

Explicit utilization of partial spatial information: visual odometry and semantic perception

RoboCup 2014 SPL Open Challenge Entry

Berlin United - Nao Team Humboldt

Institut für Informatik, Kognitive Robotik,
Humboldt-Universität zu Berlin, Unter den Linden 6, D-10099 Berlin, Germany
<http://www.naoth.de>
nao-team@informatik.hu-berlin.de

Effective navigation on the field is one of the major challenges for a soccer robot. The most of today's approaches focus on the estimation of the global pose of the robot. Thereby, a lot of information is dropped during the integration process. In our live demonstration we will show how particular situations can be directly solved based on partially integrated spatial perceptions.

In our first example we demonstrate how a robot recovers from kidnapping, i.e., the robot returns to its starting position after it was manually moved to a random position on the field. To achieve this we utilize edges in the image to track the rotation of the robot on the field. This provides us with a kind of a visual compass, which is quite robust regarding the projective distortions, e.g., due to unknown height of the camera over the ground. Fig. 1(left) illustrates how this compass is calculated.

In the second part of the demonstration the robot tracks the ball with its head and detects whether the ball is inside a penalty area or inside the goal, indicating its decision by sound. Thereby the ball is moved around to simulate different cases and the robot is disturbed by manual movement. To solve this problem we are explicitly modeling the relation between the ball and the seen lines. The global estimation of the robot's position is used to classify the perceived lines providing the basis for reasoning on semantic level as illustrated in the Fig. 1 (right).

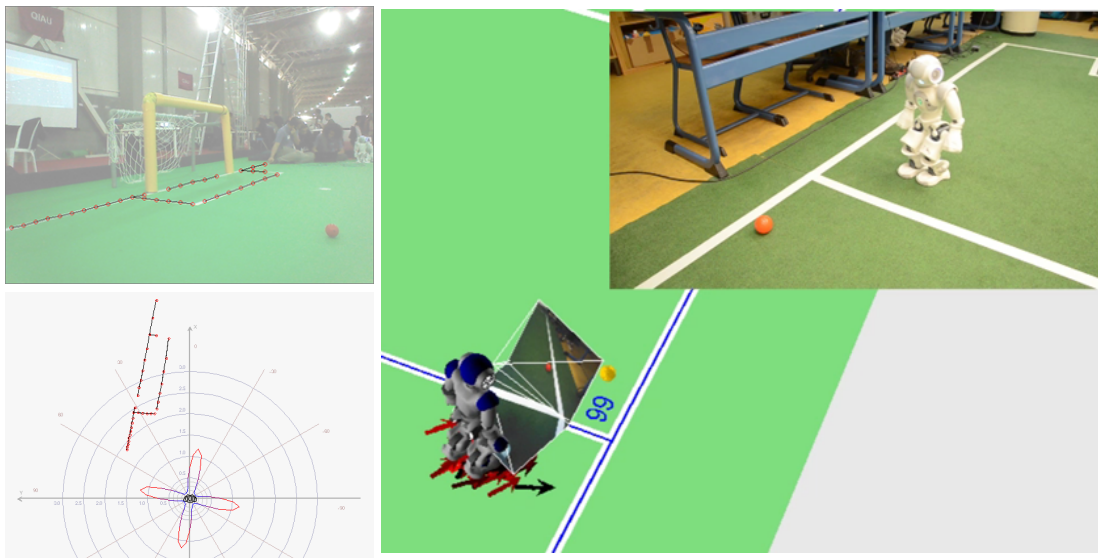


Fig. 1. (left) detected edges are used to estimate robots rotation on the field; (right) classifying the seen lines to decide whether the ball is inside the field;