OXSY 2018 Team Description

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Abstract. Oxsy team was founded in July 2002 for a graduation project of one student, Sebastian Marian, in the field of Multi-Agent Systems, at the Department of Computer Science of Lucian Blaga University (Sibiu - Romania). After graduation he continued the work on this project and so was born Oxsy team. As we started from scratch, our ideas, concepts and beliefs, was implemented year by year and today, we are happy to see that we are on the right way, as our team was growing in these years, more than we expected from the beginning. If we will qualify to the competition, this year we'll reach at the 16th consecutive participation, in RoboCup Soccer Simulation League.

1   Introduction

In July 2003 at RoboCup competition, which was held in Padua - Italy, we won the first round and for us it was a good surprise for first year of participation. Then, in the next year, we participated in Lisbon - Portugal for the second time, and again we obtained a good result (the 11th place). In 2005 in Osaka – Japan, we participated for the third time and finally we entered in the first 8 teams of soccer simulation league, as we won (the 8th place). In 2006 the competition was held in Bremen – Germany and we won (the 7th place). In 2007 we went to Atlanta – Georgia (U.S.A), where we obtained (the 5th place), the same result which we achieved in 2008 in Suzhou – China. Finally, in 2009 in Graz, we entered in the first 3 teams in the soccer simulation league, as we won (the 3rd place), the same result which we achieved in 2010 in Singapore. In 2011 we came back from Istanbul - Turkey with (4th place). In 2012 we were in Mexico City, where we had a bad experience as we made some major changes in our defensive system, and also many others overall our team strategy, changes which was not very well balanced at that time, with all others characteristics of our team, as we were not qualified for finals, from the second round groups. In 2013 we came back in top, as we won (the 6th place), in Eindhoven – Netherlands. In 2014 the competition was held in Joao Pessoa – Brazil, and we entered on the stage for the third time in our participation history, as we won again (the 3rd place). In 2015 we won the 4th place as we played the semifinals in Hefei – China. In 2016 the competition was held in Leipzig – Germany, we missed the semifinals and we came back with (5th place). Last year in Nagoya we took (the 3rd place) for the fourth time in our participation history. This year the competition will be held in Montreal - Canada. As we already have a very good experience in 2D Soccer Simulation league, we hope

that our new ideas and improvements will be reflected in the competition where we will also test other tactical elements developed.

2 Offside

2010 was the first year when we have involved the coach in our team strategy. Beside of his classical attributions, of changing player types or recognizing opponent player's type, which already were implemented, we felt that we can use it more efficiently, in order to give some tactical advices during the game. As the coach has the privilege to receive full visual information, without any kind of noise, we can use it to make an opponent modeling. In fact, we believe that it is more important to adapt the strategy during the game, instead of before it starts. We also think that importance of the coach is not speculated very well right now, and maybe it will be a good point for research, not only for our team, but also for all the teams involved in soccer simulation. So, on one hand based on some typical neural networks that we developed to be used by the coach in some specific way and on the other hand based on the power of the coach, who has a full view of the whole field without any kind of noise, this year we extend the coach attribution with the following:

- Adaptive offside trap, in defensive phase, based on opponent's attackers behavior modeling.

In the general strategy of the team, the offside trap could be defined as all these actions aiming at regaining possession of the ball, which can take place in two specific ways:

- By receiving an indirect free kick;
- Taking the ball away from the opponent thanks to the application of pressure.

In Soccer Simulation League the offside rule is implemented almost from the beginning (with server version 4.00). By years this rule affected strategy of teams' playing style in two phases, defensive and offensive. As there are many teams with different types of defending or attacking, it is hard to find a singular strategy to avoid offside trapping of all teams which are using it. The critical point of this rule is when you are trying to execute an offside trap instead of being caught in it. If you cannot avoid an offside trap the maximum "punishment" for this can be an indirect free kick for your opponent executed in his side, but if you go wrong with your offside trap, the opponent that you are facing will have a big chance to score against you. So, our analysis concentrated on this side, more exactly when, where and with which team we can use the offside trap. As we observed that already many teams have excellent skills of avoiding classical offside trap, we involved the coach in this problem. Because of its free noise information advantage, he must analyze the movement of the opponent's offenders when our team applying such an action of offside trap. Practically our goalie coordinates the movement of offside trap, as he almost always is facing towards the opponent goal, and if he receives visual information every cycle, he has a good view and also a good position to decide the moment when our defenders can execute this type of action. Of course that his decision will be based on some analysis

functions with some predefined risking parameters. If based on these functions, the goalie decides that right now is the moment to execute an offside trap, he will announce this through a say command, so the defenders which should receive this message, could synchronize in executing it. This is the crucial moment of this action, because of the heterogeneous players type, our defenders have different speed, different inertia moment and other different parameters, that could have a bad influence in what we call a perfect execution of the offside trap. If only one defender will not keep this line of synchronization, this action could return against us. So, here is the point where the coach must be involved. As we said before, he must analyze the movement of the opponent's offenders and also of our defenders and finally, to decide which of the risking parameters should be modified, for a better execution of the offside trap. He also can decide to definitely stop the execution of the offside trap with some opponents, because the action is too risky or because of any other reasons.

2.1 When to apply offside tactics

Besides the decision of the coach based on it's opponent modeling which will say when and with which opponent this defense philosophy should be applied, there are some clearly moments when offside trap should be used:

- The defenders are in numerical inferiority with respect to the strikers. In situations of numerical inferiority it is a good idea for the defense section to move backward to the limit of the penalty area in order to favor the possible recovery of their team mates' part; they will then very quickly move into depth towards the ball, one or two players coming out to put pressure on the player in possession and the others tightening up and trying to take up position on the passing lines. (Fig. 1 – Fig. 4)

- When we need to regain possession as quickly as possible because we are not satisfied with the ongoing result. Along with pressing, offside tactics are one of the most important means of regaining possession as quickly as possible.
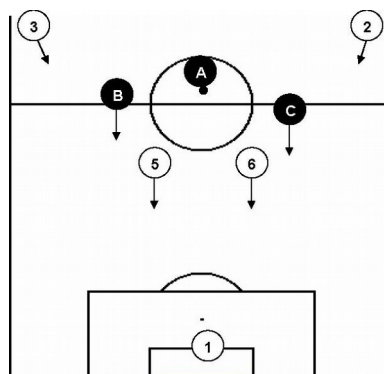

Fig. 1. Shows a counter-attack by the opponents in conditions of inferiority in numbers.
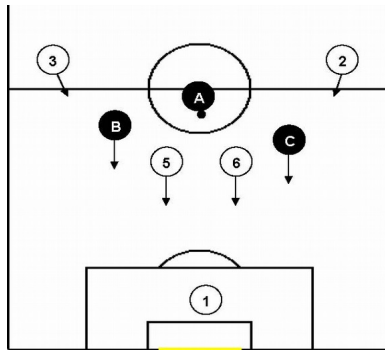
Fig. 2. We can see that number 5 and 6 play for time and at the same time shorten their distance from the player with the ball.
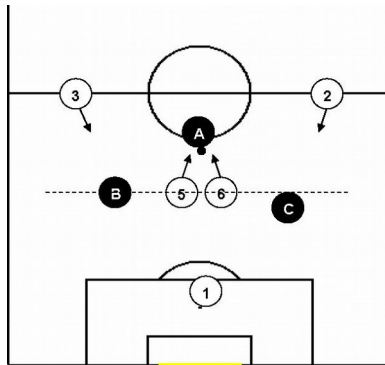

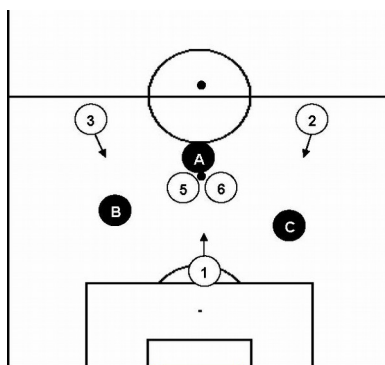**Fig. 3.** The two backs apply the off-side trap and at the same time apply pressure on "A".

Fig. 4. Shows the situation resulting from pressure aiming at leaving the opponents off-side.

2.2 How to apply offside tactics with success

Using offside tactics without adequate organization means running gigantic risks. Therefore, it is very important that team's coach should have a very good deliberation of the opponent characteristics that will make sure using offside is not a risk, but a means at the service of the team helping them to regain possession and forcing the adversaries to attack in ways that will be more difficult for them to create some dangerous situations against our team's defense. There are some important things to be followed in order to create a strong and secure defense when we are using offside trap:

- Good pressure on the player in possession; (if the player in possession is contrasted by one or more of our teammates it will be difficult for him to move forward with the ball. He can pass to one of his teammates breaking into space, but this second player will not find it easy to elude the offside trap);

- The defense section's ability to move forward in a compact way, quickly and with the right timing, (the movement into depth must be sharp, the players coming forward must be in a line and all this must be done when there is a strong pressure on the player in possession).

- Analyzing our opponents, through coach agent, for being sure that they are not really capable of applying the right counter-moves to offside tactics.

- Do not use offside tactics in a systematic way, but only in relation to certain tactical situations, so as to be unpredictable and not to give precise points of reference to the opponent's counter-moves.

2.3 The elastic: The moving up phase and the moving back phase

Using offside in an active way involves moving our defense line into depth, so forcing the opponent's attacking players to go backwards in order not to find themselves in an offside position. It is important, therefore, that, for every forward movement of the ball following on the opposition's offensive play, there must be a corresponding movement of our defense line into depth.
If we are speaking about offside tactics at all, that is the necessary condition: the defense section moves up at the same time that the ball moves down towards the goal that they are defending. On the other hand, in cases where the attacking team passes the ball backwards, the defense line do not then carry out their in-depth movement to put their opponent's in an offside position but to keep themselves at the right distances from the mid fielders, who will be moving upwards at the same time to go in contrast on the player in possession, now placed further backwards than before. The elastic forward movement of the defense section is associated, therefore, with the movements of the mid fielders, and its purpose is, first of all, to keep the team as compact as possible, and, secondly, to cut out any possibility for the opposing strikers to move subsequently into depth. Also when the adversary has received a back pass and is ready to play the ball forwards, the defenders should make some steps backward so that the opponent's attacking players cannot successfully insert themselves in

our defense line. It is this backwards and forwards movement of the defense section that resembles the movements of a wave or of a vibrating elastic band.

3   Future work

For the next future, we will involve our coach in many other issues, where the team really needs his help. Even if the free form messages, are limited by count and periods of sending, the power of the coach remains very important, as he can receive free-noise information. In this way, he can analyze many important aspects of the games and if he will deliberate based on these information, he can give valuable advice to his own team. We must accept that right now, many teams involved in this competition, adapt their strategy before the start of the game instead of while it is running. A team will be more powerful, if it can adapt correctly its strategy depending on the opponent's behavior and not by the opponent's name, and also if it can do this during the game and not only before its start. In this way, we tried to adapt our team to some unexpected situations, which are generated by differently playing style of our opponents. In the real soccer, the role of the coach during the game is very important, and his importance is motivated not only because of the players that he is changing, but because of many good advice that he gives to his team during the game. In the same way, we must really think to the power of the coach and how we can involve him, more and more, in our simulator.

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