



CoCo Seminar Series Spring 2017

Graph Theoretic Approach for Gait Characterization towards Detection of Dementia

Dr. Changqing Cheng
**Assistant Professor, Department of Systems
Science and Industrial Engineering**
Binghamton University



Wednesday March 22nd, 2017 8:30-9:30am
**Engineering Building H-9 (Knoll-MacDonald Commons / Watson
Commons)**

Dementia is a general term for cognitive declines beyond normal aging, with symptoms of memory lapses, worsening visual perception, and reduced ability to perform daily routine tasks. It is caused by a variety of diseases, with Alzheimer's accounting for 60-80% of the cases. Dementia is one of the most common causes of disability and dependency of senior people. This neurodegenerative is overwhelming not only for the patients, but also negatively affect their caregivers and families, and imposes immense burden on the society. According to WHO, the total costs of dementia, including medical and social expenditures, was estimated to be US\$ 604 billion globally, roughly 1% of the worldwide gross domestic product. Nonetheless, no treatment is currently available to cure dementia or to delay the progression. The optimized delivery of healthcare for dementia hinges on the early detection, which is often ignored due to the gradual nature. In this investigation, we adopted gait sensors to track ambulation of subjects in an assisted living facility, while they were performing daily routine tasks. The locomotion was then represented as a random walk across a graph, where each node characterizes a small neighborhood of the physical location. Biomarkers extracted therefrom was utilized for the diagnosis of dementia. Our investigation registered compelling diagnosis results, with both true positive and true negative above 85%.

Dr. Changqing Cheng is an Assistant Professor in the Department of Systems Science and Industrial Engineering at Binghamton University. His research interests include complex systems modeling and control, sensor-based modeling, time series analysis, complex networks, and stochastic simulation.

For more information, contact Hiroki Sayama (sayama@binghamton.edu).
<http://coco.binghamton.edu/>