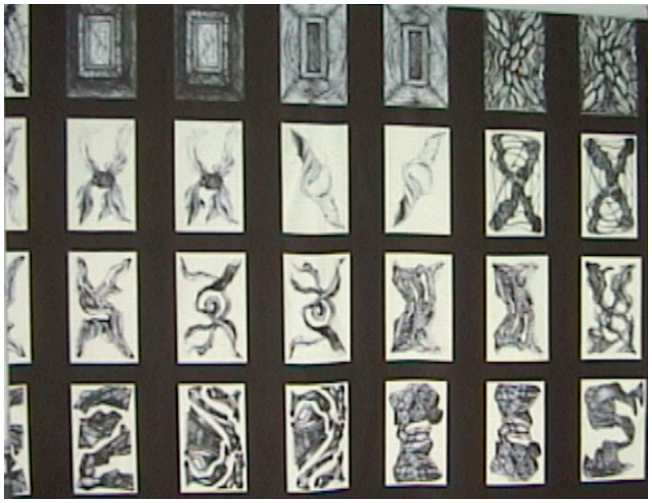

Fig 5. Drawing – some with cloth quality - inspected at the size 90x128 pixels.

We set out to moving images into clusters around each adjective. The images inside a cluster have a relation to each other to some subjective quality. But, also the clusters are analogues related to each other. We mapped the quality of images and clusters to their graphical distance on the surface. In fig 4. we can see some of the clusters which we collected for the deposit. In the centre of the right half we can see a drawing, which we scaled up, we used that as a reminder because we did not know where to put it.

OBSERVATIONS

The perception threshold was high enough for moving the tiny images around. Fig 3. shows a frame from the video of an overview of the deposit of drawings in which we could – after a zoom inspection – single out a drawing of interest. Graphical zoom provides context to inspect and found what image - in more detail - to work with. For instance, we were looking for images with cloth like quality.

The size of an image had to be zoomed to as least the size of 90x130 pixels to show enough details to assess its quality. Fig 5. Show a video frame what zoom scale where we could make judgement about the quality of the drawings. When zooming out the content at the cursor remain by the cursor, this helped us single out a drawing even in situations as in fig 4. for which the size of a drawing is 11x15. At this size we can overview a deposit of about 4000 images at the 1024x768 resolution, but to collect images into cluster we cannot for this amount of images see all images in the deposit and the clusters. Hence, the observations indicate that the limit for this simple design is between 1250 and 4000.

After a while when learning where images were in the big grid deposit of images, the task of finding, sorting, and moving became easier. We relied on the mental model of where things are, the cognitive map [6], and the visual cue of the images, yet with a low perceptual threshold, for navigating the grid.

Initial random ordering of drawings made sorting of the images less smooth, the artist said; “It feels like starting all over again!” But, random sorting overrides the real world sorting and opened categorisation possibilities beyond real world constraints such as size and quality of paper and position in the piles of drawings in the artist’s studio. Without these real world cues the task became more difficult, thus pre knowledge of the deposit transferred from the scanning order helped carrying out the task.

Shortcomings of the Current Design

The individual move of each image became tedious. We had not yet implemented multi selection. With multi selection a move of multiple items should gather the items into a closer cluster, but keep the geometrical relationship between each item. Thus, if we intend to move three items to a new place and one of the items was far out to the left of the two others, the move function should bring it closer to the rest but it remains to the left.

Suggested Improvements

The panning, as a generic interaction technique was useful but we should look for another or complementary approach than the grab-and-move metaphor instead of relying on the typical document handling mechanism with its root in desktop interaction useful in a multi window environment. We will try to combine it with panning technique inspired by real-time role-playing games where their cursor

movement to the corner of the surface will scroll that region into display.

Another improvement would be to introduce a fish-eye len's effect for tiny images, by magnify the item in focus to the inverted effective render scale of the item. For instance no fish-eye effect at the effective render scale of 1.0, but a magnifying effect of 2-4 times for an effective render scale of 0.1.

A third improvement we learned from the studies was to use multiple panes of the surface. Then effect of moving items across two panes would make it possible to warp items across wide distances on the surface.

DISCUSSION

The assessment of video data indicates the infinitely large two-dimensional data surface approach and the generic interaction techniques: zoom and panning does not breakdown for the examined amount of content elements for finding drawings, assessment of drawings' subjective quality and in navigation of the surface.

We have found shortcomings of the implementation that made the work less smooth and less fluent, for instance only being able to move one item at time. This indicates that we are closing the limit of this design to the point where we would suffer from breakdowns. For instance, when sorting out and move just a single image will be a painstaking and daunting task. From the observations, we would say that this limit at the furthest is 4000 images at the screen resolution of 1024x768 pixels.

ACKNOWLEDGMENTS

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