Formalizing Emotional E-Commerce Agents for a Simple Negotiation Protocol

Veronica Jascanu, Nicolae Jascanu, and Severin Bumbaru

Department of Computer Science at University Dunarea de Jos of Galati Romania
{veronica.jascanu, nicolae.jascanu, severin.bumbaru}@ugal.ro

Abstract. Electronic commerce has become a central pillar of the Internet. Easy access, mobile devices with permanent connection, social networks and the real-time conversation streams have a big influence over B2C and C2C commerce. Currently, e-commerce becomes a social commerce, much closer to the traditional paradigm. The inclusion of emotional components in the act of trading complies with the current social trends and further approaches the electronic commerce to the traditional one. This paper continues the work on an emotional e-commerce platform by formalizing the customer, supplier and community agents. We present a simple negotiation protocol as a proof of concept.

Keywords: multi-agent systems, negotiation, e-commerce, affective computing.

1 Introduction

In recent years, e-commerce has gained a key role in modern society. Currently, online e-commerce includes many directions like advertising and marketing, payment mechanisms, security and privacy, reputation and trust, contracting and economic legislation, business management, distribution, sale and purchase of goods and services [1]. Huge amount of products and services offered online and the scenarios in which trading occur electronically, requires the development of automatic tools. The goal is to understand the user and to give what he wants or what he needs at the right time. Using a multi-agent system to represent the various entities participating at the act of commerce is a proven method for addressing the complexity of the system. In recent years, research on electronic commerce shaped around intelligent agents [2].

The goal for service providers is to understand the customer and give appropriate products and services. All major service providers have specific methods for monitoring and identification of consumer preferences. Amazon is the representative service that, based on the history of interactions between products and customers, is able to recommend similar products that may be useful in the given context. Over 60% of customers of the Netflix movie rental service are using automatic recommendations for choosing the movies. The emergence of social communities has a major impact on e-commerce. Many online commerce services have begun to include social elements to attract a greater number of clients. Opportunity to express your opinion, to talk about a product or service, to influence the others view

© Springer-Verlag Berlin Heidelberg 2012
represents a natural evolution of the online trading. There are studies about the dynamics of information flow in social groups and the influence of the online interactions over the real life. As electronic commerce becomes a permanent part of our contemporary society, the need to use intelligent and automated systems to facilitate various operations becomes more pressing. Intelligent agents may have significant contributions in several areas like necessity identification, products and suppliers brokering, social interactions, negotiations, payment, delivery, and after sales services.

Emotion is a fundamental aspect of life. Extensive research in psychology shows that even a random emotion, triggered by unrelated events can have a major influence over the decision. Incorporating emotions in decision-making system is necessary for solving complex problems and better understanding the decisions. Today, emotional theories are a multi-disciplinary research area, which includes cognitive psychology, neurology, genetics etc. One of the leaders in emotional research is the European project FP6 HUMAINE (Human-Machine Interaction Network on Emotion) [3], which bring together over 33 partners from 14 European countries. Emotional research has taken such a magnitude that the W3C consortium is seeking to define a markup emotional language EmotionML that standardizes the description of emotional knowledge [4].

We should treat emotions as knowledge in order to integrate them in a system. Various emotional models such as discrete models, in which each response to an action is associated to a distinct emotion, could represent the emotional knowledge. We could also represent the emotional knowledge by using dimensional models. The circumplex model is a powerful theoretical tool, which describes the relations between emotions, and predicts the effects on behavior and knowledge. The structural model assumes that emotional states, depending on intensity are positive, zero or negative correlated. Russell’s circumplex is a two-dimensional model with the following axes: pleasant-unpleasant or valence and aroused-relaxed axis or excitation [5]. Russell’s circumplex model proved over decades that it could represent an impressive number of distinct emotional terms. The model is currently being used in a variety of areas, from customer satisfaction analysis and extraction of qualitative knowledge related to products or services, to mobile applications and interactive games [6], [7].

Since the early 90’s, emotional theories began to be used in the field of intelligent agents. Picard [8] separates the human emotion from the one of a software agent. For the agents, emotion is just a label that describes a certain state and the corresponding action. Many psychologists have developed emotional theories in such a way that researchers in artificial intelligence can easily assimilate them [9].

Electronic commerce should finally meet the client and his style of doing trades. Traditional trade has a history of thousands of years and the online version must take into account the many subtleties of human nature.

In this paper, we continue our work on a multi-agent system for electronic commerce that integrates emotional models for each one of the three agents: the customer, the supplier and the community [10]. Using the formalism proposed by Parsons and Sabater [11], [12], we formalize each agent for a simple negotiation protocol.