The Use of Intelligent Agents to Manage Human Resources in the Design of Chemical Processes

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Abstract

This paper presents an investigation on the use of a multi-agent system (MAS) to simulate human behaviour and specifically to understand human interaction in a team. This simulation is used to support the selection of a working team. The people that will form this team is first selected based on characteristics about the type of problem to be solved and their capabilities, experience, and personality features. Once a team has been generated, the MAS will simulate the team behaviour to perform the task that must be solved in order to analyse the performance of that team. These ideas are currently being developed for their application to chemical process design.

Keywords: Multi-Agent Systems (MAS), team performance simulation, people organisation, group behaviour learning, cooperative work.

1 Introduction

Human resources selection and particularly team selection is a challenge in the Information Society, where Internet is a new source of exchange of information and computer supported cooperative work (CSCW) tools eliminate distances [2]. Managers are now able to contract the best specialist even if he/she works hundreds of miles away from the company. In a complex task, as the design process of a chemical plant, the selection of a good team and specifically its final performance are the key points to achieve a design artifact which the adequate quality, cost and within the specified time.

Within the process engineering community there are several research groups working on process design (see for example [1,8]). All of them are aware that the first step and one of the most important points is to select a good team that will cooperate, collaborate and achieve the expected goals within the constraints imposed to the system [8]. However, little work has been done in this area. The selection of a working team and the allocation of tasks to the people in the team is a difficult task. It is necessary to decide not only who is the best person to perform a task but also to foresee how the whole team will work together and fulfil the final goal. Within the multi-agent community there is currently research carried out in the development of a framework for a team-oriented programming tool to put together diverse existing agents in a team to perform a task [5,6]. But the investigation of the use of intelligent agents to model social and skill behaviours of human experts and simulate the interaction between them is a quite novel approach in which multi-agent theories must be interrelated to social science models of human behaviour (see [3,6]).

In this paper we present our first thoughts and investigation into multi-agent systems for team selection and simulation of the team behaviour. The next section briefly describes how a human project manager acts when a new project needs to be managed. Our proposal to help a manager to select a team is presented in Section 3 and the MAS architecture is outlined in Section 4. The paper finishes with a brief discussion.

2 Managing human resources

When a company faces a new project, e.g. the design of a new chemical process, a project manager is appointed. This project manager studies the design problem, decides the amount of effort required to perform that design task and recruits the design team. Frequently, the project manager selects the people based on availability and expertise.

The project manager informs the members of the team about their working plan: duties, objectives