Evaluating Competitive Influence Maximisation Strategies Using an Online Game

Contributors:[1]

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Technical Areas:

- Coalition Distributed Analytics and Situational Understanding (TA-2): *Resource Allocation for Dynamically Formed Distributed Analytics Services (Task 4.1)*

Abstract:

We demonstrate an online game that will help us understand how we can best maximise our influence across a large social network and in the presence of adversaries, for example to gather intelligence data or recruit soft sensors in a conflict zone.

Influence maximisation (also referred to as opinion control) is the study of strategically influencing agents on social networks with the aim to align their opinions, behaviours, or choices with certain targets, and has been extensively studied in competitive and non-competitive scenarios, mostly via variants of models based on the seminal independent cascade model [1]. However, these models may not be appropriate in situations in which agents are subject to various sources of social influence, and decisions can be changed over time. The voter model, by allowing agents to repeatedly change their opinion, provides a more accurate description of the underlying opinion dynamics mechanism, as gathering data from soft sensors is often a recurring task. For this reason, and given the criticality of coalition operations, opposing parties can try to strategically influence key individuals to prevent them from contributing information to the alliance.

Although recent work has started to address the problem of opinion control in the voter model [2], these studies focussed on static control and have rarely addressed competition among multiple parties. To gain a better understanding of competition for influence, we built an opinion control game[2] in which human subjects play either against other human subjects or against intelligent agents. The goals of this experiment are twofold: first, we aim at understanding people's decision-making process in a dynamic opinion control scenario, i.e., how humans would carry out influence operations. Second, we intend to build intelligent agents that analyse the behaviour of both human players and other intelligent agents, and learn strategies that reliably outperform them.

To play the game, participants will have to select which nodes to target in a social network, with the goal of influencing more nodes than their opponents. Participants playing this demo

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[2] The UI is largely based on the open source tutorial on propagation in networks available at https://ncase.me/crowds/

will be allowed to play either against each other in real time, or against intelligent agents that will learn the best response to their moves.

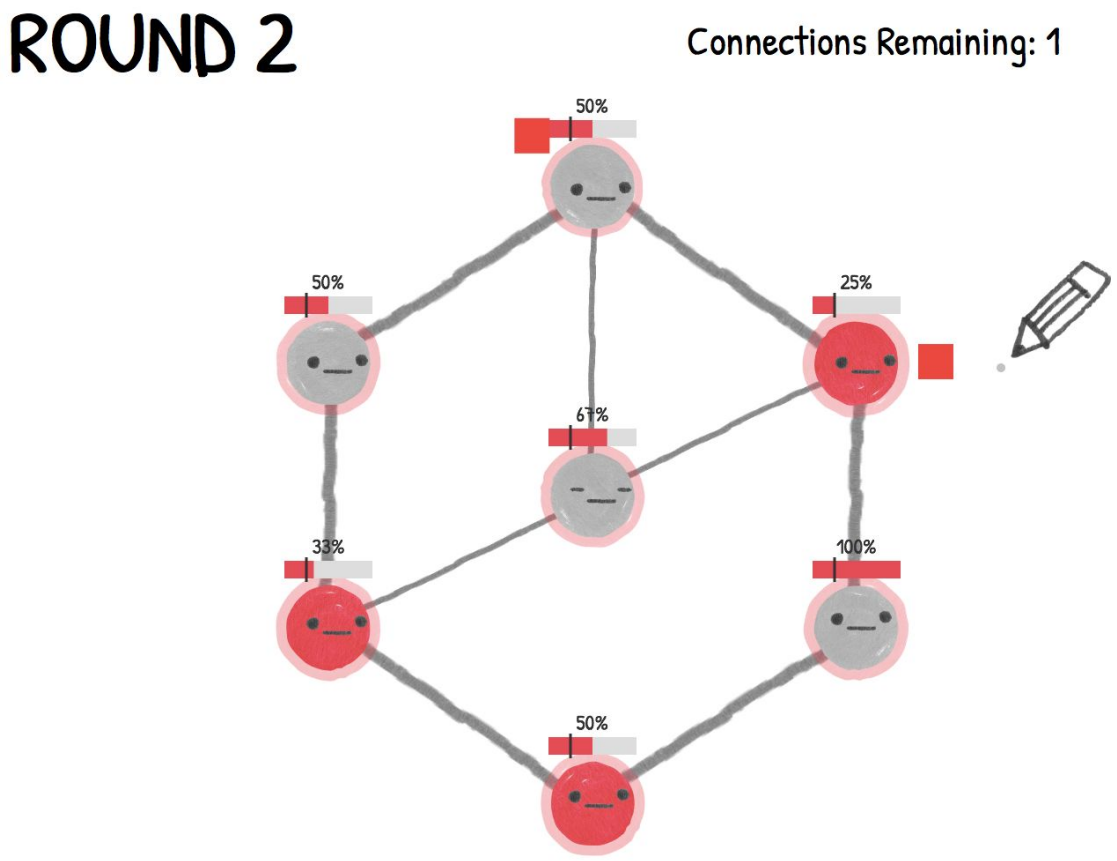

Figure 1: Screenshot of the game. The nodes can either be aligned with the player (red) or with the intelligent agent (grey). The percentage shown above the nodes represents their probability to become aligned with the player in the next round and can help the player making decisions.

[1] D. Kempe et al., "Maximizing the spread of influence through a social network.", Proceedings of the 9th International Conference on Knowledge discovery and Data Mining (KDD), Washington, DC, USA (2003).
[2] N. Masuda, "Opinion control in complex networks", New Journal of Physics 17, 033031 (2015).

Equipment needed:
Table space (100x50cm or larger)
2 external monitors (preferably 32" or larger)
Wireless connectivity
1 easel for summary poster
2 HDMI cables