TJNU2012 2D Soccer Simulation

Team Description Paper

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Abstract:In TJNU2012,we develop our simulation team based on TJNU2011.In this paper,we mainly introduce our team structure based on agent2d and several improvements,such as effective strategy of defense ,choice of side-forward offensive and penalty_kick game mode.

1 Introduction

The TJNU team,attached to the Tianjin Normal University,was set up in 2008.It was established by the lab center of the Colleage of Computer and Information Engineering in Tianjin Normal University,which is based on the years of "Affective Computing and Intelligent Interaction Lab" on the Robotices-related fields,which is formed for robot soccer competion.

The TJNU team is mainly made up by the simulation 2D group,medium-sized group,@Home group.We have been participating in annual competition of RoboCup since 2008,and have scored excellent achivments in the past 4 years.We have made our efforts to optimize the strategy of multi-agent collaboration and the agent 2d basic actions.Meanwhile we give consideration to the offensive and defensive parts,pay attention to the teamwork to win the game.

2 Team structure

Our team is built on the base of agent 2d and librcsc
agent2d-3.1.0:http://sourceforge.jp/projects/rctools/downloads/51943/
librcsc-4.1.0: http://sourceforge.jp/projects/rctools/downloads/51941/

2.1 Introduction of chain-action

TJNU2012 is based on agent2d-3.1.0.According to our analysis to it,we find it has greate differences from the the previous versions in the overall architecture.

In agent2d-3.1.0,we introduce a new concept,the chain-action,and at the same time, abandoned the previous action decisions only by this current cycle.Instead,With the chain of actions,we can link the actions needing to do in the next several cycles,in order to make it make a decision for the future cycles within one cycle at the same

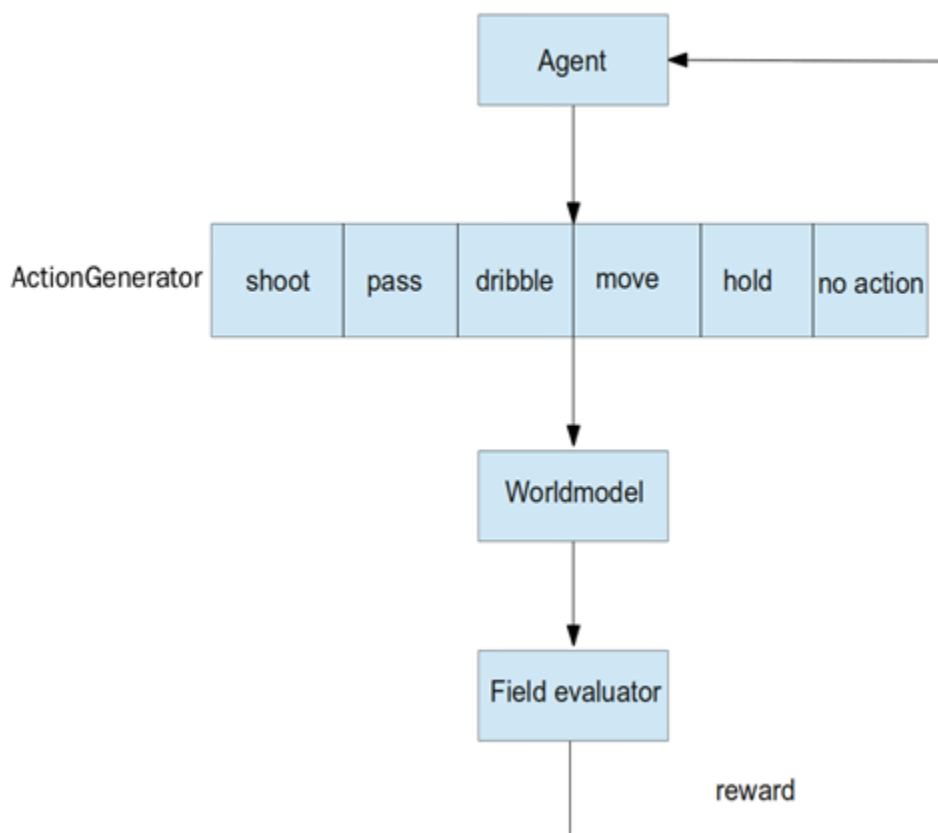time.This is also the weak part of TJNU2011.The chain-action is as follows:

Fig.1 Agent's action selecting and decision-making framework

In Fig.1,Agent selects the simulated action needing to execute by action-generator,after the simulated action is done,the worldmodel will change accordingly and meanwhile field evalutor will evaluate it,then send a reward to the agent.All of the field simulated action executed will return a reward,however,only the simulated action which returns the biggest value will be excecute eventually.

2.2 Evaluation based on field's partition

From the foregoing, the choice of action depends entirely on the field evaluator, so whether the field evaluation's mechanism is reasonable becomes critical. TJNU2012 summarizes the past experience and references Anhui University's DreamWing 2011's strategy,then adopts the evaluation based on field's partition, the actual test proves it surely has some good effect. We devide the field into 12 parts,they are symmetried about the x-axis.As we can see,different parts has different eveluation value,so we can increase the priority of the corresponding action by changing the value of evaluation.

Fig.2 Field's partition

Region 1 is for BA_Danger, the value of its underlying eveluation is smallest, Area 7 is BA_ShootChance, the value of its underlying eveluation is maximum, the assessed value of the rest areais is in between. Overall valuation = the basis assessed value of the regional + assessed value of internal refinement. A team focused on middle breakthrough, 3,5 regional's basis assessed value may be greater than 2,4 region. Internal refine assessment is relatively complex, needing to consider ball,players, different regions and overall state.

3 Improvements

3.1 Improved the defensive strategy on the basis of TJNU2011.

When the opponent is in kick-in,free-kick or goal-kick mode,our team members will take a man-to-man method to defend opponent effectively,so the other side probablly fail to pass to their teammate.The details are as follows:for example,in the kick-in mode,Opponent No. 8 starts to pass the ball,at the same time,our players will find the nearest opponent around him,if a opponent is defended,we will make sure our other teamamate wiil not defend him. By implementing this strategy, the effect is very obvious,and it greatly increases the opportunity to attack.

Fig. 3 Deffence strategy 1

3.2 Teammates near the ball-holder approach the ball initiatively when in kick-in,free-kick or goal-kick mode.

A problem exists in TJNU2011 when our side is in kick-in,free-kick or goal-kick mode.Sometimes,no teammates approach to the ball initiatively,so the ball-holder is continuously serching the best point to pass the ball,causing enen if the time is up,the ball is still in his hand.To solve that,we let the teammates near the ball-holder to approach the ball Initiatively,if oppoent comes to defend,the teammate will ajust his position.

3.3 Defensive strategy.

When opposing players dribble over half, In TJNU2011 our defender will go back and defensive instead of initiatively intercepting the ball.So at the run-time, we find that the opponent will be easy to approach the restricted area, the effect of defensive is poor, therefore, we take the initiative strategy to block the route of the opponent ball-keeper.
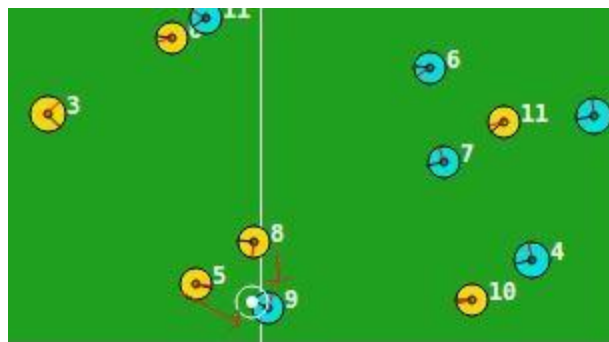

Fig.4 Deffence strategy 2

3.4 Improvement on role goalie in penalty_kick game mode.

As for TJNU2011,We improved the goalie's strategy in penalty_kick game mode,however,in our tests,we find the goalie is always restricted in penalty area,so the opponent can easily dribble to a position which he has much choice to shoot.It increases the difficulty to defend. For TJNU2012,we reference the strategy of world RoboCup2010's champion,Helios2010.When opponent dribbles the penalty area,our goalie will choose to approach to the opponent and intercept. Because the opposing player is in a location far away from the goal when he is interfered,he might only adopt a remote shot. With this penalty mode, we can more easily win.

Fig.5 penalty_kick game mode

3.5 Improvement on side offensive

We find TJNU2011's way of offensive is kind of single and not effective.When the side-forward holds the ball,he always chooses to driblle to the baseline along the border.Using this strategy,our side can be easily intercepted,besides,it wastes lots of stamina and opportunity to attack.In TJNU2012,we strengthened the possiblility of passing ball. The details are as follows:Player A holds the ball,he can not only dribble to the goal,but choose to pass the ball to player B.In this way,the success rate of shoot is greatly improved.

Fig.6 Improvement on side offensive

4 Conclusions

In general,we improved our 2D team based on agent2d and TJNU2011,fixed several bugs in strategy and code.In the future,tam's main goal is staying focused on high level decision,optimizing team's strategy.

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