

2. In this question we will test the new ghostAgent with different pacman agents. In your assignment you were asked to complete a Minimax pacman a version of Expectimax for pacman was provided. If you have not completed the assignment just use the provided expectimax version.

We will perform some experiments to compare the performance of pacman against different types of ghost agent:

- a random (not smart) ghost vs a pacman that assumes optimal play from ghosts (ie minimax pacman).
- a smart (minimax) ghost vs a pacman that assumes optimal play from ghosts
- random ghosts vs pacman that assumes ghosts may not always do an optimal move
- smart (minimax) ghosts vs pacman that assumes that ghosts may do suboptimal moves.

This will result in a table similar to the following:

	Adversarial Ghost	Random Ghost
Minimax Pacman	Win Rate = 1/5 Average Score = -37.6	Win Rate = 3/5 Average Score = 559
Expectimax Pacman	Win Rate = 0/5 Average Score = -379	Win Rate = 1/5 Average Score = 143.6

3. Describe the performance (in terms of the distribution) of Pacman in each case.

In which cases is the Pacman agent implementing the correct assumption of the ghosts behaviour?

When Minimax pacman and Adversarial Ghost, Win rate is low because both pacman and ghosts are clever and average score is higher than Expectimax pacman which means pacman eat more food and pacman is not easy to be killed.

When Minimax pacman and Random Ghost, Win rate and average score is high and we can see that ghost will not chase the pacman.

When Expectimax pacman and Adversarial Ghost, win rate is zero and average score is lowest because only ghosts are clever and they perform cooperative and kill the game very fast.

When Expectimax pacman and random ghost, win rate is low and average score is low because they are all not clever.

4. Describe why the ghosts seem as if they are cooperating when using minimax even though they are not sharing information with each other.

When they are not sharing information, they are also have the same goal which is catch pacman. So their trend of movement is to be closer to pacman and seem like they are cooperative.