# REVIEW ARTICLE

## APPLICATION OF MULTI-AGENTS SYSTEM (MAS) FOR PEER TO PEER E-MARKETING

### [1],*Manas Ranjan Mohapatra, [1]Saismita Mohapatra and [2]Jyoti Ranjan Mohanty

[1]Department of Computer Science, Banki College (Autonomous), Cuttack, India
[2]Department of Computer Science and Application, Orissa University of Agriculture and Technology,
Bhubaneswar, India

| ARTICLE INFO | ABSTRACT |
|---|---|
| | Intelligent Marketing System (IMS) can be more personalized based on cognitive and affective behaviour. This provides effective communication during e-marketing process. In this paper a MAS architecture for the said purpose is proposed where number of agents manage both cognitive and affective model of the people, that are able to express emotions through emotional agents and to recognize the people's facial expression in peer-to-peer e-business environments (Ben ammar, 2005). |

## INTRODUCTION

In the process of e-marketing, for better communication with the peoples intended for marketing purpose, the people's thoughts and emotions are to be find out and then recognized for interpretation. The marketing agent uses these interpreted forms to make decision about the states to improve the accuracy and effectiveness of their interactions with peoples for better outputs. In this context, we have shown that based on the multi-agents system how an architecture for peer-to-peer e-marketing can be developed to identify the people's current state of mind and the facial expressions in response to the marketing agent.

## MULTI AGENT'S SYSTEM

As we know, multi-agents systems (MAS) comprises of number of agents where each agent is an intelligent system that has particular role to solve a specific problem. Here all these agents are related with each other; communicate among them in order to achieve their goals. MAS is a multi-disciplinary approach with cognitive science theories,

*\*Corresponding author:* **Manas Ranjan Mohapatra,**
Department of Computer Science, Banki College (Autonomous),
Cuttack, India.

psychology and other fields are involved in a multi-agent environment (Mart nez-Miranda, 2005). The key challenges in the AI is to emulate/simulate the way human act in their environment, interact with each another, and solve problems by distributing improving performances by competition/co-operation operation. Proposed architecture for peer-to-peer (P2P) e-marketing P2P network based systems are application level, collaborative systems where agents work together to perform certain tasks. The architecture based upon MAS in a P2P e-marketing system is the following (Figure 1).

**The proposed system includes five kinds of agents**

- Interface agent
- Emotional agent
- Dialogical agent
- Curriculum agent
- Marketing agent

### Interface Agent

It is a reactive agent that transmit the facial information coming from the people to the other agents of the Multi Agents System (MAS).
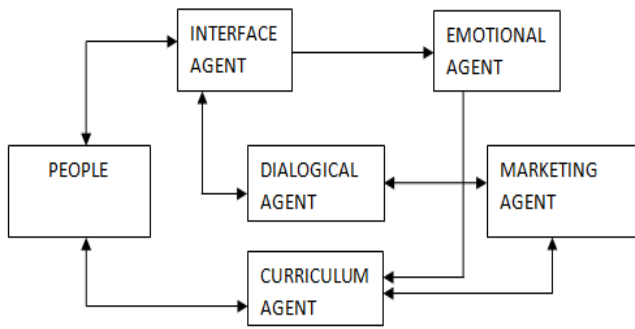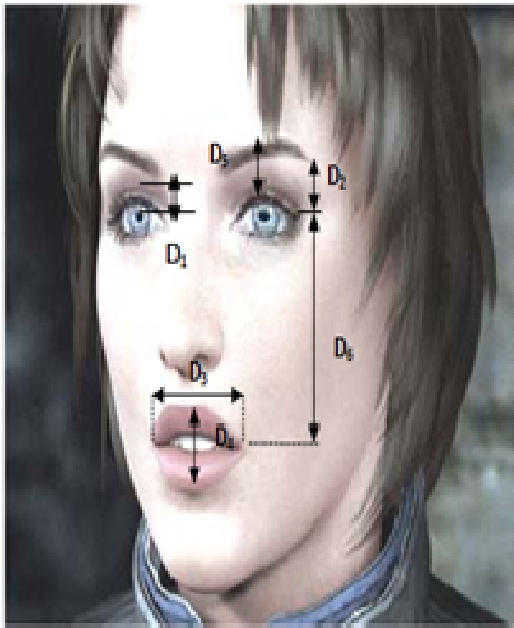
**Figure 1. Proposed architecture**



**Figure 2. Definition of the distance Di**

It assign the achieved actions and information communicated by the people, to agents Curriculum and the other agents of the MAS.

**Emotional Agents**

Extraction of appropriate facial features and recognition of the people's emotional state for validation through analysis of facial expression is done by the emotional agents.

**Analysis of facial expression**

Analysis of the facial expressions by the emotional agents is generally carried out in the following stages: detection of the face, the automatic extraction of contours of the permanent features of the face to knowing: the eyes, the eyebrows and the lips. These extractions are then used in a system of recognition of the six universal emotions on the face which are namely joy, surprise, fear, disgust, anger, sadness.

**Recognition and interpretation of facial expression**

Recognition of the facial expressions (Ekman, 1999): classification of the structural deformations facial in abstract classes based on visual information.

Interpretation of the facial expressions: bond with the basic emotions (Ben ammar *et al.*, 2005). The expressions considered are the six universal emotions (smile, disgust, surprise, sadness, anger, fear) as well as the neutral. Classification is carried out while being based on the analysis of characteristic distances calculated on skeletons of expressions resulting from a segmentation of contours of permanent features of the face. The characteristic distances considered make it possible to develop an expert system (for classification) which is compatible with the description MPEG-4 of the six universal emotions. Contours of the eyes, the eyebrows and the mouth are extracted automatically by using the algorithms described in (Spiros *et al.*, 2005). The segmentation leads to obtaining what we call skeleton of expression. Six distances were defined on these D1 skeletons: opening of the eye, D2: outdistance between the interior corner of the eye and that of the eyebrow, D3: opening of the mouth in width, D4: opening of the mouth in height, D5: outdistance between the eye and eyebrow and D6: outdistance between the corner of the mouth and that of the corner external of the eye (Figure 2). The objective of work presented is to set up a system of recognition of facial expressions starting from the analysis of these 6 distances.

- Joy: {D4 increase}, {D3 decrease and D6 decrease}, {the other distances remain constant}
- Sadness: {D2 increase and D5 decrease}, {D1 decrease}, {the other distances remain constant}
- Anger: {D2 decrease}, {D1 increase}, {D4 either decrease D4 increases}
- Fear: {D2 increase and D5 increase but more that D2}
- Disgust: {D3 increase AND D4 increase}, {the other distances remain constant}
- Surprised: {D2 increase}, {D1 increase}, {D4 increase}, {the other distances remain constant}

The table 1 gives a scripts of evolution of the distances Di for the six emotions (↑means increase, ↓means decrease and " = " translates the absence of evolution). Extracted contours being sufficiently realistic, we use them in a system of analysis and recognition of the six universal emotions on the face. The classification or recognition of an emotion is based on the temporal evolution of the information contained in the "skeleton" resulting from this stage of segmentation (temporal evolution of six characteristic distances). For example, joy and disgust differ by the evolution of the distance D6. One notes that emotions (joy and surprise) differ by the evolution of distances D1, D2, D3 and D6. This permits a distinction between these two emotions.

**Table 1. Di evolution for every emotion**

| | D1 | D2 | D3 | D4 | D5 | D6 |
|---|---|---|---|---|---|---|
| Joy | = | = | ↑ | ↑ | = | ↓ |
| Sadness | ↓ | ↑ | = | = | ↓ | = |
| Anger | ↑ | ↓ | = | ↑or↓ | = | = |
| Fear | ? | ↑ | = | = | ↑ | = |
| Disgust | = | = | ↑ | ↑ | = | = |
| Surprise | ↑ | ↑ | = | ↑ | = | = |

## Curriculum Agent

The agent Curriculum saves the trace of the evolution of the system in interaction with the people. The trace constitutes the history of interaction.

## Marketing Agent

This agent has the role of ensuring the follow-up of the interaction of people. He has a role of support for the people in their activity of marketing. The role of this agent is to support the human relations.

## Dialogical Agent

This agent interacts with the people in natural language to answer questions of the marketing agents. This agent will be responsible for communication between people and marketing agent during the process of interrogation. The emotional agents extracts the facial expressions and classify them using the evolution temporal of the Di distances while referring to the table1; The analysis of table 1 shows that it will be possible to differentiate between different emotions while being interested in priority in the Di distances. The expressions in entry are "joy", "fear", "dislike", "sadness", "anger", "surprised" and the analysis makes it possible to determine if the people is in state of "satisfaction", "confidence", "surprise", "confusion" or "frustration". The interpretation of the analyzed emotional state is then established.

## CONCLUSION AND FUTURE WORK

In this paper we proposed only the architecture for peer-to-peer e-marketing based on MAS. It is able to recognize the current emotion of the people as per their facial expressions measured and interpreted. The future work involves additional works to be carried on this for development of detailed architecture, algorithm and implementation.

## REFERENCES

Ben Ammar, M., Neji, M., Alimi, M. 2005. "The integration of an emotional system in the Intelligent Tutoring System", AICCSA, Egypt.

Ekman, P. 1999. Basic Emotions In T. Dalgleish and T. Power (Eds.) The Handbook of Cognition and Emotion Pp. 45-60. Sussex, U.K.: JohnWiley & Sons, Ltd.

Mart nez-Miranda, J. and Aldea, A. 2005. Emotions in human and artificial intelligence, Computers in Human Behavior 21323–341

Ben Ammar, M. and Neji, M. EMASPEL (Emotional Multi-Agents System for Peer to peer E-Learning) ICTA'07, April 12-14, Hammamet, Tunisia

Spiros V. Ioannou, Amaryllis T. Raouzaiou, Vasilis A. Tzouvaras, Theofilos P. Mailis, Kostas C. Karpouzis and Stefanos D. Kollias, 2005. "Emotion recognition through facial expression analysis based on a neurofuzzy network", Neural Networks 18423–435.

*******