

Description of On-line Coach for WrightEagle Simulation Soccer Team 2002¹

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Introduction

In multi-agent domains, among others, there are two challenges. One is how to make the team agents cooperate in harmony, and the other is how to response effectively to adversarial agents. On the simulation soccer platform, we search for approach to the challenges above through building an on-line coach agent whose goal is to improve the performance of our simulation soccer team. As a special agent, the on-line coach should provide teammates with information of opponents and give teammates advice on high-level decision-making. We continue focus our work on finding the plans of countermeasure and opponent modeling.

Planning

Our on-line coach will choose the global strategy and local tactic basing on the adversary model and the situation. A global strategy is represented as a key-scene queue, which is sorted by temporal order. Each key-scene includes the information of the position of ball and agents (expressed as region). We call the transformation from one key-scene to another key-scene local tactic, which consists of a sequence of collaborations among teammates such as pass, positioning, shoot, etc. Tactics can be represented as set-plays. There may be more than one strategy, and there may be several tactics that can realize the transformation from key-scene to key-scene. It's up to on-line coach to select the optimal strategy and tactic basing on the opponents' characters. For this purpose, we endow each strategy and tactic an attribute of success-rate, which is generated by an evaluating function that embeds the adversary's characters. When the opponents' characters are unknown, success-rate for each strategy or tactic should be equal. On-line coach then can choose the strategy or tactic by the success-rate.

Opponent modeling

Opponent model is the base of planning. It's composed of team model, agent model, and an evaluating function. The team model describes the characters of the adversary's team play. We define some parameters that can represent the characters of the adversary's team play, such as formation, player density in region, offensive, defensive, strategy, tactics, etc.

Agent model describes a player's action ability and habit, and some parameters such as player type, sensitivity, dribble ability, etc. At the beginning, let the parameters be the expectation of all possible value. After the observing the adversary, our on-line coach will record the opponents' behavior and use statistic estimative method to adjust the values of the parameters.

The inputs of evaluating function are opponent model parameters, and the output is the success-rate of each strategy or tactic. This function embeds the prediction of opponents' future action and the special experience in soccer game, and can quantitatively represent mapping from opponent model to countermeasure. This function is realized with a neural network.

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