Mythras

Soccer 2D Simulation Team

Description Paper

Eindhoven (2013)

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Abstract. This paper aims to summarize some process which are done in order to implement the Mythras soccer simulation 2D team, including some detailed specifications. This is Our first participation in RoboCup. In this paper we would explain the agents' decision making, the new shoot, pass, dribble and positioning method and our future plans.

1. Introduction

Mythras soccer simulation team was established in year of 2012 in Farzanegan high-school. We revised our ideas on Mersad Base Code to modify some skills and strategies such as Dribble, Pass, Shoot and Positioning.[2]

2. Decision Making:

There are two play modes that the agents' decision is based on them:

1. Play on Decision
2. Non-Play on Decision

2.1. Play on Decision

Each agent decides its action in each cycle regarding objects like ball, opponents and teammates position. Therefore, there are two options:

2.1.1. Actions with ball

When an agent is the ball owner, depending on its situation, it chooses one of the actions below to do.

a. Shoot:

The main idea of shoot action is a simple but useful one. If an agent is close enough to the opponent goal, should find the best point of the goal to kick through, so it simulates some kicks to some points of the goal to see if any opponent agent can catch the ball before it arrives to the goal. If it’s safe to kick the ball through that direction, the agent will kick the ball.

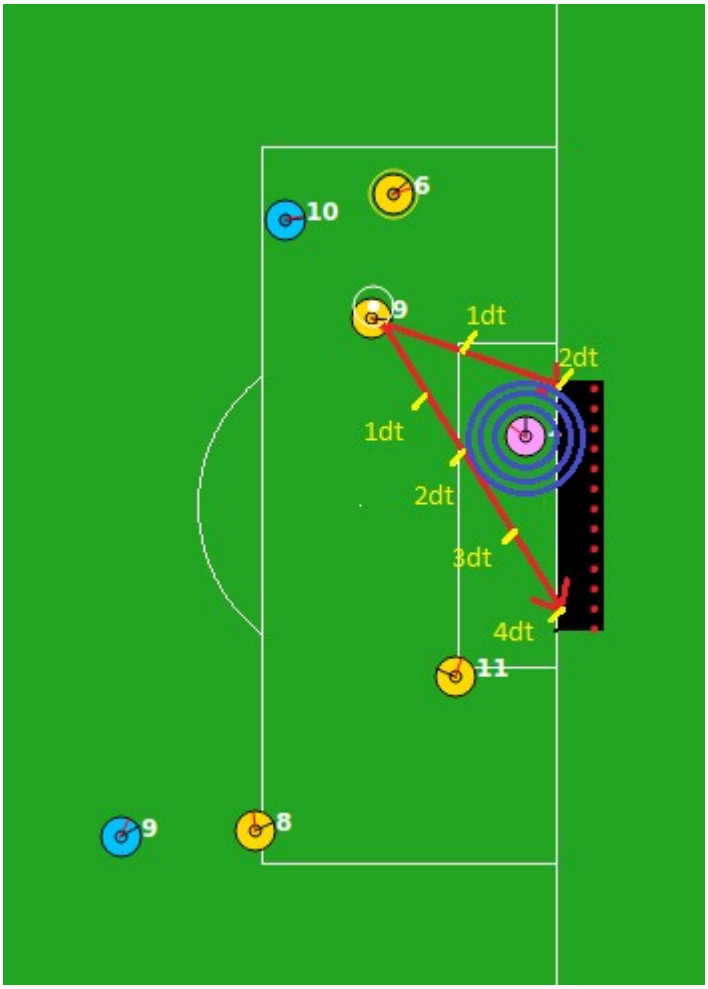

Fig1. Checking different points of the opponent goal. The goalie can catch the first kick in next 2 cycles, but the second kick is safe and will be chosen to perform.

b. Dribble:

The act of dribble has two parts. One is finding the best direction to do the dribbling and one is the act of trying to keep the ball in kickable area. To find a direction to dribble the ball through, different directions (including the direction to the opponent goal) are checked. The best direction is the one with less opponent aggregation. If the chosen direction is toward the velocity of ball, it shows that agent can keep moving without losing ball; else it should kick the ball through the chosen direction. After that, the agent should find the best power and angle to kick the ball in order to keep the ball in its kickable area for more cycles.[1]

c. Pass:

In the new pass method, different kicks toward teammates are checked in order to choose the best direction. When an agent decides to pass, it should check if a safe pass is possible, so it simulates kicks toward the teammates to check if they can catch the kick before opponent’s interception. If one is safe and possible, the agent kicks the ball through the direction of that teammate; otherwise, if more than one direction is chosen to pass through, offense players are the priorities and if there is no teammate to pass safely toward, the agent decides to keep dribbling.

d. Clear:

If the agent can't perform any of actions above, it clears the ball. Depending on the occurred circumstance, the agent may kick the ball out of the field, toward the opponent goal or other positions.

2.1.2. Actions without ball

If the agent can intercept the ball before all its teammates, it goes toward the ball and performs one of the actions below:

a. Tackle

b. Intercept

These actions are implemented in the base code. We didn't overwrite them; we just use them.

Else if another teammate is the one who can intercept the ball first, it goes to a position that may help the team to perform the best defense or offense progress.

2.2. Non-play-on Decision

When the game is not in play-on mode, one of the teams may start the game. The agents' decision in this mode is positioning in a suitable point to intercept the opponents' pass (when the opponent is the starting team) or to make a good offensive positioning style (when our team is the starting game). If our team is going to start the game, the nearest teammate to ball is supposed to pass the ball toward other teammates.

3. Future work

3.1. Say:

Without any wide vision updating all the objects around, and without knowing the teammates' decisions it is necessary to have a communication system for agents. So we decided to use a communication system by say action to let the agents be informed about things outside their vision, their teammates' decisions and other things they need to be informed about.

3.2. Multi step pass:

The multi-step pass is an action that agents perform in order to kick the ball through any direction with any suitable velocity. This action would be easily possible to do by stopping the ball in one cycle, and kick it in the next cycle.

3.3. Potential field:

The "potential field" is a method used for finding the best way toward the goal, avoiding the obstacles. The soccer field is simulated to an area with hills and valleys. In reality, the gravity causes potential in each point of an area, based on its height. In this modeling, the fields with low potentiality are attractive points and the fields with high potentiality, are repulsive points. Path planning with this method is based on some attractive and repulsive forces. This field affects direction of agents' movement. Attractive forces can be objects which are safe and recommended to kick the ball or move toward; and repulsive forces can be those which should be avoided.[3]

Mentioned forces are calculated just like physical ones:

$F = \frac{GMm}{r^2}$ G = a constant to make the result in a good scale ,

M,m = object's importance , r = object's distance .

References

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2. Boorghany Farahany, A., Rokooey, M., Salehe, M., Vosoughpour, M.: Mersad 2004 Team Description Paper. In: RoboCup 2004 Symposium and Competitions, Portugal (2004)

3. R. W. Beard and T.W. McLain, Motion Planning Using Potential Fields, January 20