Literature Review

Summary of game:

The Resistance is a social deduction game with 2 groups of players: resistance members and spies. The spies know the roles of all the players, while the resistance members know only their own role. The game consists of conducting up to 5 missions with a selection of players chosen by a leader, and players can choose whether to proceed with a proposed mission through voting. Resistance members win if 3 missions are completed successfully, and spies win if 3 missions are failed.

State objective of report:

This report investigates methods that can be used to design a game playing agent for The Resistance. While a game playing agent will lack the information from real player interactions and discussions, information from the voting and mission results is sufficient for agents to function.

Bayes Rule Notes:

Bayes Rule is used to determine probabilities of events with uncertain knowledge ([Bayes theorem in Artificial Intelligence - Javatpoint](https://www.javatpoint.com/bayes-theorem-in-artifical-intelligence))

Bayes Rule states that:

It gives a relationship between the probabilities of 2 related events and is useful in situations where the probabilities of 3 of the 4 variables is known. In The Resistance, this could be used after failed missions.

([sampleReport.pdf (uwa.edu.au)](https://teaching.csse.uwa.edu.au/units/CITS3001/project/sampleReport.pdf))

Set up a set of all possible spy combinations. E.g. for a game with 7 players, this is:

1,2,3 2,3,4 3,4,5 4,5,6 5,6,7

1,2,4 2,3,5 3,4,6 4,5,7

1,2,5 2,3,6 3,4,7 4,6,7

1,2,6 2,3,7 3,5,6

1,2,7 2,4,5 3,5,7

1,3,4 2,4,6 3,6,7

1,3,5 2,4,7

1,3,6 2,5,6

1,3,7 2,5,7

1,4,5 2,6,7

1,4,6

1,4,7

1,5,6

1,5,7

1,6,7

Let A and B be defined as:

* P(C) is the probability of the combination of spies to be correct
* P(F) is the probability of a mission failing
* P(F|C) is the probability of a mission failing if the combination of spies is correct
* P(F) is the sum of the product of P(C) and P(F|C) ([Bayes theorem in Artificial Intelligence - Javatpoint](https://www.javatpoint.com/bayes-theorem-in-artifical-intelligence))

Example:

Game with 7 players and you (1) are not a spy.

Then P(C) of any combination of spies is 1/20. (remove all spy combinations with 1)

Suppose players 2 and 3 go on a mission, and the mission fails:

Work out probability of mission failing for each combination:

* Combination where neither 2 or 3 are spies: P(F|C) = 0 [4 combinations]
* Combinations where either 2 or 3 is a spy: P(F|C) = 0.5 (50% chance the spy chooses not to fail the mission) [12 combinations]
* Combinations where both 2 and 3 are a spy: P(F|C) = 0.75 (only scenario where mission succeeds is if both spies choose to pass the mission) [4 combinations]
* \*Assuming spies choose to fail/pass at a rate of 50%

P(F) = 0.5\*12\*1/20 + 0.75\*4\*1/20 = 0.45

P(C|F) can then be calculated for each combination, and P(C) is changed to equal this.

Monte Carlo Notes:

Markov Model Notes: