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1. The 4-directional Manhattan distance is not admissible for 8 directional movement because 8 directional movement consist diagonal movement, and diagonal movement always shorter than a straight-line movement. For example, in 2d grid world, I want to take the action (1, -1) from the original tile, Manhattan distance will return 2 as the distance, but diagonal movement will return 1.41, which is shorter than Manhattan distance.

2. The node in the closed list of A* never re-expanded, because once the node is visited, it will never be expanded again, and visited mean in close list, otherwise it will cause the issue for A* keep expand this visited node if this node has less g cost among others node in open list and it will never find the goal state.

3. In Zero-Sum Game, the minimax solution the as a Nash Equilibrium because for minimax, player maximizes his/her strategy to gain 1 reward whatever opponent will lose 1 reward, same as the opponent try to maximize his own. He will gain the player's lost, because for zero sum game, the gain and lose sum up to become zero. Also, when a player try to minimize the outcome to 0, the opponent doesn't have anything to win, opponent will response 0 to the player. Which it is the same concept as Nash Equilibrium.

4. Time-Limited needed to implement for Iterative Deeping Alpha-beta because IDAB will keep searches to its maximum depth of the game tree, and some like chess have big number of game states, it will take very long time to find the best move for action or it never find the best move for the action which cause the game cannot be play anymore.

5. Web advertisement
   State - AI learn user's browsing behavior and provide the different products or services base on user's browsing history
   Action - User clicks on the ads or skip the ads
   Reward- user clicks on the ads, increase sale on those products, if user skips, which mean they are not interesting on them.

   Robotic Control
   State- Robot learn to pick up many boxes as possible
   Action – Robot do different positions to pick up boxes
   Reward –1 point for success, else -1 point for every fail

6. The different between rewards and values in reinforcement Learning are Rewards are points you can earn by performing certain actions on a given state. Values can be estimate by given state, and can be increase or decrease after performing certain actions.

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7. The intuitive effect of setting the mutation rate too low in GA are the algorithm can be stuck at some local maxima for a long time, because the randomness of each generation is so low, it doesn't have any diversity.

   If the mutation rate too high, it provides too many randomness to the algorithm, It may miss the solutions because the diversity create too many random selection between generation.

8. To Ensure both parents weren't the same will help because if two are same, which mean the children It produce are the same, it will decrease the diversity of the population, since they are multiple same persons exist in the population., since two different persons will produce two different children to increase the randomness in the population, it can help to escape the local maxima

9. The reason for smoothing the activation function of a neuron in a neural network because threshold make functions non-differentiable, and it hard the compute. So, smoothing activation will help function easier to compute and it differentiable.

10. The convolution can extract certain area of image to produce another matrix repeatedly, so the neural network will know each pixel on the image, so it can classify each image correctly