

Sepanta Online Coach 2005 Team Description

Sepanta Robotic Research Foundation
Online Coach Simulation Project Team
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Abstract. This paper describes the main features of the *Sepanta Online Coach 2005* Simulation Team. This team is an extension over our last year team which participated in RoboCup 2004 competition and ranked 4th place. Main features will be addressed briefly, including opponent modeler, strategy builder and our expected flaw detector. Finally we will describe our future research directions.

1 Introduction

RoboCup Online Coach Simulation Project subject is to develop online coaches which are able to improve players' performance by giving advice to them [1]. Player agents in soccer simulation environment act on the basis of uncertain knowledge and have single-channel, low-bandwidth, unreliable communication with each other [2]. In such an adversarial environment, the online coach that receives exact and complete information about the field could improve the team's performance. The performance improvement by the online coach also has been studied in other domains [3].

Online coach can use information extracted from previous opponent's game logs and also information gathered while the game proceeds. Although the main research domains are opponent modeling and online adaptation, in the previous years the necessity of using the standard coaching language (Clang) and the fact that coachable teams were a combination of agents developed by different research groups (so were not guaranteed to infer similarly from coach advices or even do the basic skills in a similar manner) were other challenges that an online coach had to manage. Regarding this year changes in competition rules, now the coaches are requested to force on opponent modeling and try to find some opponent's 'flaws' or misbehaviors during a game. These changes lead to the necessity of a great change in older coaches such as Sepanta.

In this paper, Section 2 describes our online coach opponent modeling system and explains how the opponent analysis results will be used to enumerate opponent flaws;

Section 3 describes how we will use our previous strategy builder in the new styled competition to help the online coach in detecting opponent's flaws; Section 4 explains what we currently think about our flaw detector system; finally, Section 5 describes our future research directions.

2 Opponent Modeler

Sepanta online coach opponent modeling and game analyzing engine, which has been developed mainly in previous years, can be used effectively to detect opponent flaws from log files. Opponent modeling deals with extracting the opponent model by observing opponent log files. This phase is done in several steps. First, online coach reads the log files and saves all the game information in a memory structure. This structure contains global velocity and position of the ball and players, play mode changes, goals scored or conceived, etc. After that, online coach does a second pass on the game data and tries to refine this data into more usable information. In this step, first the analyzer tries to find misbehavior signs such as rapid movements in field width, etc. Then some statistical work must be done to extract information such as number of each misbehavior sign occurrences and the environment conditions while the signs have been seen. Finally these environmental conditions must be unified to be used as a precondition of a flaw. By combining this information, the coach tries to model the opponent different flaws.

The results of opponent modeling phase are fed into a flaw description builder that takes this information as input and generates some flaw description files as output. These files are expected to use an XML-based format for defining flaws.

3 Strategy Builder

Our online adaptation engine which was used previously to change the players' game strategy can be used to prepare situations in which online coach detects flaws seamlessly. In this phase online coach must trace the game and try to adapt the coachable team strategy regarding to its flaw database. This adaptation may lead to very different team strategies. For example several positioning strategies may be required to test different flaws. Of course because of communication restrictions, it isn't supposed to define a complete strategy when the game proceeds. Instead, we may use some vectors as parameter holders and just redefine them when it is necessary, as we used this method partly in previous years.

4 Flaw Detector

Our online coach flaw detector system is expected to be based on generating behavior models from some XML-based flaw description files which has been generated by opponent modeling engine. We expect to have a subsystem called model builder which reads these description files and generates flaw models. As the competition changes are announced recently, we haven't implemented any specific algorithm to detect when each flaw model matches the game state, but we think several machine learning approaches such

as decision trees or Markov chains or even finite state machines can be used to do this. Of course these are subject of ongoing research.

5 Future Works

We did some study on how we can migrate to the new competition style and we think due to the modularized structure of our previous code, we can do this seamlessly. The main part of the work which is the flaw detector is subject to future studies and work.

References

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