

RYERSON UNIVERSITY
DEPARTMENT OF MATHEMATICS
GRAPHS AT RYERSON (G@R) SEMINAR

Dr. Kathleen Wilkie

Department of Mathematics, Ryerson University

Date: Friday, May 11, 2018

Time: 3pm

Location: ENG 210

**Classifying Cancer Types for Treatability
Using PPI Network Structure**

Abstract:

The existence of a correlation between cancer protein-protein interaction (PPI) network degree-entropy and cancer 5-year survival probability has been shown [Breitkreutz et al, PNAS, 2012]. We investigate the correlation between epidemiological survival data and the molecular details of specific cancers further through higher levels of degree-connectedness and through the evolution of cancer network connections compared to a random graph evolution. By comparing the cancer networks to random graphs of the same size, we create a new metric that correlates with 5-year survival and may act as a classifier. The correlative relationship suggests that our method is able to surpass individual variabilities such as cancer site, disease stage, and structural features of the PPI network, through the use of proxy measurements: 5-year survival data and our entropy-based metrics. Our findings suggest that the underlying structure of cancer protein-protein interaction networks may be used to classify cancer types into two groups: those that are more treatable for various reasons and those that are not.

Furthermore, using spectral analysis techniques we present a new method to identify potential drug targets. Eigenvector centrality can be used to provide a ranked order to a subset of the vertices in a graph. To cover the whole network, we consider several of the largest magnitude eigenvalues and their corresponding eigenvectors found from the networks associated adjacency matrix. Highest ranked vertices are considered potential drug targets and both individual and combination targets are presented. Drug targets are assumed to act by blocking the entire protein (vertex deletion) and the effects on residual network structure are discussed.

ALL FACULTY, STAFF, STUDENTS AND GUESTS ARE WELCOME TO ATTEND