**CITS3001 Project**

**2022**

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# Introduction

<Explain your understanding of the game in one paragraph.>

This project will simulate a typical Red vs Blue scenario. In this scenario the Red Team will be a dictatorial government and the Blue Team is a democratic government, each trying to persuade the citizens (Green Team) to not vote or vote in the upcoming countries election.

To win the scenario the Red Team must have more citizens (Green Team) with an opinion to not vote and uncertainties values less than 0, meaning they are certain they will not vote. The Blue Team wins if more citizens (Green Team) with an opinion to vote and uncertainties less than 0, meaning that they are certain they will vote.

This scenario will allow Red and Blue Teams to spread misinformation or information to sway opinions of the citizens.

**Please note that throughout the report, you are allowed to add screenshots, graphs, equations and code snippets.**

# Assumptions

State all your assumptions, including but not limited to:

1. Uncertainty values that are more positive and 1 being the ceiling, means that agents are more uncertain about their current opinion, meaning they will be more susceptible to changing their opinions.
2. Uncertainty values that a more negative and -1 being the floor, means that agents have an easier time persuading others and a harder time being persuaded.
3. Green Agents will have either vote or not vote opinions
4. <Any other assumptions>

# Selection and design of appropriate AI technology

## Methodology

1. Describe and justify your methodology for this project, including
   1. which parameters are hard coded,
   2. which parameters are to be input at the start of the game and
   3. what type of methods you used to make your agents intelligent.

## Game Play

1. Explain in detail how the game is played?
2. How turns are organised?
3. How opinions and uncertainties are updated?
4. Etc.

# Implementation of the Agents

1. State main points about the implementation of agents. This heading is more focused on the code and how you made it efficient.
2. How long the program takes to run a single turn with variable number of green agents. Report for both small and large number of green agents.
3. Which programming language you used? Whether you followed an Object Oriented approach or not.
4. Which libraries you have used?
5. Etc.

The libraries used:

1. Math
2. Random
3. Copy
4. Time
5. Logging
6. Datetime
7. networkx

Implementation of this project uses OOP and Python, using an OOP paradigm allowed us to implement a parent class that each agent would inherent. <EXPLAIN MORE>

## Running the game

How can a layman run your game? Provide the commands, and associated parameters needed with an example workflow of the game.

# Agent Design

This heading focuses on the architectural design of the agents in the game

e.g.,

## Green Agents

1. Are you using a static network or a dynamic network?
2. Can we generate a network when the game start?
3. What type of underlying network model you are using?
4. Other properties of the network, e.g., is it weighed, can links be added or removed during the play?
5. Etc.

The green agent network is dynamically generated for each game, an input by the user will determine how many green agents will be generated. During the game the green agents will be influenced by other agents/players (red, blue, green) depending on the effectiveness of the influence by other agents/players the agent can change its opinion and uncertainty values.

## Red and blue agents

1. Describe your design of the message potency (a.k.a. uncertainty of red and blue nodes. )
2. Describe your method for changing the followers' number in case of red agent
3. Describe your method for changing the energy level of blue nodes (a.k.a. lifeline)
4. Other Pertinent points regarding the working of your agent

## Move Options

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Option # | #0 | #1 | #2 | #3 | #4 | #5 |
| Uncertainty | 0.00 | 0.10 – 0.20 | 0.10 – 0.30 | 0.20– 0.40 | 0.30 – 0.50 | 0.40 – 0.50 |

The Red and Blue agents will be able to pick 6 options with increasing message potency and an option to simply pass the turn and to not interact with the green network will be available for both agents. The blue agent will have an extra lifeline option to deploy a grey agent into the green network which will cost zero energy. Although there are risks involved with this option since there exists a probability that the grey agent might be working for the opposite team. The grey agents will only exist for a single turn.

## Grey Agents

Describe the working of the grey agents.

# Validation of Agents

1. Report any tests you conducted to ensure the agents are doing the task they have been asked to do.

**Perform Various Simulations for the following set of questions.**

1. How does the game change if you have a tight uncertainty interval at the beginning of the game?
2. How does the game change if you have a broad uncertainty interval at the beginning of the game?
3. Plot distribution of uncertainties for each of the above questions.
4. In order for the Red agent to win (i.e., a higher number of green agents with the opinion “not vote”, and an uncertainty less than 0 (which means they are pretty certain about their choice)), what is the best strategy?
   1. Discuss and show with simulation results how many rounds the red agent needs in order to win.
5. In order for the Blue agent to win (i.e., a higher number of green agents with an opinion “vote”, and an uncertainty less than 0 (which means they are pretty certain about their choice)), what is the best strategy? [
   1. Discuss and show with simulation results how many rounds the blue agent needs in order to win.
   2. What impact did grey agents have on the simulation? Explain how did you test the impact of grey agents?

**Please note that for answering questions use your own mental model of how you implemented uncertainties if they are different from the specs**

# Performance of Agent when playing with a human

Does the agent run and performs at an excellent level with challenging play when the opponent is a human? Discuss your findings

# Visualisation

Describe your visualisation methods with some screenshots