Assignment2

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1 Reflex Agent

The evaluation function I implemented is mainly based on two factors,

1. **The distance between ghosts and Pacman**. The evaluation function give higher score, while Pacman is further away from ghosts. The Manhattan Distance between ghost and Pacman is greater than 5 is regarded as a safe distance, and returns 5 point bonus each ghost. while less than 2 is a dangerous, immediately return minimum score. When ghost is eatable, this value will times -1.

2. **The distance between Pacman and food**. If next position contains a food, add 10 points, otherwise, minus the distance between Pacman and its nearest food

Also this function will give one bonus if the action is not STOP.
Normally, this evaluation function acts very good in "testClassic". But as I don't take wall into consideration, this function does not act so well in "mediumClassic"

2 Minimax Agent

I first generate all the possible next actions that the agent can do, then use "evaluate_function" to get the score of current action, then find the highest score, and return the action related to that score
I use recurse to achieve the evaluate_actions, which needs 3 inputs, agent_index, depth, game_state. This single method can act as both min-value and max-value based on current agent index.
The problem of such agent is the speed of get action. In my Mac, for a "smallClassic" layout, it usually takes 3 or 4 seconds to do one action. Besides, as the evaluation function is not so good, often, Pacman will remains stay when ghost and food are a little far away from it.

3 Alpha-Beta Prune Agent