Seeing ISIS: Visualizing Groups in the Coalition Context

Project 4 - Task 4.1

Contributors

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Scope

Today groups form complex digital and physical societies spanning the earth, coexisting with other societal groups of many nations. When deciding the best course of action to resolve conflicts, decision makers need to understand the individual, community and societal factors that drive group behaviour. Well intentioned decisions can have inadvertent and counter-intuitive consequences.

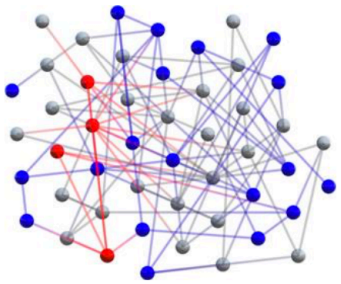

Figure 1: A force directed graph

Description

This is a demonstration of three techniques to represent groups in the context of military coalitions. The underlying aim of this work is to examine the fundamental science required to support analysts and decision makers to understand the key concepts of group models so they can use these models in their analysis and decisions. These representations are grounded in social science, network theory and information visualisation theory.

Figure 2: Membership landscape

The first visual representation is of **Ideology Propagation**. This is a representation used in research for *adversarial influence maximisation in partially observable networks* [2]. A force-directed graph algorithm has been used to create Figure 1. This algorithm assigns three forces: 1) A spring-like attractive force based on Hooke's law is used to attract each pair of vertices towards each other. 2) A repulsive force like a compacted spring is used to calculate a fixed gap to separate all vertices from each other 3) A force analogous to gravity is used to pull vertices towards a fixed point in the drawing space.

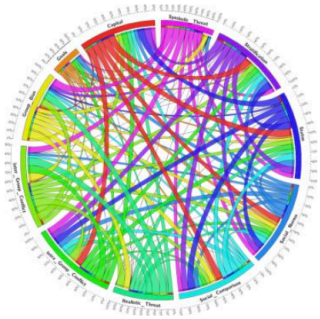

Figure 3: Concept influence

The second visual representation is **Membership Landscape**. This representation (see Figure 2) conveys how a population has aligned itself with the various groups in its society where each individual can be a member of 0 to N groups. Complexity increases as the number of groups increases. While this representation has been created for and applied to the coalition environment, the fundamental research is inherently a classification diagram that shows all possible logical relations between a finite collection of different sets. For this demonstration the results of a generative model for group mutability [3] are represented.

The third visual representation is of a **Conceptual Framework**. The conceptual framework is currently in research to support government and other analysts who aren't experts in group behaviour but who would otherwise benefit from a better understanding of key sociological concepts [1]. Figure 3 represents illustrative data while the framework is being developed using a Chord diagram. It aims to convey the main influences between sociological concepts quickly to a human analyst who can then use the framework to inform their analysis.

Acknowledgement

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[1] Williams GR, Somerville J, Johnson P, Bellamy R, A Conceptual Framework of Group Evolution: Considerations for Decision Makers and Analysts, IEEE Smart World Congress, 2017.

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