



Open Challenge Description: Using field surroundings to assist localization

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With the new rules in the SPL for 2012, all teams have to cope with two yellow goals instead of the yellow and blue goals of the previous years. Therefore a robust method to resolve the symmetry of the field needs to be developed to avoid delocalization and the own goals resulting from it. As the Nao has no sensory equipment that would trivially help with the task (e.g. compass, yaw rate sensors, GPS), we developed a novel algorithm to solve this challenge.

Inspired by how humans solve the problem, we search for features outside the field which can give us clues about the orientation and position of the robot. With this method we can resolve situations like falling down inside the center circle of the field and even situations where there are multiple possible positions according to the field lines seen. It also simplifies kidnapped robot situations.

The algorithm establishes a model of color features around the edges of the playing field. The localization determines possible positions according to the field lines detected which are then weighted according to how the border that is currently seen matches the expected border for each candidate position. We use a cross-correlation which results in values from -1 (maximum deviation) to 1 (maximum correlation). The most unlikely positions are then removed and the remaining ones are fed back into the localization pipeline together with their weights.

In the end, a position that also fits best with previous positions and odometry data is determined and can be used by the robot's strategy module.

In our open challenge we will demonstrate the robustness of our algorithm by first letting the robot do a short scan of the field surroundings and consistently kidnapping him while he tries to walk to a specified position without switching the sides.