Understanding Affect in Images

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Categories and Subject Descriptors

H.3.1 [**Information storage and retrieval**]: Content Analysis and Indexing; I.4.7 [**Image processing and computer vision**]: Feature Measurement

General Terms

Algorithms

Keywords

image affect, image classification, image features, art theory, psychology, emotional semantic image retrieval

1. MOTIVATION

Due to the exploding number of images on the Internet, current search methods based on text surrounding images or user-supplied tags are no longer sufficient. For popular tags or words, the returned images can fill many result pages. Hence techniques are needed to refine search results, allowing the searcher to home in on a smaller group of images using additional non-textual information. Colour is one such type of information that is slowly becoming searchable in image search engines.

In many cases it would be useful to be able to search for images based on their emotional content. An example could be a photo editor searching for photos to illustrate an article about the impact of cars on the climate. The target photos should have a more sombre atmosphere instead of showing cars as objects of desire in marketing photos.

The semantic content of an image has the greatest impact on the emotional influence of any picture. However, algorithms to extract semantic content from images are still in their infancy. Nevertheless, the combination and arrangement of colours in images can be used to evoke emotions in the observer. In art theory, Itten formulated concepts for combining colors to induce an emotional effect in the observer and to achieve a harmonious image. Psychological experiments measuring the emotional response of observers to colour combinations have also been done. Reformulating these findings as features allows basic emotion classification of images to be done [1].

2. DEMO

The demo application is based on the approach presented in [1]. For every image uploaded, it extracts the pertinent features, and uses them in a classifier. For each image, a histogram is produced showing the distribution of the intensities of the emotions evoked by the images. As in [1], eight emotions are used: *Amusement, Awe, Contentment,* and *Excitement* as positive emotions; and *Anger, Disgust, Fear,* and *Sadness* as negative emotions.

3. APPLICATIONS

Storing the extracted emotion histograms as image metadata opens the door to a number of applications. Some photo search engines currently allow search results to be refined by specifying colours that should appear in the images. Google image search allows one of 12 colours to be chosen, while Exalead Chromatik[1] allows multiple choices from at least 96 colours. This type of interface could also be used with the eight emotion categories, where the results of a keyword search could be refined by choosing one of the emotion categories.

Such an emotion histogram representation also simplifies integration into multi-modal content analysis and search applications. In applications for automatically illustrating text, the affect extracted from the text [2] could be used to choose images not only pertinent to the content but also to the affect. Music can also be classified by emotion [3], and one can envisage illustrating a song based on the content of the lyrics refined by the emotion of the music.

4. REFERENCES

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[2] P. Subasic and A. Huettner. Affect analysis of text using fuzzy semantic typing. *Fuzzy Systems, IEEE Transactions on*, 9(4):483 –496, 2001.

[3] K. Trohidis, G. Tsoumakas, G. Kalliris, and I. Vlahavas. Multi-label classification of music into emotions. In *Proc. ISMIR*, pages 325–330, 2008.

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[1] http://chromatik.labs.exalead.com/