Aria 2004 3D Soccer SimulationTeam Description

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Abstract. This paper describes the structure of Aria 3D soccer simulation team, which is going to participate in the Robocup 2004 competition. This document has been published some weeks after official release of the 3D soccer server. It includes an explanation of world model architecture, some basic skills and important factors of decision. In addition we will give some conclusions and describe future research directions.

1 Introduction

Aria 3D soccer simulation team is a subset of Aria 2D soccer simulation, and is built by a group of students of the Computer Engineering and Information Technology Department of Amirkabir University of Technology (Tehran Polytechnic). In the first step we decided to produce a reliable base code and design and make agents with suitable capabilities after studying the available documents.

The rest of this document is organized as follows: first we devise our plan for world model implementation, then we determine our basic skills that we are intended to implement, and finally we try to define our basic decision structure.

2 World Model

From our previous experiments in soccer 2D we can identify some important parts in designing world model. One of these important parts is agent localization. For this part we decided to use the flags of the field and provided by vision message

information. In addition we want to employ the methods explained in [1] and extend our 2D algorithms to be used in 3D world. By using this method the place of other agents and ball in the field is measurable; most of these methods are currently being used in 2D soccer simulation team. These functions are used to estimate ball and agent positions in next cycles. Moreover they help us to make better decisions and implement more reliable skills.
One of the important Information that the World Model should provide is estimation of the speed and acceleration of objects, because 3D Soccer Simulation Server does not have any percepts for speed of moving objects on the field. For example in our sample agent we simply compute change in position of an object in two successive percepts and divide it by length between arrival times of those two percepts.

3 Skills

In this part we explain the most important skills of our agents. The main action of an agent in soccer 3D environment is *driving* which is used to move the agent in the field. This action is different from dash in soccer 2D in the sense that when you drive the agent in a direction, it will drive in that direction until you drive it in another direction. Because of the inertia of the agent when it is moving in one direction, attempts to drive it in another direction will not result movement of the agent in new direction. To stop or decrease speed of a moving agent, a drive action in reverse direction of its speed should be applied. So to write a move skill for the agent we must consider these facts. In our sample agent we tried to write a simple move skill which moves the agent toward the ball and stop it near the ball so that it can kick the ball. To do this we initially speed down the agent. Then we drive it toward the agent with full power. On the path to the ball we compute when we must start to speed down the agent. We compute this point having agent's current speed and drive max power. When we reached this point we drive the agent toward reverse direction of its current speed and with max drive power (100).
The kick action kicks the ball toward the vector from agent center to ball center when the agent is close enough to ball. So to kick the ball to goal we locate a point that is on the line which connects the center of the ball to center of the goal. To kick the ball toward the goal we should move the agent to that point and then fire kick action.

4 Decision

Because soccer 3D is new, most of our time is taken for implementing skills and low level codes and currently we don't have any specific plan for designing and implementing decision of our agents. Firstly, it is intended to have good skills for agents.

5 Conclusion and future directions

Since soccer 3D is a new concept in Robocup soccer simulation and its rules are varying by time, having an adaptive structure seems necessary. So we intend to implement a flexible base code for it. It is obvious that a good architecture make future works more reliable and software maintenance will be easier.

6 References

1. R. de Boer and J. R. Kok. The Incremental Development of a Synthetic Multi-Agent System: The UvA Trilearn 2001 Robotic Soccer Simulation Team. Master's thesis, University of Amsterdam, The Netherlands, Feb. 2002.

2.Patrick Riley , SPADES System for Parallel Agent Discrete Event Simulation User's Guide and Reference Manual, December 7 ,2003

3.Soccer 3D Text Instead of manual