Chapter XIII
A Cognitive Appraisal Based Approach for Emotional Representation

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ABSTRACT

Today, realism and coherence are highly searched qualities in agent’s behavior; but these qualities cannot be achieved completely without incorporation of emotions. This chapter shows a model for emotional representations in intelligent agents. The model is based on the cognitive appraisal theory of emotions; this theory affirms that stimuli are processed by a cognitive mechanism that determines what emotion to feel. It is also based on the Aaron Sloman’s research where positively and negatively affective states are exposed, as well as, on the theory of basic emotions. The model tries to define an emotional representation data structure for intelligent agents. It also defines the emotional behavior mechanisms when a stimulus is processed, as well as, emotional interaction mechanisms. This chapter is presented in five sections: Introduction, where the topic is presented. State-of-the-Art, where it is introduced a review of emotional studies in psychological areas, as well as, computing areas. The Model Definition section, where a detailed model structure and mechanism are introduced. A fourth section describing the future trends and researches and finally the chapter conclusions.
INTRODUCTION

Nowadays, the tendency toward the search for more realistic behavior in intelligent agents is remarkable. Beyond the philosophical and socio-cultural implications (which are a significant study matter) it is undeniable that, this realistic level could not be reached without the emotions incorporation to the agent’s behavioral mechanisms. This work intends to place a base for this virtual human construction presenting an agent mind fundamental component: the structure for emotions representation.

It is then, the main objective of this work, to place the base for a theoretical emotion representation model in intelligent agents capable to represent each one of this in every possible dimension. The model should be sufficiently flexible to cover the entire complexity of human representation of emotions, as well as, the emotion interaction complexity. In order to accomplish this objective, it is necessary to generate a data structure with all the values required to configure an emotion in all its dimensions, and capable to represent any needed emotion. Those mentioned values within the emotion, will be parameters. These parameters will control the emotion behavior. Then it is necessary to identify the mechanisms presented in the human emotions, the reasons and ways emotions arise, and the way an emotion stabilizes. All of this in order to create equivalent mechanisms into the model. Then it will be necessary to identify the interaction mechanisms between emotions, because they clearly affect each other. For example, receiving bad news and good news at the same time, or in a short period of time, will normally produce an almost mathematical annihilations effect in the person, letting the individual in a neutral state. But this is not the case when the importance of one of the news is considerably greater than the other. In this case, one emotion will normally diminish the intensity of the other one. All this must be observed, once again, in order to implement equivalent mechanisms for the model.

It is expected to create a flexible model, not too restrictive at the moment of its implementation, offering the developer the possibility to include the required emotions for his agent, with the required values for each one of those, and the required interaction between emotions, finally conforming different agents personalities through setting this values. It is important to notice, that this flexibility places in the developer part of the responsibility of keeping the agent’s behavior coherent with human’s behavior. However, this situation is considered better than having an over restricting model at the moment of its implementation.

A model that takes into account all the previous statements will make developers able to implement a more realistic agent with a coherent behavior. These agents correctly implemented, will offer a wide application spectrum that goes from entertainment to psychological and sociological investigation. Creating an intelligent agent capable to actually represent the human mind is the ultimate objective; this work intends to offer the first step in this direction.

Four main sections will be found. First, the State-of-the-Art section offers an overview of related works in this area, in emotional theories, as well as, in computational models and architectures. Next, the cognitive appraisal based approach model is presented; also its structures and interaction mechanisms are presented and deeply analyzed. This section is followed for a view of the future works that are intended to develop in the area and trends that could be approached for researchers. Finally, conclusions are presented in the matter of this work.

STATE-OF-THE-ART

The beginnings of the emotional studies could be set back in Athens where Socrates proposed the inalterable human behavior principles existence, among them, the good feelings like ethics. In modern times, Charles Darwin conducts studies about