

ParSocial 2017 Keynote

Large Scale Community Detection in Social and Bio-Medical Networks

Boleslaw Szymanski, Claire and Roland Schmitt Distinguished Professor of Computer Science and Professor of Cognitive Science,
Rensselaer Polytechnic Institute, USA

Abstract: We discuss the challenges of designing parallel algorithms for network science and especially for network analysis. The rapid growth of the volume of data collected from networks fuels the urgency of using parallel processing to provide timely network analysis. The main challenge in creating the needed parallel solutions is the network connectivity. In many physical world simulations interacting components are located close to each other, and computational stencils are regular. In contrast, social, biological, and some other types of networks allow for distant and irregularly structured communication. Consequently, partitioning of such networks for parallel processing is challenging and often invokes heavy communication overhead. It is especially so for networks which represent social interactions or biological processes at different levels of abstraction. We discuss these challenges using community detection as an example. We start with the GANXiS algorithm that we designed for social network analysis and show how it was efficiently parallelized on two different parallel architectures. Then, we discuss GANXiS extensions to bio-medical networks which require combining local metrics employed by GANXiS with global metrics useful in bio-medical networks. We first briefly describe some interesting applications in which the resulting algorithm, named SpeakEasy, excels. Then we present an outline of SpeakEasy parallelization.

Speaker Biography: Dr. Boleslaw K. Szymanski is the Claire and Roland Schmitt Distinguished Professor of Computer Science and a Professor of Cognitive Science at RPI. He is the Founding Director of the ARL Social and Cognitive Networks Academic Research Center and of the RPI NEST Center. He received Ph.D. in Computer Science from National Academy of Sciences in Warsaw, in 1976. He published over 400 scientific articles, is a foreign member of the National Academy of Science in Poland, an IEEE Fellow, and a National Lecturer for the ACM. In 2009, he received the Wilkes Medal of British Computer Society and in 2003 the Willey Distinguished Faculty Award from RPI. His current research interests focus on network science and computer and social networks.