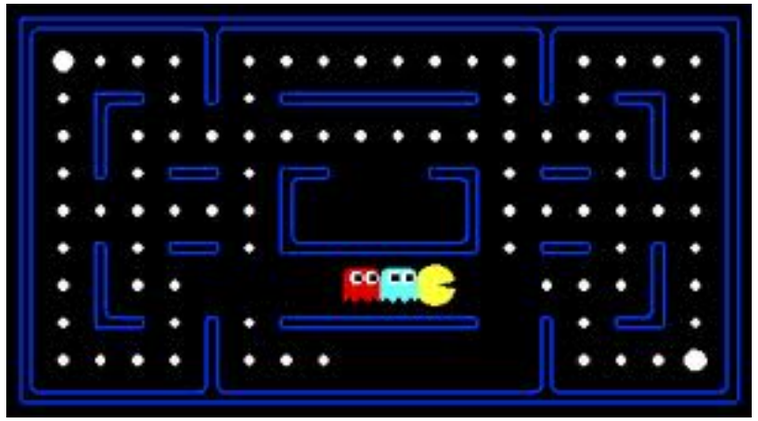
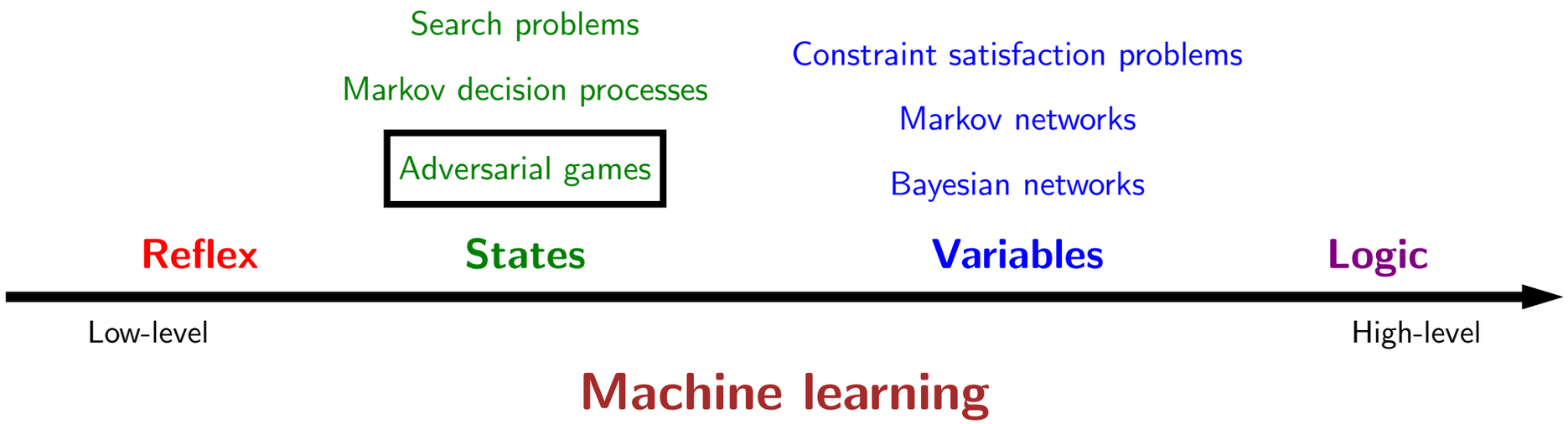
Games: overview



Course plan


Search problems
Markov decision processes
Adversarial games
Constraint satisfaction problems
Markov networks
Bayesian networks
Reflex
States
Variables
Logic
Low-level
High-level
Machine learning

- This lecture will be about games, which have been one of the main testbeds for developing AI programs since the early days of AI. Games are distinguished from the other tasks that we've considered so far in this class in that they make explicit the presence of other agents, whose utility is not generally aligned with ours. Thus, the optimal strategy (policy) for us will depend on the strategies of these agents. Moreover, their strategies are often unknown and adversarial. How do we reason about this?

A simple game

Example: game 1

You choose one of the three bins.

I choose a number from that bin.

Your goal is to maximize the chosen number.

A	B	C
-50 50	1 3	-5 15

- Which bin should you pick? Depends on your mental model of the other player (me).
- If you think I'm working with you (unlikely), then you should pick A in hopes of getting 50. If you think I'm against you (likely), then you should pick B as to guard against the worst case (get 1). If you think I'm just acting uniformly at random, then you should pick C so that on average things are reasonable (get 5 in expectation).

Roadmap

Modeling

Modeling Games

Algorithms

Game Evaluation

Expectimax

Minimax

Expectiminimax

Evaluation Functions

Alpha-Beta Pruning

Learning

Temporal Difference Learning

Other Topics

Simultaneous Games

Non-Zero-Sum Games