



Open Challenge Proposal: A Histogram-based Approach to Solve Field Dis-ambiguity

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Motivation

In 2012, it was imposed the new rule to set both goals of the same color. This decision produced several problems in the particle filter localization systems because of the field symmetries. For that reason, we proposed a histogram-based approach to create background models for each goal, in order to identify each side. This idea was proposed by our team in [1] and a similar idea was proposed last year by the Austrian Kangaroos Team[2]. It's important to mention that this idea was designed to be used only in the area near the center circle, because in that sector were observed the most severe problems in localization.

Implementation and operation

Solving this problem required implementing a new module which calculates background models of the upper part of each goal in real time. We chose using the upper part of the goal rather than the sectors beside it, because we want to avoid confusions caused by other robots, white backgrounds, and advertising symmetries. The default models are set during the *ready stage*, but they're rechecked and improved during a game because the possible changes in the environment. As was said before, this module only works in an area near the center circle, so the updating steps are not enabled out of it.

Demostration

Our Open Challenge demonstration will show a simplified operation of our new module. We want to present the qualitative differences between the original localization system and the modified system that uses histograms. For our demonstration we'll use one NAO robot and a display to show the SimRobot's world state [3], as a way to understand the particle filter operation graphically. Firstly we'll show the operation of the original particle filter in a challenging situation (mirrored positions respecting to the center circle) to illustrate the main problems observed with symmetries. After that, we'll activate our module with histograms trained during the setup time to show the improvements in robot localization and the sectors selected to calculate the histograms.

References

- [1] P. Guerrero, J. Ruiz-del-Solar, J.M. Yañez, L. Leottau, W. Celedón, J. Mardones, P. Schütte, M. Mattamala, P. Flores, A. Vidal, P. Cano, *UChile - RoboCup 2012 Standard Platform League Team Description Paper*. RoboCup 2012, Mexico.
- [2] M. Bader, H. Brunner, T. Hamböck, A. Hofmann, M. Vincze, *Colour Histograms as Background Description: An approach to overcoming the Uniform-Goal Problem within the SPL for the RoboCup WC 2012*. RoboCup 2013, The Netherlands.
- [3] T. Röfer, T. Laue, J. Müller, M. Bartsch, M. J. Batram, A. Böckmann, N. Lehmann, F. Maaß, T. Münder, M. Steinbeck, A. Stolpmann, S. Taddiken, R. Wieschendorf, D. Zitzmann, *B-Human Team Report and Code Release 2012*. 2012.