

SISY 2021 Plenary talk

Data Mining and Machine Learning for Analysis of Network Traffic

Ljiljana Trajković

Simon Fraser University

Vancouver, Canada

ljilja@sfu.ca

Abstract:

Traffic traces collected from deployed communication networks have been used to characterize and determine traffic loads, analyze patterns of users' behavior, model network traffic, and predict future network traffic. Data have been also used to analyze network topologies and capture historical trends in their development. Of particular interest to cybersecurity is detection of network anomalies and intrusions including worms, denial of service attacks, ransomware, and blackouts. Machine learning techniques have proved to be valuable tools for predicting anomalous Internet traffic behavior and for classifying various traffic routing anomalies. In described case studies, traffic traces collected from various deployed networks and the Internet are used to characterize and model network traffic, analyze Internet topologies, and classify network anomalies.

Bio:

Ljiljana Trajkovic received the Dipl. Ing. degree from University of Pristina, Yugoslavia, in 1974, the M.Sc. degrees in electrical engineering and computer engineering from Syracuse University, Syracuse, NY, in 1979 and 1981, respectively, and the Ph.D. degree in electrical engineering from University of California at Los Angeles, in 1986.

She is currently a Professor in the School of Engineering Science at Simon Fraser University, Burnaby, British Columbia, Canada. From 1995 to 1997, she was a National Science Foundation (NSF) Visiting Professor in the Electrical Engineering and Computer Sciences Department, University of California, Berkeley. She was a Research Scientist at Bell Communications Research, Morristown, NJ, from 1990 to 1997, and a Member of the Technical Staff at AT&T Bell Laboratories, Murray Hill, NJ, from 1988 to 1990. Her research interests include communication networks, computer-aided circuit analysis and design, and nonlinear circuits and dynamical systems.

Dr. Trajkovic served as IEEE Division X Delegate/Director (2019–2020) and IEEE Division X Delegate-Elect/Director-Elect (2018). She served as Senior Past President (2018–2019), Junior Past President (2016–2017), President (2014–2015), President-Elect (2013), Vice President Publications (2012–2013, 2010–2011), Vice President Long-Range Planning and Finance (2008–2009), and a Member at Large of the Board of Governors (2004–2006) of the IEEE Systems, Man, and Cybernetics Society. She served as 2007 President and 2006 President-Elect of the IEEE Circuits and Systems Society and a member of its Board of Governors (2004–2005, 2001–2003). She served as Chair of the IEEE Circuits and Systems Society joint Chapter of the Vancouver/Victoria Sections (2001–2021). She was Chair of the IEEE Technical Committee on Nonlinear Circuits and

Systems (1998). She was General Co-Chair of SMC 2020 and General Co-Chair of SMC Workshops on BMI Systems (2018–2021), SMC 2016, and HPSR 2014, Special Sessions Co-Chair of SMC 2017, Technical Program Chair of SMC 2017 and SMC 2016 Workshops on BMI Systems, Technical Program Co-Chair of ISCAS 2005, and Technical Program Chair and Vice General Co-Chair of ISCAS 2004. She serves as Editor-in-Chief of the IEEE Transactions on Human-Machine Systems (2021–2023) and served as an Associate Editor of the IEEE Transactions on Circuits and Systems (Part I) (2004–2005, 1993–1995), the IEEE Transactions on Circuits and Systems (Part II) (2018, 2002–2003, 1999–2001), and the IEEE Circuits and Systems Magazine (2001–2003). She is a Distinguished Lecturer of the IEEE Systems, Man, and Cybernetics Society (2020–2021) and the IEEE Circuits and Systems Society (2020–2021, 2010–2011, 2002–2003). She is a Professional Member of IEEE-HKN and a Life Fellow of the IEEE.