

Project 2 report Pacman

Paavan Kumar Sirigiri, 109596437 Vivek Pradhan, 109596020 Varsha Paidi, 107677677

1 Statistics and Implementation

Q 1 :

We considered the following features for the evaluation function:

- 1) Nearest food to the Pacman position : This has been added to the score
- 2) Maximum distance to the ghost: This has been subtracted from the score
- 3) Scare times of ghosts: All ghosts' scare time have been added to the score

Q2:

MAX player is Pacman and MIN player is all the ghosts. The standard Minimax algorithm has been used to implement the Minimax agent. In the min player turn by the ghosts, possible actions of all ghosts at the same depth were considered before moving on to next level.

Depth	Search nodes expanded	Running time (in sec for 100 games)	Win rate(for 100 games)
1	33	3	50
2	211	11	42
3	1160	65	38
4	5916	160	66
5	24890	440	55

Q3: Minimax algorithm has been modified to include alpha and beta values and hence the search tree was pruned.

Depth	Search nodes expanded	Running time (in sec for 100 games)	Win rate (for 100 games)
1	19	2.5	50
2	179	7	42
3	886	31	38
4	4463	90	66
5	18625	265	55

2 Critical Analysis

The following observations and inferences can be made from the statistics.

1. We can observe from the statistics that Alpha beta pruning has drastically reduced the number of search nodes as compared to Minimax algorithm at various depths. The reduction varies almost exponentially with respect to depth.
2. We can see that the running time of Alpha beta pruning has always been less than that of Minimax algorithm at all depths.
3. We can see that the win rate of Alpha beta pruning is the same as that of Minimax algorithm at all depths.
4. We can see that the running time of is increasing exponentially from one depth to another depth.
5. We can see that the winr rate of Alpha beta pruning has always been same as that of Minimax algorithm at all depths.