ABSTRACT

Existing computational collaboration theories explain some of the important concepts underlying collaboration, e.g., the collaborators' commitment and communication. Although these theories explain the important elements of a collaboration structure, the underlying processes required to dynamically maintain the elements of this structure are largely unexplained. Our insight is that in many collaborative situations acknowledging or ignoring a collaborator's affective state can maintain or impede progress of the collaboration for which collaboration theories do not explain the required processes. This implies that collaborative agents need to employ a series of processes that (1) can use the collaboration structure to evaluate the status of the collaboration, and (2) can influence the collaboration structure when required. This thesis develops a new affect-driven computational framework to achieve such objectives which can empower collaborative agents to be better collaborators. This thesis' contributions are: (1) Introducing Affective Motivational Collaboration (AMC) theory which incorporates appraisal processes in the collaboration structure descibed by SharedPlans theory. Our theory also incorporates particular functions of emotions to generate collaborative behaviors. (2) The development of new computational appraisal algorithms based on the collaboration structure. Reciprocally, we use the outcome of the appraisal to maintain the collaboration structure using our new algorithm for affect-driven goal management. (3) Implemention of a computational system based on AMC framework in order to evaluate our overall system within an interaction with human collaborators. (4) Validation of AMC theory. We have conducted two user studies a) to validate our appraisal algorithms before further development of our framework, and b) to investigate the overall functionality of our framework within an end-to-end system evaluation with participants and a robot.