Good Afternoon, Colleagues

Are there any questions?
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• What's an MDP?

• How did Darwin United do?
Logistics

• Project partners?
Logistics

• Project partners?

• RoboCup qualification
Logistics

- Project partners?
- RoboCup qualification
- US Open
Logistics

- Project partners?
- RoboCup qualification
- US Open
- UWC folks coming today
Markov Decision Process

- \( S = \{\text{Blue, Red, Green, Black, \ldots}\} \)
- \( A = \{\text{Wave, Clap, Stand}\} \)
- \( T : S \times A \mapsto S \)
- \( R : S \times A \mapsto \mathbb{R} \)
Markov Decision Process

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$s_0, a_0, r_0, s_1, a_1, r_1, s_2, \ldots$
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\[
\begin{align*}
\text{s}_0, \text{a}_0, \text{r}_0, \text{s}_1, \text{a}_1, \text{r}_1, \text{s}_2, \ldots
\end{align*}
\]

- \( r_i = R(s_i, a_i) \)
- \( s_{i+1} = T(s_i, a_i) \)
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- History beyond the current state is irrelevant
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\end{array}
\]

- History beyond the current state is irrelevant
- Representable as a transition graph
Evolutionary Computation

- Motivated by biological evolution: GA, GP
Evolutionary Computation

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- Search through a space
Evolutionary Computation

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- Search through a space
  - Need a **representation, fitness function**
  - Probabilistically apply search operators to set of points in search space
Evolutionary Computation

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- Randomized, parallel hill-climbing through space
Evolutionary Computation

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- Learning is an optimization problem (fitness)
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- Learning is an optimization problem (fitness)

Some slides from *Machine Learning* (Mitchell, 1997)
Darwin United

- More ambitious follow-up to Luke, 97 (made 2nd round)
Darwin United

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- Lots of spinning, but figured out dribbling, offsides
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- Lots of spinning, but figured out dribbling, offsides
- 1-1-1 record. Tied a good team, but didn’t advance
Darwin United

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• Evolved on huge (at the time) hypercube

• Lots of spinning, but figured out dribbling, offsides

• 1-1-1 record. Tied a good team, but didn’t advance

• Success of the method, but not pursued