Java Settlers: A Research Environment for Studying Multi-Agent Negotiation

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Abstract
Java Settlers is an environment for doing research in the area of multi-agent negotiation. The vehicle for this research is a Web-deployed java program for playing the popular German board game, *Settlers of Catan*.

Keywords
Negotiation, Game Environments

INTRODUCTION
We wanted to create a virtual environment in which to study the effectiveness of different approaches to creating intelligent agents that could negotiate with people in a competitive situation. To this end we developed Java Settlers, a Web-deployed java program for playing the popular German board game, *Settlers of Catan*. We chose this game as an environment because it provided opportunities for the kind of negotiation behaviors that we were interested in, but without the complexity of a typical real world scenario. The focus of our research is on faithfully recreating the environment and creating competent agents that can interact with the environment and the players.

JAVA SETTLERS
The Java Settlers system is an environment for doing research in the design of intelligent agents that negotiate with people. The system architecture consists of a main server and a client applet that is deployed through the World Wide Web. This setup allows anyone with a Java-enabled Web browser to use the system. Typically the Java Settlers server gets over 1400 users a day. In addition to the system, we have created computer players that connect to it in the same way as regular players do. This allows anyone to make new computer opponents and test them using the system. The Java Settlers system allows us to collect data on the behavior of the people that use the system as well as the behavior of the software agents in it.

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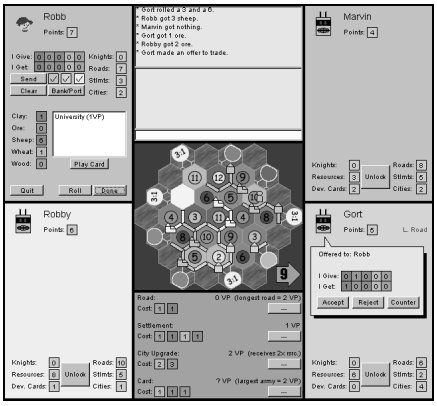
IUI'02, January 13-16, 2002, San Francisco, California, USA.
ACM 1-58113-459-2/02/0001.

SETTLERS OF CATAN
Settlers of Catan is a popular German board game where four players compete to be the first to colonize the newly discovered island of Catan. The players gather resources from the land and use them to build roads, settlements, and cities. Usually a player doesn't have all of the required resources to build what they want, so they must negotiate with the other players to get the needed resources. The first player to achieve ten victory points is the winner. Victory points are awarded for building settlements and cities as wells as for achievements like having the largest army, or the longest road.

In order to play the game competently, a player must make strategic decisions about what actions to take next, and take other player's goals into account along with what kinds of actions they are likely to take. Most importantly, a player must be able to negotiate and trade with the other players. For our research, we have created software agents that play the game competently with other people. We then record the behavior of the agents as well as how people interact with them in order to study the effectiveness of different AI programming techniques used in the agents.



The Java Settlers system can be accessed by going to:

http://settlers.cs.northwestern.edu