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On Realizing Emotional Memories

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ABSTRACT

Emotion and memory have been two intermingled areas in psychological research. Although researchers are still fairly clueless on how human emotions or memory work, several attempts have been made to copy the dynamics of these two entities in the realm of robotics. This chapter describes one such attempt to capture the dynamics of human emotional memories and model the same for use in a real robot. Emotional memories are created at extreme emotional states, namely, very positive or happy events or very negative ones. The positive ones result in the formation of positive memories while the negative ones form the negative counterparts. The robotic system seeks the positive ones while it tries to avoid the negative ones. Such memories aid the system in making the right decisions, especially when situations similar to the one which caused their generation, repeat in the future. This chapter introduces the manner in which a multi-agent emotion engine churns out the emotions which in turn generate emotional memories. Results obtained from simulations and those from using a real situated robot described herein, validate the working of these memories.

INTRODUCTION

Emotion constitutes a very important phenomenon in living beings and plays an important role in every aspect of our life. Emotions depend upon both the current status of the environment and the past experience of the emoting individual. The term Emotion has a wide variety of definitions. Kleinginna Jr. et al. (Kleinginna Jr & Kleinginna, 1981), after reviewing numerous explanations and sceptical statements

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on emotion from various dimensions including affective, cognitive and psychological, proposed the following definition for emotion-

“Emotion is a complex set of interactions among subjective and objective factors, mediated by neural/hormonal systems, which can

1. Give rise to affective experiences such as feelings of arousal, pleasure/displeasure,
2. Generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labelling processes,
3. Activate widespread physiological adjustments to the arousing conditions and
4. Lead to behaviour that is often, but not always, expressive, goal directed and adaptive” (Kleinginna Jr & Kleinginna, 1981).

Emotions can be broadly categorized as those that are positive (happiness, surprise, enthusiasm, etc.) and negative (anger, fear, disgust, etc.). Both positive and negative emotions can occur concurrently and play different roles for an emoting individual. All the negative emotions are results of our response to mental, emotional or physical threats. Such emotions make us more aware of the surrounding and aid in survival (Lefkoe, 2010). On the other hand, positive emotions help tackle adverse environments and tight spots. Positive emotions not only contribute to life satisfaction and a feel-good factor in the present but also improve the likelihood of feeling similarly in the future (Fredrickson & Joiner, 2002).

The traditional viewpoint is that emotion and reasoning do not blend well at all. If a person wishes to make rational decisions then he should not allow the reasoning process to be entangled by emotions. Contrary to this view there are many research studies which support a greater role of emotion in day-to-day activities. Research in this direction has pointed out that emotion helps us in learning, memory formation and retrieval, survival, prediction, decision-making and so on (Adler, Rosen, & Silverstein, 1998; Bechara, 2004; Loewenstein & Lerner, 2003; Macht, 2008; Velásquez, 1998). Peters (Peters, 2006) outlines four roles that emotions can play in constructing judgment and decision. These four roles are:

1. **As a Guide to Information:** Emotions are used as information for future decision making, constructing prices of plays and lotteries, in the perception of risks, etc.
2. **As a Selective Attentional Spotlight:** Emotions can force the decision maker to focus on some specific information so that this information is used in decision making or judgment; incidental emotions also work as a spotlight for memory.
3. **As a Motivator of Behavior:** A good environment tends to encourage one to approach a problem in the right spirit while a bad environment tends to make one to avoid it; Emotions are also linked to the amount of effort a decision maker can put.
4. **As a Common Currency for Comparing Alternatives:** Emotion helps in comparing things when things are not comparable by working as a common currency.

Numerous studies have shown that emotions can make good impact on the decision-making process in human beings (Bechara, Damasio, & Damasio, 2000; George, 2000; Zeelenberg, Nelissen, Breugelmans, & Pieters, 2008). Álvarez et al. (Álvarez, Galán, Matía, Rodríguez-Losada, & Jiménez, 2010) have pointed out the importance of human emotions in judgment, adaptation, decision making and communication and argued that the disconnection of emotions lead to poor judgment and inability to make

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