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## Moodsorce

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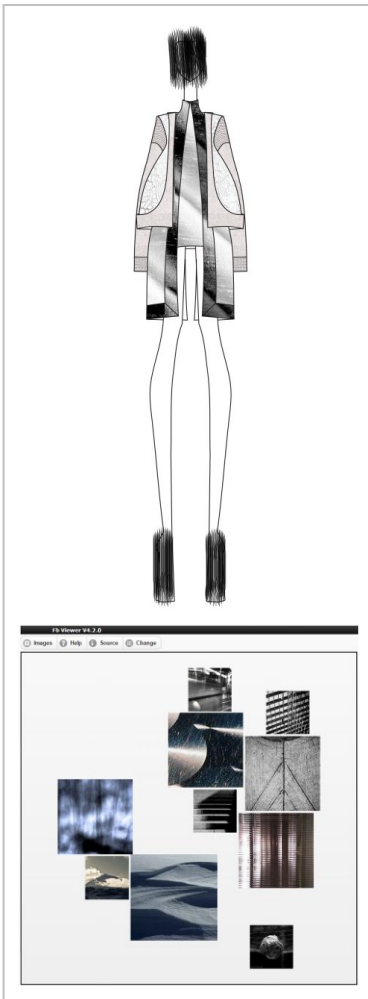
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# Moodsource: Enabling Perceptual and Emotional Feedback from Crowds



**Figure 1:** Fashion design (top) (by permission PD1) and abstract image feedback summary in Moodsource (bottom).

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**Abstract**

The emotional reaction of an audience to a design can be difficult to assess but valuable to know. Moodsource allows intuitive visual communication between crowds and designers. A crowd responds to a design with selections from image banks. Visual summarization reduces the massed image choices down to a few representative images to be consumed at a glance by *designer users*. In two studies *crowd users* reported their ability to express emotions with the Moodsource image browsers and with text. Cognitive styles theories suggest users can be visual or verbal thinkers; *crowd users* preferring images thought they could express emotions equally well with abstract images as with text. *Designer users* “reading” the visual feedback reported that it represented the perceived mood from their designs and were inspired to make improvements.

**Author Keywords**

Crowdsourcing; visual design feedback; abstract, perceptual and emotional imagery; image summarization; image browsing interfaces.

**ACM Classification Keywords**

H.5.3 Information interfaces and presentation: Group and Organization Interfaces

### Steps in the visual feedback method

- 1) Designer shows design
- 2) Crowd views design
- 3) Crowd responds with images from browser
- 4) Images collected
- 5) Summary generated algorithmically
- 6) Designer views feedback.

### Contributions:

Image banks instead of text; application of summarization to image selections from a crowd; evaluations of the method.

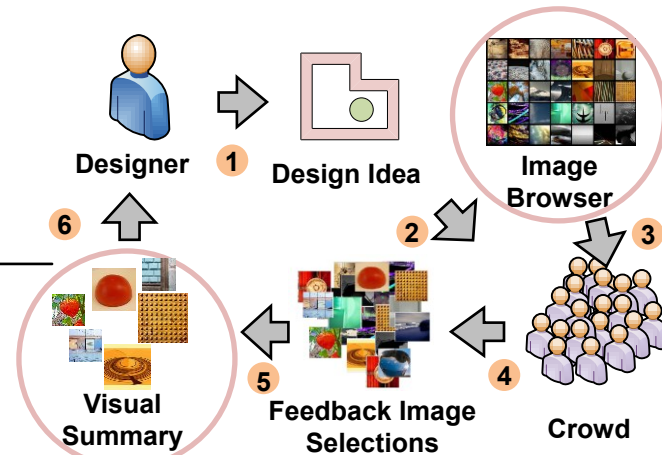


Figure 2: The visual feedback method

### Introduction

For many people images are a medium preferable to text and yet, with the exception of star ratings [1], most formats for conventional feedback focus on text and suffer from drawbacks such as selective non-response contributing to biases. We have developed a new form of design feedback (Figure 1) produced using the method shown in Figure 2 and expected to appeal to people with a visual cognitive style [2]. Work on crowdsourcing design feedback has developed effective systems to gather specific and objective feedback from paid non-experts [3]. However, the visual feedback method has been developed as a compliment to such systems and generates subjective, impressionistic and inspiring feedback in a visually engaging way which can access a crowd's perception of the mood of a design.

In the rest of this paper we describe Moodsource (an implementation created to evaluate the method) and two evaluation studies. Then we discuss the possibilities for services based on this idea.

### The Moodsource System

Moodsource relies on two main components: 1) image browsers specially constructed to allow intuitive image selection by crowd users and 2) summarization to condense high volumes of image selections from the crowd for presentation to designer users.

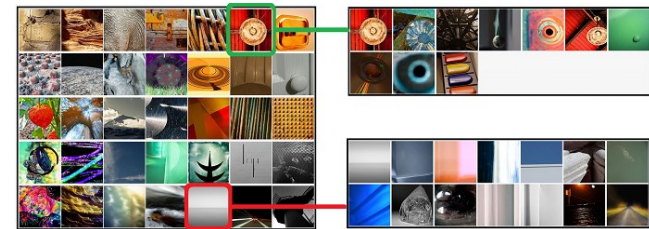


Figure 3: Abstract images in a self-organizing map (SOM) browser. Tapping or clicking the top image of a stack reveals the full stack. On the left is the top level. On the right are two stacks opened. Adjacent stacks hold similar images. Those far apart hold dissimilar images.

There are two image browsers. One offers a diverse set of 500 abstract images (*abstracts*) in a self-organizing map browser (Figure 3) based on human derived similarity data (as described by Padilla et al [4]). Designers are already comfortable with abstract images through their use of mood boards [5]. However, to allow more figurative communication, a second browser was built. 2000 images were categorized by tagging them with terms from an emotion model [6]. Thus every image has a normalized emotion tag frequency profile (Figure 4) representing the judgments of 20 paid, crowdsourced, participants. Using these profiles, the set was filtered to 204 images (*emotives*) covering a subset of emotions suited to design conversation. The emotives are arranged in a SOM browser defined by the emotion profiles (frequency vectors) in a similar way to the abstract browser (based on similarity vectors).

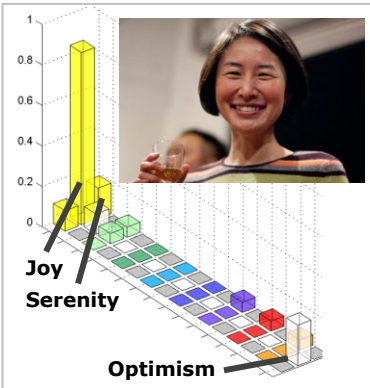
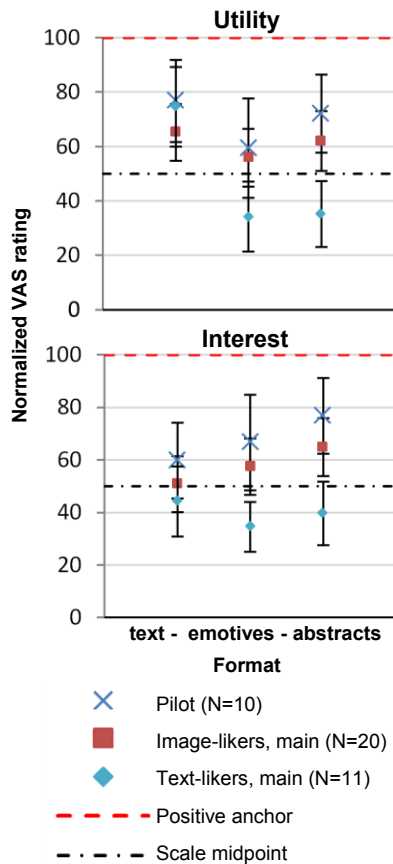


Figure 4: Image ID103, from the emotive browser, with its emotion profile. During classification, the most popular category for this image was 'joy'. The chart shows the normalized tag frequencies laid out on the emotion model [6].



**Figure 6:** Means and 95% confidence limits for the crowd user ratings. 0 marks the VAS negative anchors. The Interest anchors were “Very much fun” and “Very much boring”. Utility anchors were “Completely” and “Not at all” when asked “How well could you express your answer?”.

The summarization of a crowd’s image selections (*CIS*) uses an algorithm which exploits the human perceptual data already known about each image by clustering the *CIS* based on the similarity vectors (or on the emotion vectors). The image nearest each of *k* cluster centroids becomes a representative image (*RI*). The summary is a 2D projection of the *k* *RI*s each sized proportionate to cluster population.

In Moodsource for the evaluation studies, design presentation and image browsing are implemented in a web application, clustering is done in MATLAB and the summaries are rendered in a second web application (using JavaScript) for viewing by designers. *K* was set to 10 allowing summaries to fit on an iPad while still portraying a range of feedback.

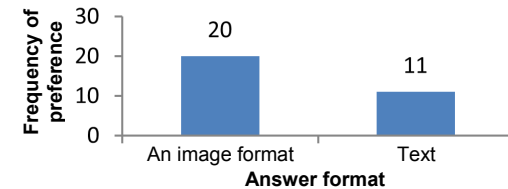
### The Moodsource CSCW Demo

Attendees can explore the browsers choosing images as crowd users responding to designs, and interact with summaries from the studies (below) as designer users.

### Evaluation Studies

Two studies were done, one a pilot. Participants in both pilot and main studies were recruited from the same year group of undergraduate students. The pilot participants, all “creatives”, were rewarded with 100g chocolate for participation. The main study participants, some majoring in creative subjects, others not, received course credit for taking part. A small number took part as designer users and put forward their designs (3 in the pilot, fashion design students; 12 in the main study, interior design students). The remainder took part as crowd users to view and react to the designs (10 in the pilot; 31 in the main study). Crowd users viewed designs, for each being asked the

question, “How did the design make you feel?”, and responding using three answer formats: text, abstracts and emotives. The order of formats was randomized for each user. Crowd users rated the formats for *utility* (ability to express their answer) and *interest* (level of fun) using visual analogue scale (VAS) items. For the main study, in a post-task survey, crowd users ranked the formats by overall preference (Figure 5).



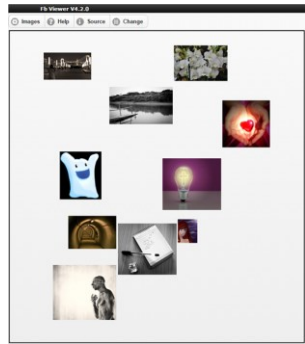
**Figure 5:** Crowd user format preferences from the main study post-task survey. 20 ranked either abstracts or emotives first (**image-likers**). 11 ranked text first (**text-likers**). These groups were used in the analysis of utility and interest ratings.

### Crowd User Ratings for Utility and Interest

The main study ratings (Figure 6) are evidence that

- Image-likers and text-likers behaved differently when rating the formats. This fits with the prediction of cognitive styles theories that some prefer a visual and others a verbal medium.
- Image-likers found the image formats more useful for expressing emotions than did text-likers.
- Image-likers thought *utility* for emotion expression was not significantly different for text and abstract images; (text-likers rated images as less useful than text).
- Image-likers rated both abstract and emotive images as more fun to use than did text-likers.
- Image-likers rated abstract images as fun to use but were equivocal about whether text was fun or boring.

The pilot crowd users were not asked about their format preferences but the results (also in Figure 6) show that their ratings pattern matches that of the



**Figure 7:** During interviews (top), designer users interacted with their Moodsorce feedback (abstract and emotive) and viewed lists of text comments on an iPad. The summaries such as the emotive one above (middle) are interactive in that component thumbnail images open to full view (bottom).

image-likers (correlation  $r=0.95$ ) rather than the text-likers (correlation  $r=0.47$ ) from the main study.

Thus the utility and interest ratings are evidence that this visual feedback medium for commenting on the emotional impression of a design would appeal to a section of the population.

#### Summary of designer user interview themes

Themes emerged from interviews when designer users in the main study viewed their feedback (Figure 7):

- The visual feedback inspired design improvements.
- Abstract image summaries can act as 'reverse engineered' mood boards showing a design's mood as perceived by the crowd.
- Designer users thought emotive images had enabled feedback participants to focus on their emotions more effectively than text.
- 11 of the 12 designer users in the main study valued the visual feedback formats and wished to continue receiving them.

#### Discussion

The interviews established that the main study designer users wished for a service offering Moodsorce. In addition to the interior and fashion designs in our studies we see it as working for any aesthetic design where first impressions are important. Social networks can be a useful source of feedback on ideas [7] and could be one route via which designers could use Moodsorce to leverage participation in feedback. Users already engaged in photo sharing social media are likely to be open to responding visually.

It need not end with design inspiration from the feedback. While garnering visual impressions of their design prototypes from a crowd, designers could build a following. A record of the visual conversation could form an attractive design narrative adding value to a

final product. Elements of a visual crowd could become engaged in augmenting and refreshing the image sets by sourcing and categorizing new images, adding another dimension to being a visual crowd member. Currently feedback is dominated by text in forums and surveys. Moodsorce can redress the balance by engaging visual crowds in the design process.

#### Acknowledgements

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