

NetBreaker analytical tools identify terrorist groups, members, capabilities

Argonne National Laboratory's NetBreaker provides analytical tools to help identify terrorist groups, their membership and their capabilities, even in the face of uncertain or missing information.

After a terrorist group attacks, both the attack's precursors and the group's makeup are often readily discernable. In some cases, the data necessary to make these inferences and thereby prevent the attacks was available before the attack occurred; however, as in the case of the 9/11 attacks, the data's collective significance may have been under-appreciated. In other cases, little may have been known beforehand about the terrorist group, leaving it to analysts to predict both the makeup of the group and the threats it poses.

The NetBreaker conceptual prototype addresses these exploratory and extrapolatory needs. NetBreaker reduces terrorist groups to their basic form: social networks of heterogeneous agents. This approach allows the application of agent-based modeling along with social network formation rules to find and model feasible terrorist networks. NetBreaker infers the "space" of feasible networks from a list of known participants, along with possible unknown players, existing evidence of interactions among the participants and hypothesized interactions. The network under investigation falls within this space. The space is then used to generate actionable questions. As the questions are answered, the space shrinks, narrowing in on the actual real-world network. In addition to identifying networks implied by the known data, NetBreaker also captures hidden networks that could be implied by unknown data.

The science behind NetBreaker is that of dynamic social networks, which extends traditional social network analysis. In dynamic social networks, the networks are fluid – nodes and links are created and dissolved, and relationships change over time. Dynamic social network technology is based on agent-based modeling and simulation. The term "agent" is a general

one that refers to anything that has autonomous behaviors. Agents in the network interact, adapt and possibly change their rules of behavior according to their experiences. Patterns emerge that are not directly predictable from knowledge of individual agent behaviors alone.

NetBreaker's functions are broken into two aspects:

- Simulation provides a basis for determining what a group could do; this includes building and distributing weapons, as well as disseminating ideas or opinions.
- Space generation looks at the network's possible shapes, who interacts with whom, and what these interactions mean for the overall probability and threat of the network.



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