WrightOcean Team Description for RoboCup2015

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Abstract. The paper introduces the information of WrightOcean team and presents three techniques that would be used in RoboCup 2015. These techniques consist of a new vision algorithm optimizing white goal detection, a new algorithm about localization when robot players are kidnapped in competition and some behavior approaches for the drop-in player competition and three technical challenges.

Keywords: RoboCup, Vision, Localization, Behavior

1 Introduction

WrightOcean, a team which belongs to Lab of Robotics, School of Information and Electrical Engineering, Ludong University in China, was established in April, 2012. We have two V5 and three V3.3 H25 NAO robots now. It is a young and passionate team, and all of the members are undergraduates keen on robotics. The team consists of the following numbers.

- Instructors: Fei Liu, Gaohuan Lv
- Students: Liming Liu, Hanjun Xiao, Haiming Ding, Yongjin Qu, Ge Sun, Yanbin Wang

The WrightOcean team participated in the Standard Platform League of RoboCup China Open in 2013 for the first time, and we were the runner-up to the TJArk (a team from Tongji University) in a team competition. In 2014, we took part in three technical challenges and shared the third place with Dalian University of Technology. In 2015, we are very glad to take part in the drop-in player competition and the technical challenges of Stand Platform League in RoboCup 2015 held in Hefei, China.

This team description paper is organized as follows: Sect. 1 is about our team and team members' information. Sect. 2 is about a new algorithm for localization based on Wi-Fi. Sect. 3 is about white goal detection. In Sect. 4, we describe some behaviors for technical challenges.

2 Localization

Robot Localization is very important during the game. In order to make the robot player know where it is every moment, many of information from camera and game controller need to be analyzed.

At the beginning of the game, the robot player scans own goal post and the center circle of the ground to know at which side it is. after that, different roles of robot players need to walk to different locations, which is calculated with the walk speed and distance from own goalpost and center circle. The robot player must be located in the own side when the game state changed from Ready to Set. When the game state is Play, the distances from robot self to the ground line, center circle and opponent goalpost are updated at the same frame. For every confused robot player, it will look for the own teammates and recognize the own goalie to make sure which side it belongs to.

Robot localization based on Wi-Fi fingerprint[1] is going to be used in the future. We establish a location fingerprint database based on different Wi-Fi Radio Signal Strenth Information (RSSI) before the game begins. The robot player detects the Wi-Fi RSSI on time and finds out where it is from location fingerprint database. In fact, there are some weaknesses while we test this method in our lab. For example, no one can guarantee that RSSI are always same at different moments, so we need to evaluate it before using this technology in game.

3 White Goal Detection

In rule 2015[2], the color of goalpost is white, different from ones in former years. When robots scan up and down, goal detection algorithm will mark the robots in the horizon with two white vertical lines and then those vertical lines will confuse the recognition of the goal. For this problem, the goal post recognition algorithm needs to be corresponding changed.

We develop a new scanning algorithm with robots' information. In the case when the game starts, it can use the cross bar who is the longest white line to judge the position of goal post. But in the normal cases, the robots may ward the cross bar in the horizon image. The algorithm marks the start point and the end point of all robots and then excludes the robots from goalposts. It can improve the accuracy of white goal detection.

4 Behavior

We are developing new independent behaviors for the drop-in player competition and three technical challenges[3]. Using corner kicks challenge as an example, the behavior is designed as follows.

At the beginning of the game, the robot at position R1 (called R1 robot) has to firstly move and the robot at position R2 (called R2 robot) keeps the original state. If R1 robot cant touch the ball, R2 robot is in the same state. If R1 robot

touches the ball at the first time, R2 robot starts to move and R1 robot kicks the ball to R2 robot until R2 robot touches the ball.

If R1 robot and R2 robot see the ball at the same time, the robot which is closer to the ball moves and kicks ball first. If they are equal to distance from the ball and no obstructions, R2 robot has the priority to kick. If the robot can't see the goal, it should kick the ball to its teammate.

5 Conclusions

The paper presents the techniques that we would use in RoboCup 2015. In 2015, we are going to design a new algorithm optimizing white goal detection and the localization when robot players are kidnapped in competition. In addition, we work on approaches for the drop-in player competition and three technical challenges.

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