Team Description of AmoiensisNQ2006 3D

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Abstract.

Robocup started its 3d competition since Robocup 2004, which attracted us and give us a great challenge. Our team Amoiensis NQ2005 is based on the Automation department of Xiamen University. We are now trying to make some approaches to build the 3d agent architecture. Since we have got much experience of 2D competition, we believe that we will construct an appropriate agent architecture which will lead us to the further development and research.

1. Introduction

For it is a much more complex system, 3D soccer simulation has a larger architecture than the 2D one. In the following passages we'll describe our ideas of agent architecture, world model, agent skills, team strategy ,formation strategy, conclusion and future directions.

2. Architecture

The whole architecture consists the components of communication component, world model, agent skill library, and decision-making layer. Communication component does the work of receiving messages from the server, like agent state, vision information about the world model, and some other information sent by the server and sending commands to the server (init, drive, beam, kick, say). World model components provides an imprecise image of the real world, which our decision-making depends on. Agent skill library teaches the agent basic and advanced skills like "go to some position with specific speed" or "kick the ball with a speed in specific direction" "shoot the goal to a specific position" etc. The decision-making layer is the most important part of our agent architecture by which the agent gets the ability to think and behave, and coordinate the 11 agents to achieve the goal.

3. World Model

A world model should represent an approximately precise mirror of the real world, this is the foundation of decision-making layer. It has three parts:

First to parse and store the message from the server, and then update the world model, our parser is easy to modify and update.

As agent's vision is imprecise and limited, we have to get the state of the agent, team-mates, and opponent refined, we use "Kalman Filter"[2] to reduce the error (the position error can be reduced to between 0.04m and 0.05m).

For the former position and the present position are known, world model can calculate the velocity, we can predict the possible position and velocity of the player and the ball, so it can also provide some low and high level interfaces (such as to get the player who can get the ball in the shortest time) to describe the situation on the field, It's an important basis of decision making.

3. Basic Skills

The decision making layer can't directly use the primitive commands (Of course, it will make it too difficult to make decision). Agent skill bridges decision and action i.e. "What to do?" and "How to do?" For instance, "Drive the ball to a specific position with a given velocity" "kick the ball to a specific position with a given 3D velocity" "shoots the ball to a specific point" and so forth. So the decision making layer could select some skills to make an action.

4. Team Strategy

Our team strategy is divied to three parts , handle hall strategy, interception strategy and formation strategy. First we calculate all the agent's intercepton infomation, include the interception cycles, the interception point. And then use this interception infomation to judge the agent should adopt which strategy. If the agent has controlled the ball, go into the handle ball startegy. And if the ball is free controlled and the agent is the best person to interption , then he will go to interception. And if the current sutiation don't match above two, the agents will go into fomation.

5. Formation Strategy

As the same with our 2D agents, we adopt 433 formation which has more balance in both offend and defence. In 433 formation, there are offend system & defence system. We use BP neural net to construct the basic formation point of players who will change the formation point according to its role and the location of the ball. In the fundament of basic formation point, we add the dynamic formation strategy: when we are in defence state, player have 4 choice: BLOCK, PRESS, MARK, FORMATION. We create a set of coordinate mechanism to ensure the each player of other side in our field would have at least one of our player doing one action to him. When we are in offend state, player adopt the basic formation strategy; when player is in the offside position, he will move back to the offside line automatically(in rcssserver3D 0.4); when the linkman dribble in 30m advance of opponent's field, forward will give up the basic formation point and choose to get rid of the backs of opponent

6. Conclusion and Future direction

Generally, we are working for making each component into a whole, so it can work more efficiently, stably, flexibly. Make it easy for us to do some further research.

In the future, we will strengthen our team strategy and agent skills, optimize the world model to make it more accurate, finally make all the 11 agent work together to play the football naturally and smoothly like a real match. In the end, special thanks to the Robocup committee, we will try our best to provide wonderful matches.

Reference

[1] Liu Rujia, Sun Zengqi. Maintaining World Model in RoboCup 3D Simulation League.

[2] Macro Kögler. Simulation and visualization of agents in 3D environments. Diploma thesis,Fachbereich Infomatik,Universität Koblenz-Landau,2003