RAClearning – a Survey of Reinforcement Learning Techniques Applied to Robot Soccer

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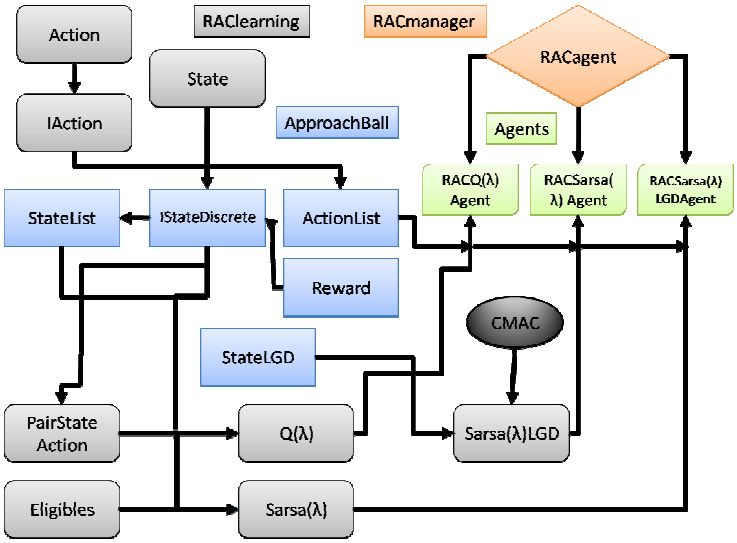
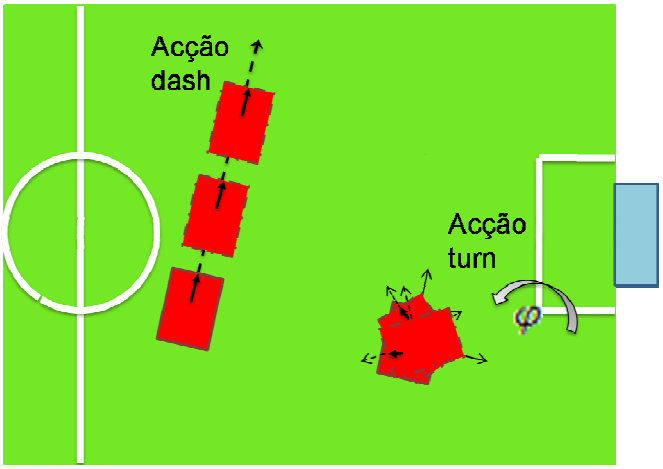
- Introduction to Reinforcement Learning (RL) and first step to a reinforcement learning controller for RAC robotic soccer team.
- Presentation of simplest RL techniques.
- Generic RL framework is proposed and implemented.
- Skill *ApproachBall* is provided in order to test various RL algorithms.

- Definition of State, Actions and Rewards depending on the problem.
- 3 different algorithms : Q(λ), Sarsa(λ) and Linear Gradient Descent Sarsa(λ).
- Possibility of choosing different discretization with CMAC – Cerebellar Model Articulator Controller.
- Implemented in RACmanager and tested in RACsim.
- RL agents depends on RACagent, the base for all agents in RACmanager.
- Each experiment uses only one single agent, learning ApproachBall skill without previous knowledge.

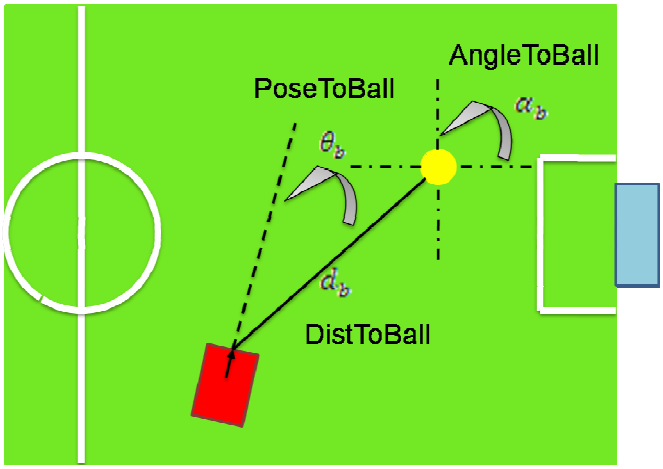
RAClearning controller



Actions defined for ApproachBall



States defined for ApproachBall



- The experiments showed that learning from zero knowledge was done successfully but slowly. Learning was proved with different features for a designed skill, which can be loaded anytime.
- Algorithms Q(λ) and Sarsa(λ) were compared, wherein Sarsa (λ) got better results.
- Sarsa(λ) studied with different parameters.
- Tested parameters demonstrate that this is a valid system for RACmanager and, therefore, to robotic soccer problem.

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