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Homeland Security Data Mining using Social Network Analysis

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Abstract

The tragic events of September 11th have caused drastic effects on many aspects of society. Academics in the fields of computational and information science have been called upon to help enhance the government's ability to fight terrorism and other crimes. Keeping in mind the special characteristics of crimes and security-related data, data mining techniques can contribute in six areas of research: information sharing and collaboration, security association mining, classification and clustering, intelligence text mining, spatial and temporal crime pattern mining, and criminal/terrorist network analysis. Grounded on social network analysis (SNA) research, criminal network analysis and terrorist network analysis have been shown to be most promising for public safety and homeland security. Based on the University of Arizona's highly successful COPLINK and Dark Web projects, we will discuss relevant SNA for "dark networks" (criminal and terrorist networks). Selected techniques, examples, and case studies will be presented based on gang/narcotic networks, US extremist networks, Al Qaeda member networks, and international Jihadist web site and forum networks. Unique homeland security challenges and future directions will also be presented.

Biography: Dr. Hsinchun Chen is McClelland Professor of Management Information Systems at the University of Arizona and Andersen Consulting Professor of the Year (1999). He received the B.S. degree from the National Chiao-Tung University in Taiwan, the MBA degree from SUNY Buffalo, and the Ph.D. degree in Information Systems from the New York University. Dr. Chen is a Fellow of IEEE and AAAS. He received the IEEE Computer Society 2006 Technical Achievement Award.

He is author/editor of 13 books, 17 book chapters, and more than 130 SCI journal articles covering digital library, intelligence analysis, biomedical informatics, data/text/web mining, knowledge management, and Web computing. His recent books include: Medical Informatics: Knowledge Management and Data Mining in Biomedicine and Intelligence and Security Informatics for International Security: Information Sharing and Data Mining, both published by Springer. Dr. Chen was ranked #8 in publication productivity in Information Systems (CAIS 2005) and #1 in Digital Library research (IP&M 2005) in two recent bibliometric studies. He serves on ten editorial boards including: ACM Transactions on Information Systems, ACM Journal on Educational Resources in Computing, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Systems, Man, and Cybernetics, Journal of the American Society for Information Science and Technology, Decision Support Systems, and International Journal on Digital Library. Dr. Chen has served as a Scientific Counselor/Advisor of the National Library of Medicine (USA), Academia Sinica (Taiwan), and National Library of China (China).

H e has been an advisor for major NSF, DOJ, NLM, DOD, DHS, and other international research programs in digital library, digital government, medical informatics, and national security research. Dr. Chen is founding director of Artificial Intelligence Lab and Hoffman E-Commerce Lab. The UA Artificial Intelligence Lab,

which houses 40+ researchers, has received more than $20M in research funding from NSF, NIH, NLM, DOD, DOJ, CIA, DHS, and other agencies over the past 17 years. The Hoffman E-Commerce Lab, which has been funded mostly by major IT industry partners, features one of the most advanced e-commerce hardware and software environments in the College of Management.

Dr. Chen is conference co-chair of ACM/IEEE Joint Conference on Digital Libraries (JCDL) 2004 and has served as the conference/program co-chair for the past eight International Conferences of Asian Digital Libraries (ICADL), the premiere digital library meeting in Asia that he helped develop. Dr. Chen is also (founding) conference co-chair of the IEEE International Conferences on Intelligence and Security Informatics (ISI) 2003-2007. The ISI conference, which has been sponsored by NSF, CIA, DHS, and NIJ, has become the premiere meeting for international and homeland security IT research.

Dr. Chen's COPLINK system, which has been quoted as a national model for public safety information sharing and analysis, has been adopted in more than 200 law enforcement and intelligence agencies in 20 states. The COPLINK research had been featured in the New York Times, Newsweek, Los Angeles Times, Washington Post, Boston Globe, and ABC News, among others. The COPLINK project was selected as a finalist by the prestigious International Association of Chiefs of Police (IACP)/Motorola 2003 Weaver Seavey Award for Quality in Law Enforcement in 2003.

COPLINK research has recently been expanded to border protection (BorderSafe), disease and bioagent surveillance (BioPortal), and terrorism informatics research (Dark Web), funded by NSF, CIA, and DHS. In collaboration with Customs and Border Protection (CBP), the BorderSafe project develops criminal network analysis and vehicle association mining research for border-crosser risk assessment. The BioPortal system supports interactive geospatial analysis and visualization, chief complaint classification, and phylogenetic analysis for public health and biodefense.

In collaboration with selected international terrorism research centers and intelligence agencies, the Dark Web project has generated one of the largest databases in the world about extremist/terrorist-generated Internet contents (web sites, forums, and multimedia documents). Dark Web research supports link analysis, content analysis, web metrics analysis, multimedia analysis, sentiment analysis, and authorship analysis of international terrorism contents. The project was featured in the Discover magazine, Arizona Republic, and Toronto Star, among others.

Dr. Chen is the founder of the Knowledge Computing Corporation, a university spin-off company and a market leader in law enforcement and intelligence information sharing and data mining. Dr. Chen has also received numerous awards in information technology and knowledge management education and research including: AT&T Foundation Award, SAP Award, the Andersen Consulting Professor of the Year Award, the University of Arizona Technology Innovation Award, and the National Chaio-Tung University Distinguished Alumnus Award.