Workshop 4: Project Workshop – The Resistance

CITS3001 Algorithms, Agents and Artificial Intelligence
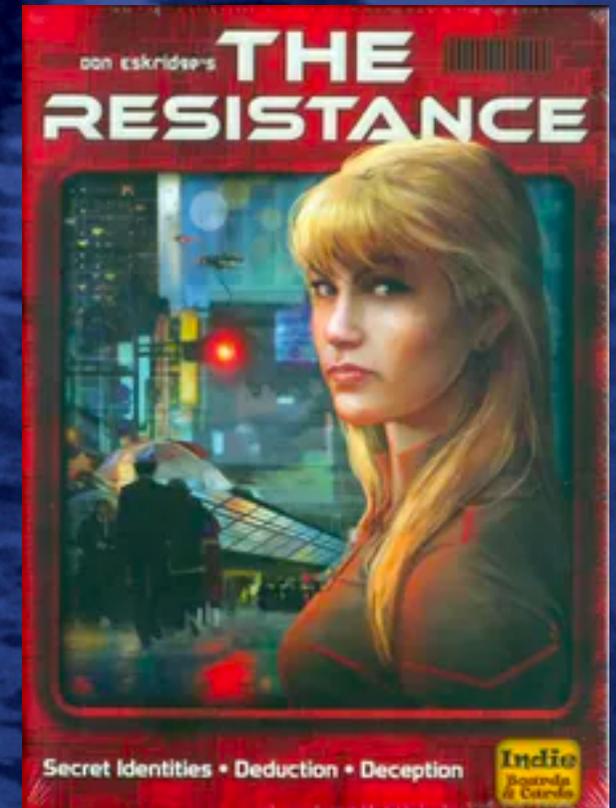
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2021 Semester 2

The Resistance

- The project will require you to research, implement and validate artificial intelligence for the card game, The Resistance.
- The Resistance is a bluffing game for 5 to 10 people..
- Players are secretly assign into teams as spies (for the government) or members of the resistance. Spies know who the other spies are, but the resistance members have no information about the teams.
- The game consists of 5 rounds. Each round a leader proposes a team to go on a mission. If a majority of players accept the mission it proceeds (otherwise a new leader is appointed).
- If a spy is on the mission the spy can chose to make the mission fail. Players are not told who made the mission fail, but they are told how many missions failed.
- If a majority of missions succeed, the Resistance wins, otherwise the Spies win.
- The game has many challenges for AI: there is uncertainty, as the resistance do not know the roles of the players, and you do not know what strategies other players are using; each player on their has relatively little impact on the outcome of the game, so there is only a weak reinforcement signal; and to succeed at the game it is vital that you learn as much from every piece of information.

Submission

You will be required to submit a research report, and source code for one or two agents (pairs must submit two agents, individuals may submit two agents). The marking scheme is:

Project report (1500-2000 words): 50%
Literature review of suitable techniques: 20%
Description and rationale of design: 20%
Validation of agent's performance: 10%

Java/Python Implementation: 50%
Correctness and code quality: 20%
Program Design: 20%
Agent Effectiveness: 10%
Tournament performance: +10%
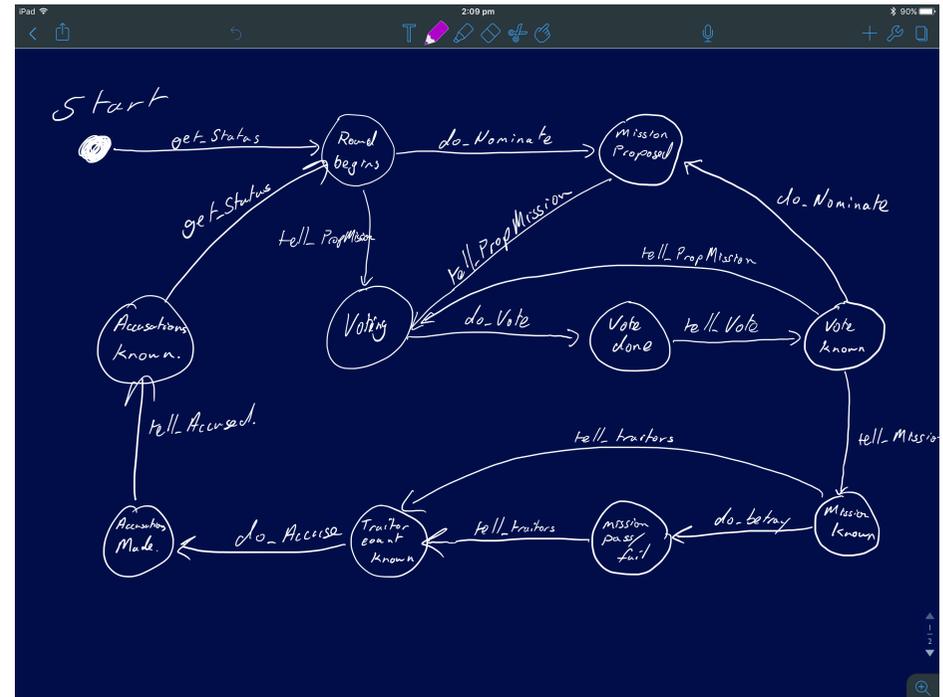
An assessment criterion is available on the project website:
`http://teaching.csse.uwa.edu.au/units/CITS3001`
A tournament server will be set up after the mid-semester break, along with some scaffolding files to allow your agent to compete on the server.
Your research report can cover any AI or machine learning technique you like, and doesn't not necessarily need to be related to the agent you play in the tournament.

Getting Started

It is recommended that you do this project in pairs. That gives you someone to discuss the project with, try ideas, and adds a competitive element to agent development.

Start by designing simple reflex agents with some heuristics to guide play, and then use these to find better ways to exploit the game.

Some ideas to research are:

- Bayesian Reasoning is very helpful to deal with uncertainty, and Bayesian Networks could be applied to model opponents strategies and guess their next move.

- Evolutionary algorithms: If your heuristics have probabilities, or parameters you can design an evolutionary algorithm to find the most competitive set of parameters.

- Genetic Programming: You can even evolve a program that creates a decision tree describing a strategy.

- Artificial Neural Networks and Reinforcement Learning can be applied.

- Minimax can be important to understand the consequences of actions once you learnt about the other players.

Friday 3rd September! (THIS FRIDAY)
EZONE Central Rooms 1.05 & 1.06
(4pm - 6pm)

- **Free Pizza!**
- **Meet project partners!**
- **Learn the game!**
- **Develop strategies!**

shorturl.at/estvL