

CSE260 Honors Project Proposal

Chosen area of study

Game theory is used to analyze decision-making among rational agents. It is used to find strategies to maximize gains or minimize losses. A popular example is the Prisoner's Dilemma. In its modern form, it has been used to explain evolutionary outcomes, cooperation and mixed-strategy games. Being a theory assuming rational agents, cultural aspects, psychological or emotional effects, etc. are not taken into consideration.

Goals

The project will investigate a children's game called "007", "Guns", etc. It is a simple game, involving only three actions. However, the way these interactions interact grants it a complexity beyond simple probability like in rock-paper-scissors.

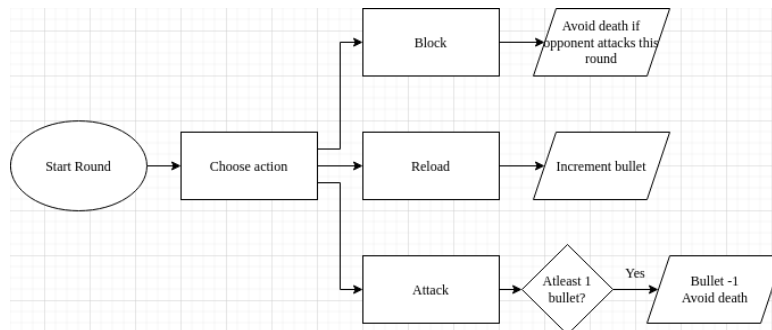


Figure 1: A simple summary of the game 007

The project will investigate various possible strategies by hand. The strategies will then be verified using a genetic algorithm program. The program will be used to further investigate the strategies obtained under various constraints. An interesting case will be the study of the "bluff-factor" which might be introduced.

The project will attempt to answer the following questions:

- Can cooperation evolve in a non-cooperative game?
- How do strategies evolve throughout a continuous simultaneous game?
- Can rudimentary bluffing be modeled in code?
- What is the nature of the Nash equilibrium in a continuous simultaneous game?

Why this topic?

The motivation for studying game theory is its prevalence and the utility of it. My recently acquired knowledge of genetic algorithms can also be used to perfectly complement the study of competition, and therefore, even game theory. Personally, I enjoy finding strong strategies in simple games. The study of game theory will help me formalize and optimize this pastime of mine.

Preliminary references

The initial exposure to the topic was due to pop-culture, including the movie, "A Beautiful Mind". Further semi-formal reading on the topic was from the following:

<https://brilliant.org/wiki/nash-equilibrium/>

<https://www.youtube.com/watch?v=emyi4z-O0ls>