CS 394R
Reinforcement Learning: Theory and Practice

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Good Morning Colleagues

• Are there any questions?
Logistics

• First 3 assignments due next Friday by midnight

• Project proposals due next Thursday 9:30am
Outline

• Get a feel for how to approach a complex RL problem

• Keepaway Domain

• Group Activity!

• One approach and extensions
Keepaway: A Subtask of 2D Simulated Soccer

• Play in a **small area**
• **Keepers** try to keep the ball
• **Takers** try to get the ball

• **Episode:**
  • Players and ball reset randomly
  • Ball starts near a keeper
  • Ends when taker gets the ball or ball goes out

• Performance measure: **average possession duration**
Keepaway

• **Sensations**
  • Your position
  • Teammate and opponent positions
  • Ball position
  • Landmark positions

• **Raw Actions**
  • Move(x, y)
  • Kick(x, y, power)

• **Higher level** actions/skills
  • HoldBall, PassBall(k), GoToBall, GetOpen
Some questions to think about...

- **State/Action** space?
- **Reward** function?
- Function **approximation**?

- MDP formulation
  - Each agent learns separately?
  - Each agent shares a set of learned skills?

- What will be **learned**, and what will be **hand-coded**?
  - If it’s a mix, what will the final policy look like?

- Keep the learning problem **tractable**!
One approach...

• **Reinforcement Learning for RoboCup-Soccer Keepaway**

Extension: Transfer Learning