Professor Dr. Armin R. Mikler

In 1997, Professor Mikler joined the Department of Computer Science at the University of North Texas with a PhD from Iowa State University. With the help of four courageous undergraduate students, he established the Network Research Laboratory (NRL), and with it, UNT's first Beowulf Cluster to facilitate complex simulations in support of the group's research on Computer Network Protocols and Distributed Systems. In addition to the inaugural group of students, who completed their MS theses under Dr. Mikler's guidance, the laboratory attracted many graduate students with interest in experimental design of protocols and algorithms for large distributed computing infrastructures. In 2004, Dr. Mikler started to gradually move into a new field of research, which was motivated by the need to facilitate advances in the field of Public Health and Epidemiology through computational methods. He established the Computational Epidemiology Research Laboratory (CERL) with focus on the development of computational methodology to model and simulate the spread of diseases and the design and analysis of bio-emergency response plans. Together with colleagues in Biology and Geography, Dr. Mikler established the truly interdisciplinary Center for Computational Epidemiology and Response Analysis (CeCERA) after receiving federal funds from the US Department of Health and Human Services. Today, CeCERA is the home of over 15 PhD students who are conducting research in a variety of areas related to Computational Epidemiology, Ecology, Social Network Analysis, and High Performance Computing under Dr. Mikler's mentorship. Recent graduates of his research group are using their expertise in Computational Epidemiology as faculty members at different universities and as researchers at National Laboratories. Dr. Mikler’s research on response plan design and analysis is supported by the Texas Department of State Health Services (DSHS), the National Science Foundation (NSF), and the National Institutes of Health (NIH). He has supervised over 30 PhD and MS theses and has published over 70 research articles related to a range of topics, including distributed systems, networking, computational epidemiology, and response plan design and analysis.

Computational Intelligence and Big Data Challenges in Computational Epidemiology and Population Health

The development of computational approaches to solving problems in Public Health has commenced only about two decades ago and has led to the emergence of the field of Computational Epidemiology. Its primary goal is to provide health researchers with computational tools that facilitate the prediction and analysis of the progression of diseases in time and space. Whether modeling an Influenza epidemic in Germany or the spread of Dengue Fever in Thailand, computational models must be developed, which are informed by data from disparate sources. The design, implementation, and execution of such models represents a significant scientific challenge as it is often difficult to validate their fidelity. Further, data availability and representation across different geographic regions is inconsistent at best, which necessitates the design of region specific models.

In this tutorial, we will introduce Computational Epidemiology as a data-centric example of computational intelligence for which Big Data challenges will have to be addressed by today's computer and information scientists. We will exemplify the types of data that will have to be integrated to inform model development in an effort to provide computational tools to researchers and practitioners in the domain of Population Health.