Expectimax

(Project2)

Nguyen Quoc Huy

23020082

CS 188

Method

Research Design

Objective: Gain an understanding of how the Expectimax algorithm operates.

Results

Expectimax definition

- Idea: Uncertain outcomes controlled by chance, not an adversary

- This randomness can be represented through a generalization of minimax known as expectimax.

- Chance nodes in game tree instead of minimizer nodes. They considers the average case.

- Chance nodes compute the expected utility or expected value.

Expectimax formulation

- $\forall$ agent-controlled states, $V(s) = \max V(s')$ $(s' \in \text{successors}(s))$

- $\forall$ chance states, $V(s) = \sum s' \in p(s'|s)V(s')$ (successors(s))

- $\forall$ terminal states, V(s) = known

Model Probabilities

We model how adversaries behave using a probabilistic model.

Assumptions Vs Reality

- Dangerous Optimism: Assuming chance when the world is adversarial

- Dangerous Pessimism: Assuming the worst case when it's not likely

Other game types

Mixed Layer Types

- Sometimes, we must add layers to our game trees as necessary.

- Hence, we can have groups of maximizer-chance-minimizer nodes if needed.

Multi-Agent Utilities

- Terminals have utility tuples.

- Node values are also utility tuples.

- Each player maximizes its component.

About Pacman project

I completed Project 2 and its implementation is pushed to Github.