Identification of Collaborative Skills with Serious Games

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Collaborative skills are defined as a subset of learned behaviors that involve people in interpersonal situations to get or keep strengthening the environment [8]. If the collaborative skills of a group members is insufficient, individual behaviors might arise. These individual behaviors can negatively impact the performance of the group and prevent to achieve an adequate collaborative work [9]. Collaborative skills are essential in the software development market, since the increasing complexity of applications causes the need of a coordinated work of teams to carry out the implementation of any project.

In recent years, there has been an increasing interest in the application of serious games for training groups of people. The interest in this paradigm shift is mainly due to three factors: 1) games provide an excellent framework for training and learning, 2) the diversity of possible scenarios and 3) the possibility of direct observation of behavior and interactions among individuals of the team [6]. Video games enable the collaboration needed to identify the collaborative skills of each member of a team and at the same time help to improve the performance of the group, to capture the behavior among group members in a direct way, and to increase the group productivity.

There has been previous efforts in using serious games as tools to enable innovative support for the development of collaborative skills. James [7] proposed a model based on flow theory to help designers to understand the learning mechanism in games distinguishing factors that make the game enjoyable. Said [11] proposed a model for children, which presents five factors needed to create a compelling experience: "simulated interaction", "constructive interaction", "immediacy", "feedback" and "objectives". A different approach to collaborative games design is presented in [12], where a board collaborative game was analyzed and significant learning lessons and difficulties in the creation of collaborative games lessons were identified.

In this work, we propose an approach for detecting collaborative skills in a group of people working towards a common goal. Our approach seeks to predict the future performance of the group as a team by using games that map actions to an interaction analysis model which measures the behavior of individuals. The proposal aims at analyzing the activity log generated by the game in each session, evaluating the collaborative process and identifying problems caused by any inadequate expression of the collaborative skills of individual members of the group.

As a theoretical model, we propose the use of SYMLOG [4], a model with multiple levels of observations that encode both the acts and the contents of communications among the members of a group. SYMLOG is divided into three independent dimensions, each of them with two extreme poles and a value of no relevance: "Dominance" vs. "Submissiveness", "Positive" vs. "Negative", and "Acceptance of the Task Orientation of Established Authority" vs. "Rejection of the Task Orientation of Established Authority", giving a total

of 26 categories. These dimensions are also referred as Up/Down, Positive/Negative and Forward/Backward, respectively. This model is an alternative to the limitations posed by IPA [1] in the sense of not considering nonverbal behavior.

The contribution of our research is to define a profile of the members of a team that can be updated as members interact with each other to solve a common goal, using a serious game as a shared working space. This will require defining a mapping between the actions available in the game with the different categories of SYMLOG model. The profile defined will reflect the strengths and deficiencies in the collaborative skills of the group members and can then be used, for example, to train the skills for which a member showed deficiencies.

To our best knowledge, there are no applications that use a collaborative game as a means for identifying collaborative skills. In contrast to other studies of collaborative skills identification [5] we propose the use of an alternative model to IPA for the automatic identification of skills and the use of games for obtaining the data needed to implement the proposed model.

The project is in its initial stage of development. We have selected a collaborative board game where players must achieve a common goal. In order to achieve this goal each member must take orders from a coordinator. On the other side, we implemented an application where, by means of a questionnaire based on the results published in [2,10,3], the behavior of the members of the group is assesed. The next step will consist in replacing the questionnaire by the actions of the players in the game developed. Results from the proposed model will be compared with the more effective profiles given by SYMLOG. Finally, we will assess the degree of aggrement between both results.

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