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“Emotion sensing machines will soon become ubiquitous .”

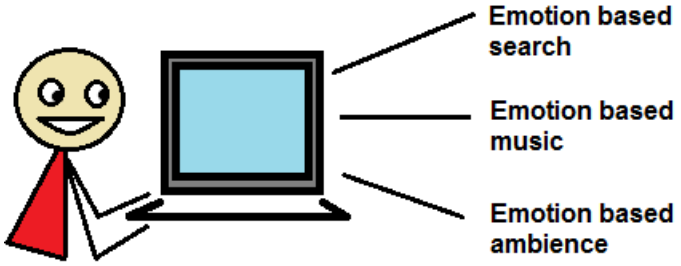
-Adam Beckford.

APPLICATIONS OF EMOTION SENSING MACHINES

Adam Beckford

Emotion sensing machines will soon become ubiquitous. There is an increasing interest in creating an eco-system of products that can communicate with each other. Wrist watches, smart phones, laptops, tablets, cars, household electronics will soon seamlessly interact with each other. The ability to recognize user emotions becomes increasingly important in such an environment. In the last decade, several studies have focused on improving the emotion recognition capabilities in computers with the help of input data from various channels such as webcam, infrared, audio and physiological devices.

Klein et al (2001) developed a system that identified the user’s emotional state and provided feedback for support in the form of intelligent companion. A novel three dimensional, temporal, behavioral pattern based technique to recognize emotions from multiple modalities was developed by Patwardhan et al. (2013). This was a major significant contribution in automatic emotion aware computing. The technique was evaluated on emotional response from several participants after testing consumer based products while interacting with an emotion aware kiosk. The data was captured using 3D sensors and multimodal fusion process. The novel idea enabled real time feedback to marketing department and significantly improved product sales and identification of popular consumer accessories proving to be a major advantage over competitors. The system could recognize six basic emotions such as angry, sad, happy, surprise, disgust and afraid. These emotions were modelled based on the work on basic emotions by Ekman (1999). The system was implemented using easily available out of the box sensors and a software development kit for facial and human activity feature extraction kit.



Lisetti and Nasoz (2002) created a system that could replicate the users emotional by recognizing fear and anger. The system used features from the face, in combination with physiological data to predict the user’s state of mind and represent it in the form of virtual agent. Duric et al (2002) integrated perceptual and cognitive abilities into a multimodal environment that enabled intelligent interaction between the human users and computer devices. Maat and Pantic (2006) developed a tool for efficient human computer interaction. The tool could proactively assess the user’s mood and adapt the

interface corresponding to the detected emotion. This affect aware feedback improved the quality of interaction greatly.

Kapoor et al (2007) implemented an affect sensing companion program which could automatically help a frustrated user based on data obtained from specially designed chair to detect physiological information, skin sensor and cameras. These are all examples of how emotional sensing environments can create a synergy between humans and computers and vastly enhance the interaction level between the user and the surrounding devices.

Various techniques have been used to achieve the emotion sensing technology including facial expression recognition, voice recognition, body language detection and physiological cues. There are still challenges such as lighting conditions, background noise, outdoor scenarios in which such systems still fail to produce accurate results. The research community is heading towards resolving these issues in recent years. However; a lot of improvements in the robustness of systems still needs to be done before it will become pervasive.

Emotion recognition can find use in many fields ranging from security, counselling, marketing, sports, advertisement, medicine and simulated environments. It is important to combine information from various modalities and successfully fuse the data while also maintaining the context awareness. Most of the studies have proved effective only in controlled environments and evaluating spontaneous data remains a challenge. Furthermore, performance in terms of recognition accuracy and real time feedback remains an area that needs improvements.

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