Barelang FC Extended Abstract
Humanoid Kid Size League of RoboCup 2020

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1   Abstract

2017 was the first time we participated in the Robocup competition in Nagoya, Japan and managed to get 4th place. In this year, we still used the OpenCV color segmentation as the object detection algorithm. This algorithm made our robot affected and depended on the light so much and reduce the ability to detect the object around the robot. And also, the robot is not equipped by the localization algorithm made it difficult to decide the next strategy. The second time was in 2018 we participated in Montreal, Canada and got the second runner up. This year, we still used the OpenCV color segmentation as the object detection algorithm only the result of detecting the ball better than before. The movement of robot execution of kicking the ball also slower than the other team this year. Our robot failed to kick the ball as quickly as possible because we have not added the decision making to kick faster. While on the third participation in Sidney, we only competed until the semifinal which held in 2019. In this event, we already changed the vision system from using the OpenCV color segmentation into the deep learning algorithm which is YOLO V3. However, we still did not meet the good measurement of the landmark distance, detecting the white ball and the goalpost. We realized that from the past two years of participation in the Robocup competition, localization of the current position of the robot is a really important thing and needs to be emphasized. The robot current position by using the localization can be used to understand the robot position whether its own position or the others, this also affected as a decision making before kicking the ball to the goal and also to understand the position of the object in the field. We tried to add the localization algorithm in this year by using the particle filter algorithm based on the data from odometry. By only used the odometry as the input to understand the position of robot movement, it made the robot loses its reference point easily. This problem made the robot hard to determine the decision whether it is to kick or dribble the ball. By reflecting on the problems which occurred in the previous year, in this year we highlighted the localization algorithm more than the object detection. This is because we are confident that our object detection algorithm which is YOLO v3 algorithm is a trusted algorithm in detecting the object accurately. For enhancing the precision of the robot localization position, we tried

to read the landmark in the field and used the stereo camera to estimate the object position toward the robot. If the robot able to understand its own position in the field, this will make us determine the decision of making goal strategy easily. The current work of our research is combining the object detection by using the deep learning algorithm and the stereo camera to get the position of 3 dimensions of the detected object. By doing this we hope that the estimation of object position toward the robot able to estimate easily, able to pass the ball each other accurately, avoid the opponent's robot more flexible and kick the ball in the direction that there is no opponent anymore. We also improved the mechanical design of the robot, especially in the lower limb parts. The improvement of mechanical design also needs to be in line with the algorithm applied to the robot kicking system in the ball. So that the robot able to kick the ball as stronger as possible. Eventually, all the strategy of the robot improvement will be implemented as a whole system for each robot, although the implementation is done separately. With this better change, it is hoped that BarelangFC able to give major contribution in the match at Robocup 2020, France.