

Mark Chavez (sg)Nanyang Technological University,
School of Art, Design & Media
Assistant Professor
mchavez@ntu.edu.sg**Cinematics
And Narratives:
Prototype1.2****The System Within The System**

It is interesting to admit that emotions play an important role in rational decision making and other sensible activities, though the emotional factor is easy to be naturally ignored by scientists when they model rational and cognitive human activities. Picard [1] uses the rationale to found the affective computing theory that aims to make computing more intelligent via embedding the factor of emotions. She also pointed out it is a huge challenge for a computer to recognize human's emotions without verbal communication, but after an extended period of observation with aid of sensors, the computer is able to recognize 80% accuracy of human emotions [2][3]. This result urges us to move further to explore the possibility of implementing the real-time system for recognizing and reacting instantly within the narrative frame and context.

Implementation, Integration And Prototype

The prototype aims to integrate art research and computing development to test out relevant methodologies, character archetypes as well as functionalities and technologies that will be employed in the final system. In the prototype, researchers set up a simple interactive line including a few circumstances that the system is able to receive audience feedback and trigger the change of both the characters' behaviors/movements and imagery styles. In lieu of a complex story, a single scenario is adopted and protagonists are situated in a closed environment [see Fig 1].

As for the part of character development, artists are strictly following the pipeline workflow that most animation studios adopt, where character is not only treated as a single sheet of intuitive drawing, but a crucial step of detailed settings with prescriptive reference, data and imagery, such as the numeric dimension of body parts and proportion, still poses (sitting, lying down, standing, etc), action poses and finally with environment. The inspiration of art research is basically from the theme of revenge movies that we



Fig. 1: Prototype Room With Protagonists

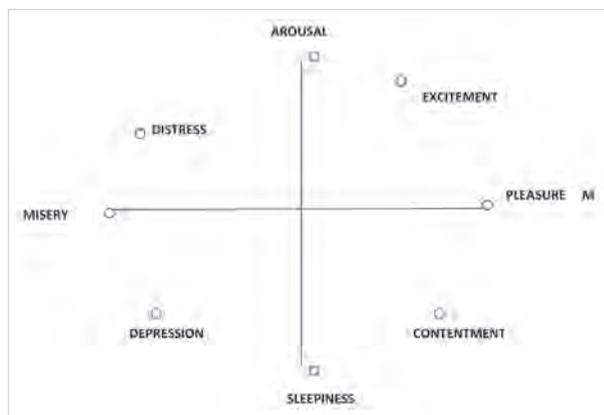


Fig. 2: A Circumplex Model Of Affect

show to participants in archetype study. So character primitives appeared in the system supposedly has a strong correlation with typical archetypes that are seen in commercial Hollywood titles.

Facial detection and recognition system plays an important role in the technical interface, which connects the input from audience and the output to main system that is about to retrieving the matched interpretation and further response of characters and narratives. In the initial state, we use the facial image sequences as the input which was downloaded from the website. Then the actively facial emotion pictures are employed as test pictures in the real system. Ekman and Friesen [4] developed the Facial Action Coding System (FACS) to code facial expressions where movements on the face are described by a set of action units (AUs). It is a common standard to systematically categorize the physical expression of emotions, and it has proven useful to psychologists and to animators. Mase [5] used optical flow

(OF) to recognize facial expressions. He was one of the first to use image processing techniques to recognize facial expressions. There are some other methods available such as geometric feature extraction, frequency domain feature extraction.

We try to rely upon the subspace methods to do the feature extraction. Later on, the dynamic feature extraction method optical flow will be used. Based on numerous researches [5][6][7] on emotion studies, as well as our foundation research described above, a six-emotion model is broadly adopted by scholars in relevant disciplines. However, when we apply it to the trigger mechanism, it is not enough to demonstrate another important factor, the degree of arousal, which is an essential indicator of narratives that directly reflects audience's participation and intensity of attention. Thus we introduce this circumplex [Fig 2] theorized by Russell [8] as the reference frame of emotions. As for the classifier, after comparing several models, such as SVM, Hidden Markov Models (HMM), Artificial Neural Network (ANN), K Nearest Neighbor (KNN), we decide to choose KNN as the classifier in our system.

At the same time, we utilize a developed graphics engine as the platform, Unreal Development Kit (UDK). We have five core requirements for the graphics engine that must support (1) high graphic quality; (2) level editor; (3) DLL bind which aims to integrate motion recognizer; (4) morph animation; and (5) last result as a standalone application. Unreal Development Kit or UDK is the Prototype system engine chosen by the production and programming teams according to the stated requirements.

References

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