Strategies for RoboCup Soccer

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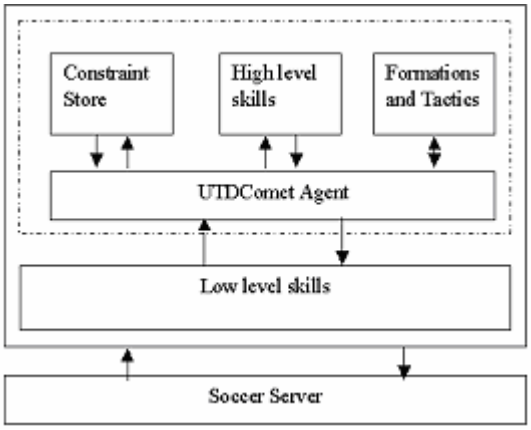
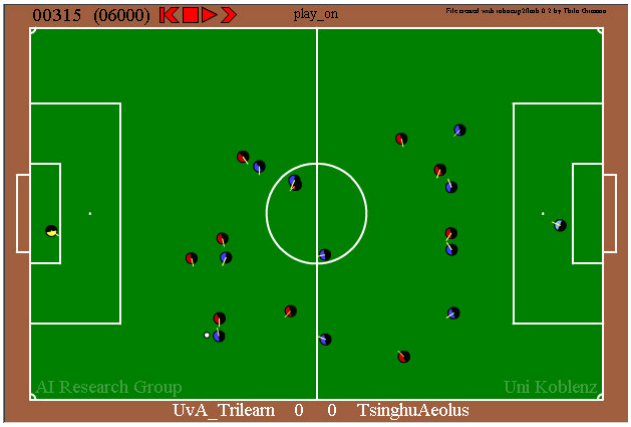
Robocup is an international research and education initiative. It encourages investigation in the fields of robotics and artificial intelligence using game of soccer. It focuses on developing cooperation among autonomous agents in a dynamic multi-agent environment. The dream of the RoboCup initiative is *"By the year 2050, develop a team of fully autonomous humanoid robots that can win against the human world soccer champion team."*

A constraint-based approach to model teamwork and agent behavior for team-play in the RoboCup Soccer simulation league has been devised. The constraint based approach views the problem of planning offense and defense as a geometric constraint satisfaction problem. Agents concurrently formulate these geometric constraints based on their local views. They solve these constraints to calculate the appropriate action that should be taken in that situation. In cases where a definite action is not possible, the agents resort to negotiation in a coordinated manner giving rise to a coherent high level team strategy for playing the game. Approximation mechanisms for efficiently solving the constraints are also designed.



Architecture Diagram



Snapshot of Soccer Server Monitor

A prototype framework based on the above architecture has been implemented. The development has been done using C++ on Linux platform. Current and future work is focused on enhancing the framework and building a full-fledged team that can participate in the Simulation league competition.

References:

1. V. Ahuja, V. Halaharvi, V. Mahakala, A. Mallya, and G. Gupta, "A Negotiated Constraint based Approach to RoboCup Soccer Play''

2. V. Ahuja, "Strategies for RoboCup Soccer", Masters Thesis, UTD.