PacMan Search

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1 Implemented Algorithms

Breadth first search, Depth first search, A* search, Iterative deepening search, Hill-Climbing algorithm, Simulated Annealing Algorithm and Evolution algorithm(without crossover).

2 Design Choices

The target that I decided for the pacman search is just **the score**. The reason why I choose this target is because **the score is more representative** than any other targets(such as powerpills). It will make pacman to eat pills and powerpills as more as possible, and it also will make pacman to eat the ghosts when the ghosts are available. Additionally, the other choice that I make is let the pacman not to be eaten by ghosts. The method is that if the future move will make pacman die(it can survive), I would not choose that move.

3 Results for my algorithm

The average score of the algorithms are as follow: *the ghost mode is StarterGhost, and the number of the trails for each algorithm is 20.*

BFS	DFS	A*	Iterative deepening	Hill-climbing	SAA	Evolution
6884	3386	4056	4142	1158	1257	2001

4 Explanation

Obviously, the algorithm with the best performance is **BFS**. The reason is that the bfs is comprehensive. It will search almost every single game states by simulating the moves, and in the real game it is so smart and aggressive. It would not lost its life easily if and only if there is no way out. In terms of DFS, although it is not bad, but its search strategy is not comprehensive. The iterative deepening search also does good because it is similar to BFS in this case. The A* algorithm is as good as iterative deepening search because it will always choose the move the highest score, but the reason why it is not as good as BFS is that it is not very comprehensive in that the pacman will choose the move that the current score is satisfying but it does not make a long run actually. **Some bad algorithms such as hill-climbing and SAA are really bad** because the pacman using this algorithm is so greedy, and usually greedy does not have a good result. Actually, **the worst algorithm I think is the evolution algorithm**, because the form of the evolution strategy is not suitable for the pacman search at all(the mutation and crossover will make pacman move badly).