

Real time behavior of quadruped robots in RoboCup environment (Prof. ARAI)

RoboCup (Robot soccer world cup) is a standard problem for research of robotics and artificial intelligence in this real world. We have taken part in RoboCup four-legged robot league since 1999. Our purpose for the participation is to study image processing, decision making, and the other methods that enable a small quadruped robot, ERS-210, to behave wisely in the constraint of real time computation.

Trade-off for information and time is a typical problem in RoboCup. Robots should decide its behavior with partial and uncertain information, because they do not have enough time for complex image processing and to move its camera for observation. This lack of information prevents robots from behaving faithfully based on planned results.

We have solved this problem especially about a robot's position and orientation, which is the most essential information for navigation tasks. Though behavior of a robot is planned with Dynamic programming without consideration of the lack of information, our on-line method uses this result and our self-localization method that represents lack of information for choosing a feasible action under the lack of information. Fig. 1 shows behavior of a goalkeeper, which wants to return the goal, with our method. This robot stays in front of the goal until it obtains enough information of its position and orientation to enter the goal without collision.

We also attempt to plan robots' behavior in a simulator. Our simulator (see Fig. 2) reproduces truly camera images that are obtained by an ERS-210. Through these images, we can realize viewpoint of the robot, and utilize it to design behavior of the robot.

Keywords: Dynamic programming, Real-time decision making, Simulator

References

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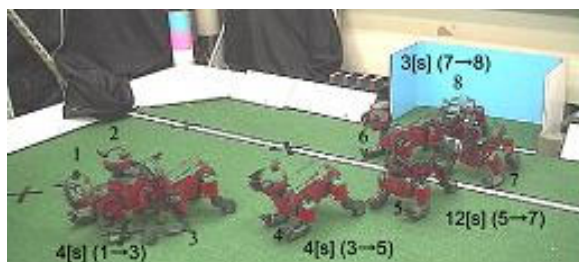


Fig. 1: Behavior of a goalkeeper robot

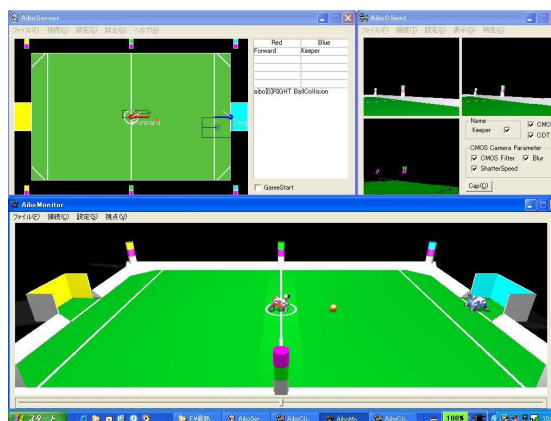


Fig. 2: Simulator