Modeling Social Influence in Large Populations

Steve Lieberman
stlieber@nps.edu

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Session 1
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# Modeling Social Influence in Large Populations

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Theory and Introduction

Theory: human collectivities are composed of individuals with different meaningful identities, and these identities form the basis for meaningful interaction, realized within a model “ecology” of identities.

- Intersections of identities give rise to meaningful interactions:

Intersecting dimensions of identity-driven trust and confidence for two individuals (obtained via self-report).

Image source: http://xkcd.com/171/
Large Population Structure

Society level structure is calculated by mapping all pair-wise relations on to the distributions of social factors present in the collectivity, accounting for the impact of variance between dimensions.

• Social structure is represented as a social network of probabilistic meaningful interactions:
Population Network Model

Society level structure is calculated by mapping all pair-wise relations on to the distributions of social factors present in the collectivity, accounting for the impact of variance between dimensions.

- Social structure is represented as a social network of probabilistic meaningful interactions:
Communication Networks

Communication networks are simulation output that represents the actual communications and influence in a multi-agent system.

<table>
<thead>
<tr>
<th>Population Networks</th>
<th>Communication Networks</th>
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<tbody>
<tr>
<td>Simulation Input</td>
<td>Simulation Output</td>
</tr>
<tr>
<td>Instantaneous representation of the distributions of social factors in a populations</td>
<td>Intrinsically represent a window of time (e.g., before, after, or during a simulation event)</td>
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<tr>
<td>Constructed via a theory to model translation of a system based on empirical observations</td>
<td>Ground truth representation of meaningful communications, and inter-agent influences.</td>
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<table>
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Cultural Geography MAS Output
Directed (pair-wise) influence, as well as each agent’s global influence contribution to the MAS can be visualized and analyzed.

Inter-agent influence network for small time window following an exogenous simulation event, nodes sized by eigenvector centrality.

- Communication networks are \textit{directed} (i.e., have a sending agent and a receiving agent).
- Can be \textit{weighted} to represent communication frequency, reciprocity, and combinations of other model parameters.
- Directed and weighted networks allow for much deeper modeling and analysis of influence in large populations.
- Analyzing population networks and communication networks \textit{together}, can address a wide range of important questions related to the dynamics of influence flow and the spread of information (e.g., for information/psyop campaigns).
HSCB Modeling at MOVES

See the full presentation at
Session 4: HSCB Modeling: 0815-0945,
Wednesday, July 14 (Tomorrow Morning!)
Mechanical Engineering Auditorium

See the HSCB demo at
MOVES Demo Night: 1630-1830,
Wednesday, July 14 (Tomorrow Night!)
Watkins Halls, Room WA-275/285
Questions, Comments?

References/Further Reading
B. Edmonds, “How are physical and social spaces related?,” *Agent-Based Computational Modelling Springer.(Downloaded on 10 March 08 from cfpm.org/cpmrep127.html)*, 2006.
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