The Science of Social Cyber-Security

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ABSTRACT

Social Cyber-Security is an emerging scientific and engineering area. It is an applied field focused on the science to characterize, understand, and forecast cyber-mediated changes in human behavior and activity, and the related social, cultural, economic and political outcomes. From the engineering side it is concerned with building the cyber-infrastructure needed for society to persist in its essential character in a cyber-mediated information environment under changing conditions, in the presence of actual or imminent social cyber-threats. Research in social cyber-security has demonstrated that social media and personalized data assistants are critical technologies that affect the ways humans navigate this cyber-mediated information space, and the way they interact and engage in discussions. This impact is complex and is related to the human socio-cognitive response, engineered features of the technologies, and the policy/legal environment in which humans and technology interact. The changing nature of interaction in the cyber-mediated information environment are creating new scientific and policy challenges that those in social cyber-security must address. This talk will describe the nature, promise of, and challenges in social cyber-security. The role of network science and AI, as to of the core methodologies, in addressing these challenges is addressed. Illustrative examples will be drawn from areas such as disaster response, state stability, and the distribution of false information.

Author Keywords

cyber security; cyber-threats; disinformation; disaster response; state stability; social media

BIOGRAPHY

Dr. Carley is a Professor of Computer Science in the Institute for Software Research, IEEE Fellow, and Director of the Center for Computational Analysis of Social and Organizational Systems at Carnegie Mellon University. She joined Carnegie Mellon in 1984 as Assistant Professor Sociology and Information Systems. In 1990 she became Associate Professor of Sociology and Organizations, in 1998 Professor of Sociology, Organizations, and Information Technology, and in 2002, attained her current role as Professor of Computation, Organization, and Society. She is also the CEO of Carley Technologies Inc. aka Netanomics.

Dr. Carley's research combines cognitive science, sociology, and computer science to address complex social and organizational issues. Her most notable research contribution was the establishment of Dynamic Network Analysis (DNA) – and the associated theory and methodology for examining large high-dimensional time variant networks. Her research on DNA has resulted in tools for analyzing large-scale dynamic networks and various multi-agent simulation systems. She has led the development of tools for extracting sentiment, social and semantic networks from social media and other textual data (AutoMap & NetMapper), simulating epidemiological models (BioWar), and simulating changes in beliefs and practice given information campaigns (Construct). Her ORA system is one of the premier network analysis and visualization technologies supporting geo-temporal analysis of social network and high-dimensional/meta-network data.

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