

# MRL Coach 2005 Team Description

Ramin Fathzadeh, Vahid Mokhtari and  
Alireza Mohammad Shahri

Mechatronics Research Laboratory  
Department of Computer Engineering, Islamic Azad University  
Qazvin Branch, Qazvin, Iran  
{fathzadeh, mokhtari, shahri}@mrl.ir  
<http://robocup.mechatronics.ws/coach.htm>

**Abstract.** This paper describes the main features of the MRL Coach 2005 Simulation Team. Our team participated in RoboCup 2004 competition and took 1<sup>st</sup> place. The online part of MRL is based on MRL Online-Coach-2004. We focus on two matters: One is Opponent Modeling and Online Learning using Expert System, and the other using learning algorithms, analyzes the behavior of opponent team by their log files.

## 1. Introduction

In soccer coach simulation league, the online coach has a global view from the match environment and receives the needed information, then does the necessary analyses and investigations at the appropriate times to increase the efficiency of team, then sends the advice in form of standard coach language called Clang to one of the teams, [1]. The aim of the coach agent is designing intelligent systems to control and observe multiple robots and provide the robots with the suitable methods to enhance their performance, [2].

The MRL coach operates as follows: Prior to game, in offline mode coach verifies the provided log files of the game played by the Fixed-Opponent and reports the result of analysis as a pattern, [3].

In online mode, the coach starts with some hand-coded advice and during the match coach receives the information such as capabilities of the opponent, match time, result of the match, etc. from the environment. At first, using predefined rules, coach models an appropriate strategy against the opponent team. Additionally online coach compares the detected pattern with the ones recognized in offline mode and afterward sends the activated pattern to the server.

## 2. Opponent Modeling

Opponent Modeling is a common challenge for agents in multiagent systems is trying to predict what other agents are going to do in the future. Such knowledge can help an

agent determine which of its current action options are most likely to help it achieve its goals, [4, 5].

We can model the behavior of opponent team to learn more information and try to analyze them. The analysis is divided into two parts: detect players' behavior such as pass, shoot, dribble, run with ball, mark and intercept and detect team behaviour such as formation, strategy in defensive and offensive mode and activity area.

To model opponent team, in offline mode we receive information such as ball position, players' positions, stamina, play modes, etc. and using learning methods we predict the behavior of opponent team, then the appropriate pattern is generated and put to shared library between offline and online coach. These patterns consist of opponent strategy, players' skills, and flows of opponent.

In online mode, our duty is composed of two parts:

**a. Pattern Detection:** In online mode, we actually use the same algorithm used in offline mode to detect the behavior of opponent. After generating the pattern of opponent team, we compare this with the detected patterns in offline mode. Then the active pattern is sent to server as a freeform message.

**b. Online Learning:** Our goal is to provide a suitable strategy for scoring and optimization of the behavior of our players. For gaining this purpose, we have made our effort to use Rule Based Expert System architecture as a decision-support system. To achieve this, the detected skills and positions of opponent team are fed to the above mentioned system. Afterwards using decision-making trees, ability of opponent is predicted and employing the predefined rules as inference engine, a proper strategy is recommended. Finally the advice fitting this strategy is generated then sent to players, [6].

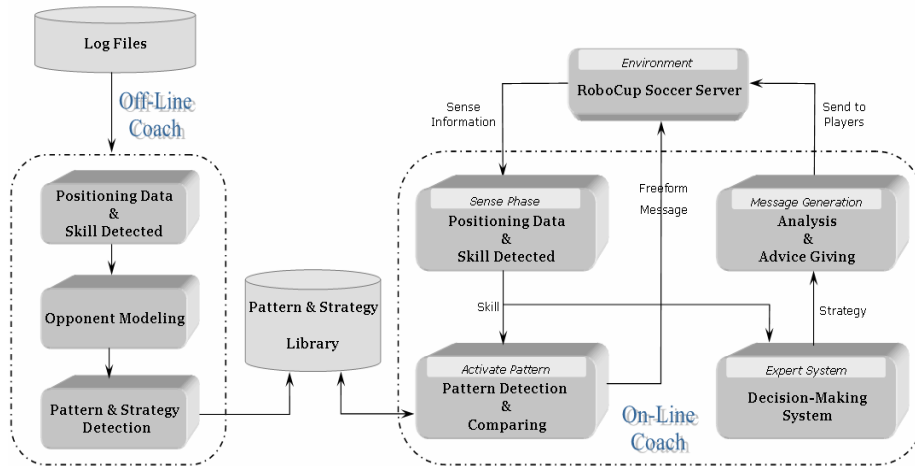


Fig. 1. MRL Coach 2005 architecture and its components relation

### 3. Conclusion and Current Work

Our prospective effort is to develop a learning system which is able to generate advice being on-line with usage of algorithm for modeling the opponent team. Some parts of our current effort are to expose these hand-coded advices from the log files of opponent team. We also plan and try to improve and develop learning algorithms and finding out better solutions for generating advices. Further details about online learning will be presented in Japan 2005 RoboCup symposium.

### References

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