

ESKILAS

Soccer 2D Simulation Team

Description Paper

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Abstract. The goal of this paper is to describe ESKILAS 2D soccer simulation team researches and current status of our team. Here, we explain some facts about our advanced plans such as mark plan that is used in defense system.

1 Introduction

ESKILAS 2D soccer simulation research was established in the year 2007 in Allameh Helli high school (but with the name HelliBASH). ("Mersad" 2D soccer simulation team, which achieved the third place in Robocup 2004 competitions, was established in this high school). We have achieved the fifth place in ChinaOpen 2008 competitions, 2nd place in RoboCup IranOpen 2009 and the 7th place in RoboCup 2009 Graz. Our efforts are concentrated on using new ideas for the team in order to choose the best possible choice out of a series. At first, we used Mersad 2D Basecode, but now we take advantage of Agent2D's instead, in order to create a more advanced code with better performance; however, we have changed some basic and advanced sections, such as audiosensor and audiomemory, coach world model, build system, side dash, etc.

2 Decision Making

Decision making is the most important part of the team. Here, each agent decides what kind of action to do, based on different information that he has about the worldmodel objects, such as his teammates, the ball, the opponents, etc. In decision making it is not important that we are defense, offense or goalie. These structure works in all main plans. Decision making is separated into with ball and without ball decisions.

3 With Ball Decision

If ball is in agent's kickable this part will be executed, else the without ball decision will be called. In this section agent decides based on his vision and generated weights and priorities of actions (shoot, dribble, pass, ...). The most important decision in this part is shooting. It's the first action that will be checked by agent.

1. Shooting:

Our shoot is written by the FastIC system (a system like intercept calculate of mersad source). In this action the best shoot will be chosen from the generated shoots.

2. Passing:

In the pass system we simulate some series of ball kicks and find the fastest player in each kick. Then we select the kicks that the fastest player is teammate. And we select the best kick based on the weights that written in a config file. The weights format is such as follows:

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"( PassConf 1 ( Priority 9 ) ( TargetPolygon ( Vertex (X 0) (Y -34) ) ( Vertex (X 0) (Y 34) ) ( Vertex (X 52.5) (Y 34) ) ( Vertex (X 52.5) (Y -34) ) ) ( Weights ( DistToGoal (Weight 1) (Max 64) ( CheckIt 1 ) ) ( ReceiverAbility (Weight 1) (Max 11) (CheckIt 1) ) ) ( MinValue 0.1 ) ( Receivers 69AB ) )"
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Pass Safety Factors:

Safety factors are some factors for each player which tell us how much the probability of intercepting ball by that player is. Max dash is for example one of these safety factors that has a value between 0 and 1. This value is determined by the type of the pass needed.

3. Dribbling:

The important point in dribbling is setting the dribble target. The default dribble target is in front of the agent in the same y. If the agent's position is near the opponent penalty area, the dribble target is center of opponent goal. Also is determining dribble target. We consider the near opponents position. Finally we choose a dribble target which makes our agent nearer to opponent goal and dribble the opponent player. In returning value of dribble we generate a double number indicating number of opponents in the way to dribble target. In such a situation that there were more opponents, the value of dribble is less than other situations.

4. Clearing the ball:

If there were no good pass and dribble conditions, this action would be executed. Also if the ball was in the penalty area and in both kickable areas of our player and opponent another kind of clear called DangerAreaClear would be executed.

5. Defense Breaker:

This is a kind of risky pass, which is used to send the ball behind the opponent's offside line, without getting trapped in opponent's offside trap, in

order to help the offensive players advance. This kind of risky pass means that we have to underestimate opponents interception ability. Here, we can decrease opponent's "Max Dash" and increase the control buff instead. For achieving this goal, there has to be an interactive communication between the agent who owns the ball and the other agents.

4 Without Ball Decision

If we are the fastest player in the field, the intercept action will be executed. If we are the fastest player between teammates:

1. If the player had an offensive role, he blocks the opponent and ball.
2. If the player had a defensive role, he select between block and mark actions with considering the circumstances.

5 Mark

Our defense system is based on marking system. Mark's goal is to prevent opponent's players from receiving his team mate's pass.

Mark will be executed in two situations:

1. Dangerous situation:
When the ball is near our goal.
2. Normal situation:
When the ball is not behind the half line.

Marking process is consisted of two important tasks:

1. Determine which opponent is the best one to mark:
Coach (who has a complete vision) sorts opponents by their danger factor. Then he relates each agent to each opponent based on their position, and finally he designates a "Mark Table". After that, he says the mark table to agents each 400 cycles and when the opponent enters our half.
2. How to mark the opponent:
 - (a) What to do when the ball is in dangerous situation : (Fig. 1)
Defensive player sticks to the opponent and moves in a very short distance. When they reach the opponent's marking point, he changes his body direction based on the opponent's and ball's vector. Then, he uses "Side Dash" in order to follow the opponent. As it uses too much stamina, side dash is only used usually when the ball is in a dangerous situation or when the distance from the opponent is less than 3 meters.

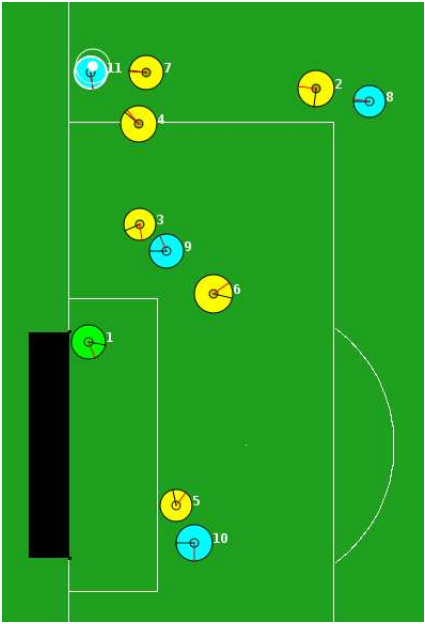


Fig. 1.



Fig. 2.

- (b) when the ball is in normal situation:
Defensive player sticks to the half line and moves in the same width as the opponent's, and middle players stick to the opponent and stay in a secure distance from the half line in order to receive offensive players' back pass.
- (c) Non-play on marking: (Fig. 2)
When the situation is "Non-play on", which means the game is not being played and one team owns the ball, coach tells every agent which opponent to mark.

6 Future Plans

According to the latest changes of rcssserver, we have to change some basic actions such as intercept and dribble. We have consider the side dash in these actions.

1. Dynamic Positioning:

- (a) Importance of Positioning:
Positioning, is the part in which the agents are given the exact position to move to. In fact, this part can be the most important one, as it affects the performance of the agents, and is essential to make the best possible situation for both defensive and offensive players in order to defend the ball from getting into the goal position, and simultaneously, try to get the ball into opponents goal position.
- (b) Dynamic positioning system development:
This is a new method of positioning for the agents. It requires the interactive communication between the coach and the agents. In the first 1000 cycles, coach analyzes opponent's type of positioning. Then, he tries to find out the best suitable positioning type for the agents from a list. Then, he tells all the agents what to do and where to go. Finally, he tries to generate a position and add it to the list, based on the results of the match, in order to make the positioning system better; therefor, this is considered as a "Learning Method".
The position selection system is based on a new positioning format that we designed it and we're currently using it in positioning system.

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"(PositioningConfig (MinX 0) (MaxX 20) (OffsideLineWeight 1) (Bal-
lXWeight 0) (MidLineDif 10) (QBLineDif 5) (Area (MinY -34) (MaxY
-21) (MinPosY -28) (MaxPosY -21)) (Area (MinY -21) (MaxY -8) (Min-
PosY -21) (MaxPosY -8)) (Area (MinY -8) (MaxY 8) (MinPosY -4)
(MaxPosY 4)) (Area (MinY 8) (MaxY 21) (MinPosY 8) (MaxPosY 21))
(Area (MinY 21) (MaxY 34) (MinPosY 21) (MaxPosY 28)) )"
```

- (c) Position Generation:
There are some ways for the coach to generate a position:

- i. After the game, if the result was against our team, coach tries to change our positioning system based on advantages of the opponent's one in the match.
- ii. If our team wins the match, he tries to change our positioning system based on the merits and demerits of the latest one in the match.

7 Summary

In this team description paper, we have explained the strategies of the ESKILAS team participating in Robocup 2D Soccer Simulation Competitions. Our main focus was on defense mark system and dynamic positioning. [2, 1]

References

1. Trost F Gabel T., Riedmiller M. A case study on improving defense behavior in soccer simulation 2d: The neurohassle approach.
2. Gabel T Riedmiller M. On experiences in a complex and competitive gaming.