WrightEagle 2D

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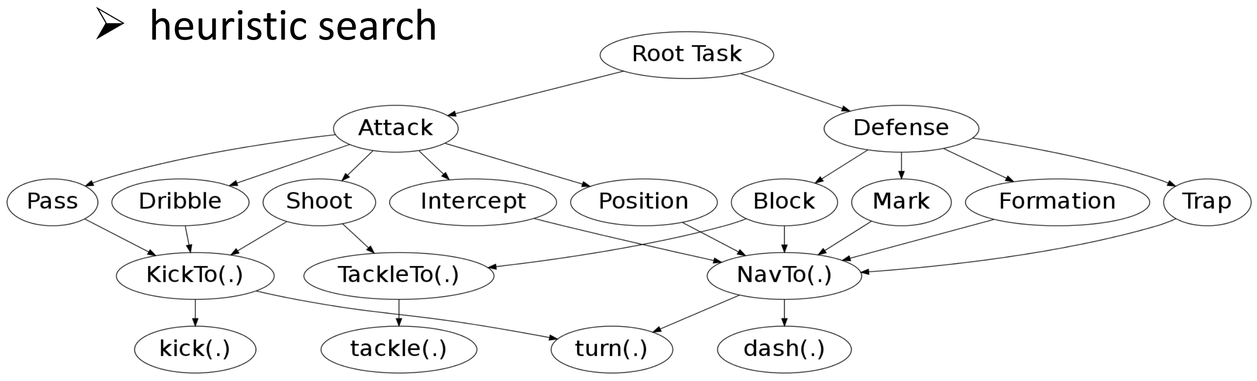
Introduction

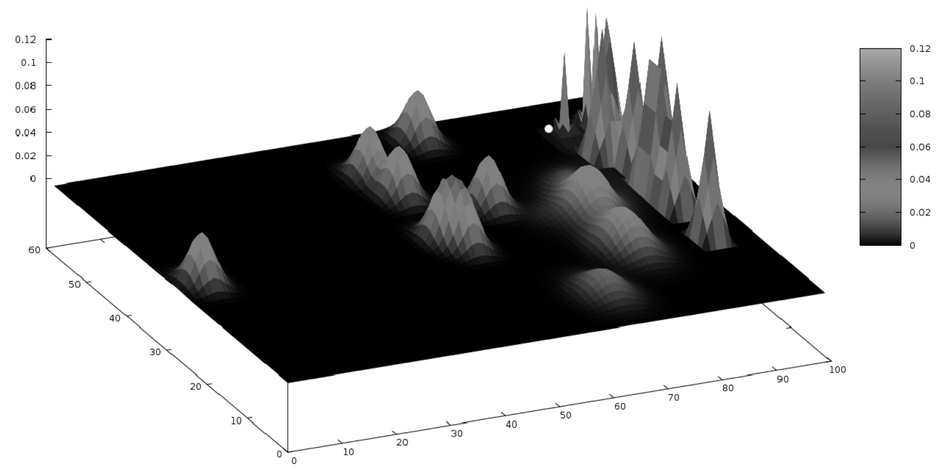
We are the WrightEagle 2D soccer simulation team, a branch of WrightEagle RoboCup team of USTC. We have participated in annual competitions of RoboCup since 1999 and have got 3 champions and 5 runners-up in the recent 8 years. We take RoboCup 2D soccer simulation as a typical problem of planning and learning in multi-agent systems. The key challenges of RoboCup 2D lie in the fact that it is a fully distributed, multi-agent stochastic domain with continuous state, action and observation space. Our research work mainly focus on addressing such challenges in a principled way.

Key Techniques

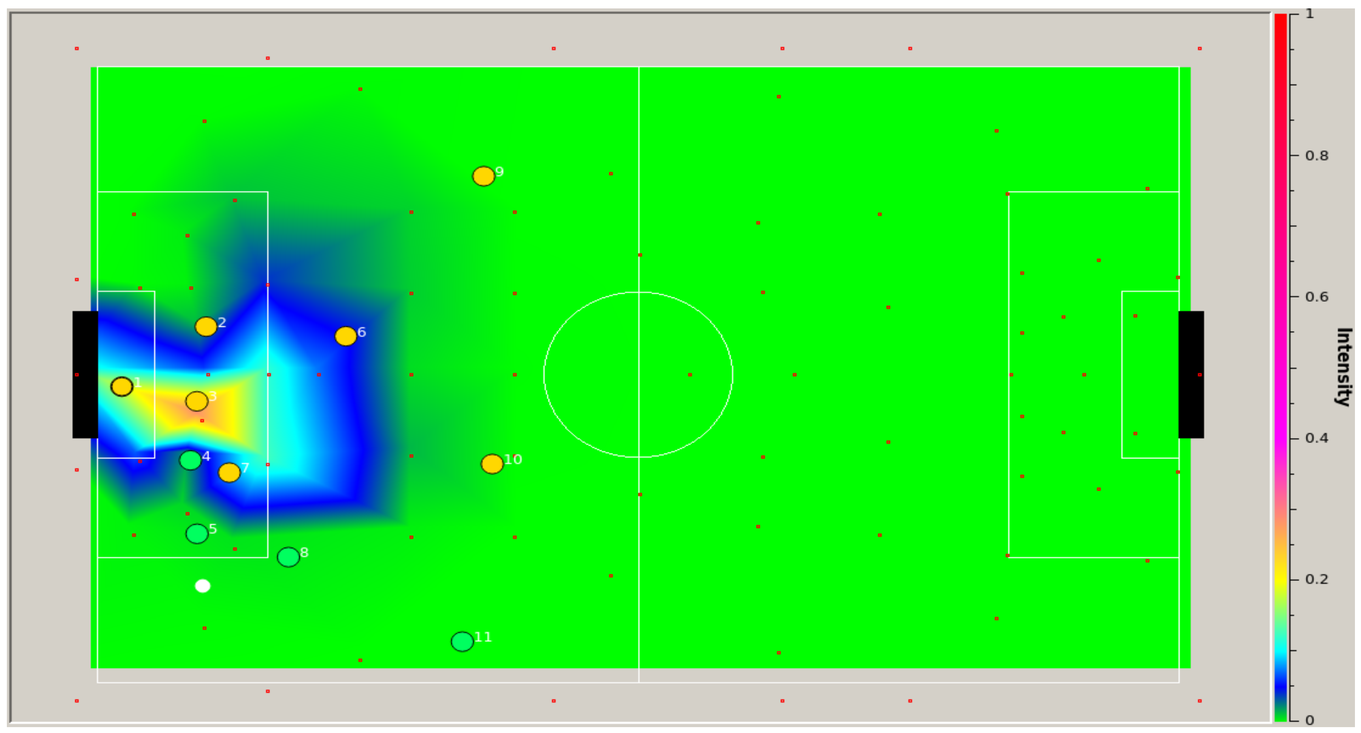
- **Fundamental Decision-Making Architecture**
  - domain knowledge based behavior hierarchy
  - MAXQ-OP based online planning method
    - RoboCup 2D modeled as an MDP
    - hierarchical decomposition
    - heuristic search



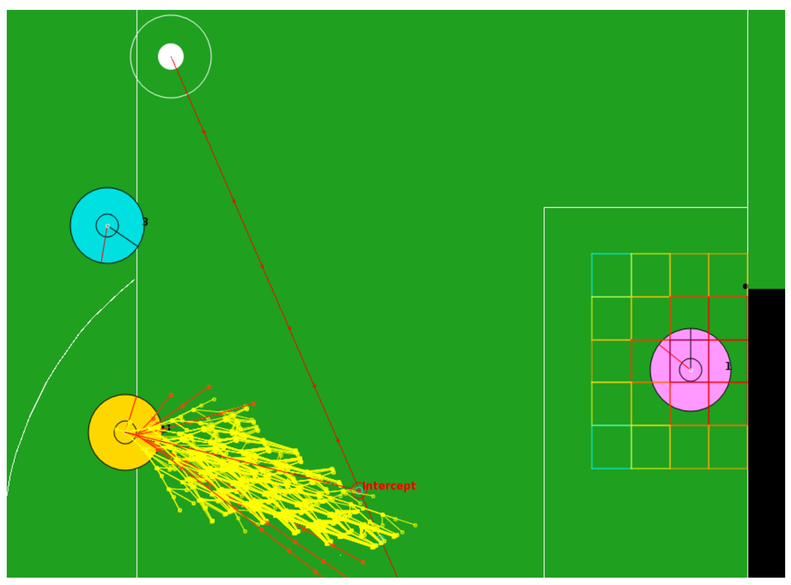
- **Belief State**
  - position distributions of all players and ball
  - updated by Monte Carlo methods



- **Zonal Defense System**
  - ensure the safety of a region rather than just defend an opponent
  - defensive zone: area where a player often appears during defending
  - represented as probability distributions over positions
  - obtained by statistical methods both online and offline



- **Intention-aware Motion Planning**
  - modeled as POMDPs
  - opponent model defined as intentions
  - probability distribution over intentions
  - updated using Bayes' theorem
  - sampling of intentions
  - heuristic search



Publications

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[3] Aijun Bai, Xiaoping Chen, Patrick MacAlpine, Daniel Urieli, Samuel Barrett, and Peter Stone. WrightEagle and UT Austin Villa: RoboCup 2011 Simulation League Champions. RoboCup-2011: Robot Soccer World Cup XV, Lecture Notes in Artificial Intelligence, Vol. 7416, Springer Verlag, Berlin, 2012.

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[5] Changjie Fan and Xiaoping Chen. Bounded Incremental Real-Time Dynamic Programming. IEEE Proceedings of Frontiers in the Convergence of Bioscience and Information Technologies, Jeju Island, Korea, 2007.