

Emotionally Based Multi-Agent E-Commerce Platform

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ABSTRACT

Experiencing and expressing emotions are integral parts of our life. In the retail area of commerce, emotion plays a fundamental role. When we choose or buy a commodity, our choice has a profound emotional dimension. We are social beings, we are influenced by others opinions, we have our opinions and we like to bargain for everything. To capture the magic behind negotiation, a first step will be to build a model that incorporates human emotions and community emotional opinions. Using dimensional models of emotion, the agent is able to capture and interpret such knowledge. The thesis proposes a novel design for an e-commerce system based on three agents: customer, supplier and community. The thesis settles the ground for emotional negotiations and the role of emotion in bilateral, multi-issue negotiations in retail markets.

Categories and Subject Descriptors

I.2.11 [Artificial Intelligence]: Distributed Artificial Intelligence

K.4.4 [Computers and Society]: Electronic Commerce

General Terms

Design, Experimentation, Economics, Human factors

Keywords

negotiation, e-commerce, emotions, social shopping

1. EXTENDED ABSTRACT

Electronic marketplaces are becoming necessary for a successful business and more and more companies have an alternative e-commerce way of selling. The final scope of e-commerce is to imitate, and of course improve, the process of negotiation that takes place between human beings. The plethora of fine aspects and subtleties involved in human negotiations are difficult even to be identified. This is one of the reasons why current e-commerce websites are in fact catalogs of products and services along with their descriptions and prices.

Bilateral negotiations are part of every dialog we may have and it is so natural to negotiate that we do not even become aware of it. We negotiate when we need to buy or sell a product with some gain, we negotiate when we expose or contest some ideas and we negotiate when we need some sort of satisfaction or emotion. Negotiation is a central part of human being and this is the reason why it is so difficult to be formalized in some theoretical model.

In order to build a realistic model we need knowledge from multiple domains like psychology, neuroscience, economics or artificial intelligence.

Multi-issue negotiation is necessary for every e-commerce agent. It is rarely the case when a single issue characterizes a product or service. Even if you try to buy a new TV set, apart from technical characteristics that are quantitative by their nature, there are many qualitative aspects like the beauty of design, the visual experience, the profoundness of sound, the manufacturing quality. When you buy something, you place that product in a future environment and build different scenarios of interactions. As in life, every negotiation is a compromise between issues.

Emotions, or affect, defined as the conscious experience of affective states, are central to our existence as human beings. Since birth, we experience emotions in every action we take. Our world is based on interactions between us and the environment around us. These connections are communicated in affective and cognitive ways in which semantic terms describe our inner state. Affect, together with cognition, drives the communication of needs, ideas, and personal states. In the last two decades, the interest for the role of emotions in decision-making raised again. Emotions are now interpreted in correlation with rational thinking and decision-making. Extensive research in the field of psychology has shown that even incidental emotions, unrelated with the current decisional process, can have a major impact over current choices. Incorporating emotions into decisional models is necessary for solving complex problems and for better understanding conclusions. Nowadays, a new field of research has an explosive growth. Emotion theory is a multidisciplinary research area including aspects from cognitive psychology, neuroscience and genetics, as well as other fields. It is a huge area and many theoretical models of emotion have been developed. Depending on the given problem, one could choose one model or other or select one perspective or other from the emotional spectrum. Some models are successfully used in capturing human emotions for qualitative surveys over products or services.

Emotional judgments and affective self-ratings are found to array in circular arrangement, referred to as a "circumplex" structure arrangement. A circumplex is a two-dimensional, circular structure in which single attributes correlate highly with those attributes nearby on the circumference of the circle, correlate near zero with those attributes one-quarter way around the circle, and correlate inversely with those attributes directly opposite on the circle.

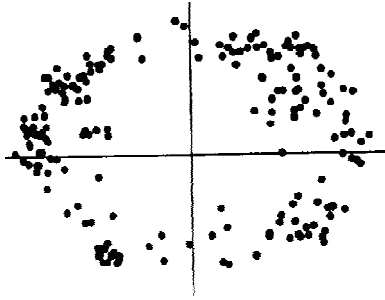


Figure 1. Principal components of 191 affect terms.

The circumplex model of affect is a powerful theoretical tool that describes the relations between emotions as well as suggests the dimensions that characterize, to some degree, all emotions. As a basic structural model of affect, it specifies which emotions are similar and different or which emotions are likely or unlikely to be experienced together. Emotion circumplex models are very specific in indicating mathematically testable relationships between various affects. Thus, the emotion circumplex provides a theoretical structure that can potentially advance our understanding of emotional life.

2. THE PROPOSED PLATFORM

Traditionally, bilateral negotiations involve only two entities: the customer and the supplier. From real life negotiation scenarios, we all know that it is recommended, as a customer, to be informed about the product or service or at least about the supplier. Also, it is recommended for the supplier to do market researches in order to understand better the client. The proposed platform brings a new actor into the scene, the community agent. The role of community agent is to gather information as feedback from people and to offer this emotionally enriched knowledge to the customer or supplier agents. In fact, the community agent acts as a recommender system. In the Figure 2 are represented these three agents along with the interactions between them.

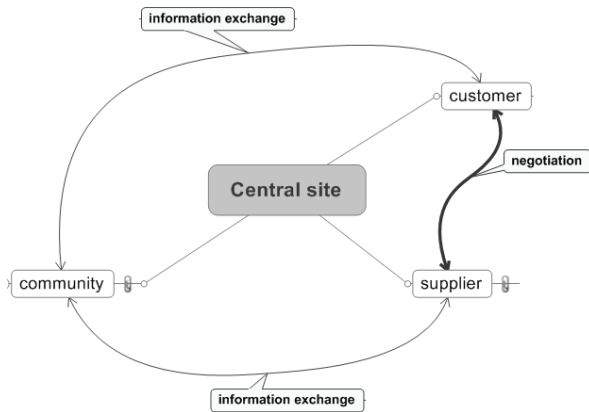


Figure 2. E-Commerce ecosystem: customer, supplier and community.

The model of customer agent relies on the circumplex theory, for emotional knowledge acquisition and representation. When someone explains why he or she decided to buy or wish to buy that product or service, the explanation includes both the rational and emotional components of the reasoning process. For example, when you try to rent a house in a Caribbean resort, the final

decision is a pleasing one, even if the price is a little too high. The pleasure comes from the fact that the location is near the beach and the renting period is the desired one. Therefore, it is natural to make a compromise, accept the offer, and feel good about it imagining how good it will be on the next summer. Of course, there is a limit on price, and if the price is too high, the offer is denied, no matter how good are the other issues. It is relatively easy to build a model for the rational part of decision, but it is very hard for a person to think in a pure quantitative way for every issue.

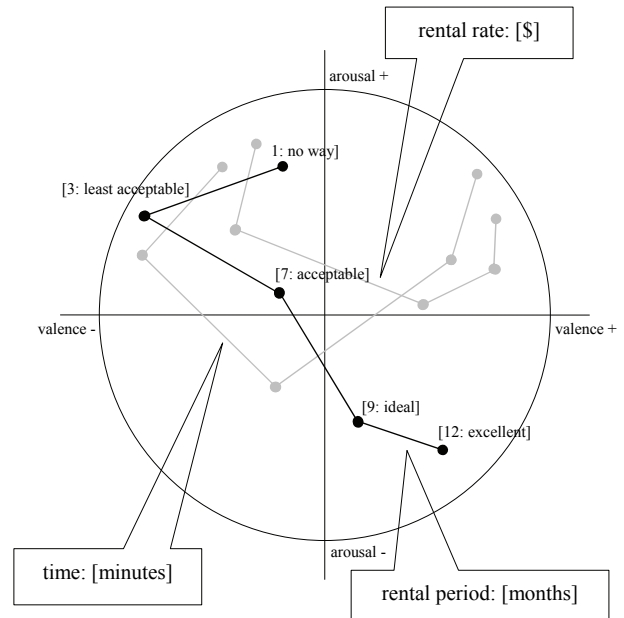


Figure 3. Snapshot of customer agent internal representation of multi-issues used in bilateral negotiation for a renting scenario.

The scenario for collecting knowledge from customer is very simple: the customer defines the commodity issues with or without community support; for every issue will be defined mark points. Supposing that the commodity is accepted or acceptable, the user chooses a point into circumplex model. The mark represents the valence and arousal dimensions of the felt emotion when the issue has that value; for a more refined negotiation, the user could let the community agent to insert automatically more issues or the customer agent to use its negotiation experience.

3. CONCLUSIONS

The doctoral thesis tries to introduce a B2C e-commerce multi-agent platform with three major actors: the customer, the supplier and the community. The novelty of the model is represented by the way in which emotions are integrated in every aspect, from customer knowledge acquisition and representation to bilateral negotiation and supplier marketing research tools. By incorporating emotions, the model is able to capture almost naturally the rational and the emotional aspects, to learn about personal preferences, to gather and use in negotiation process the community opinions, which are essentially emotional, to offer snapshots of emotional state to negotiation partners without exposing internals, and finally to offer a more human-like experience over negotiation.