



THE UNIVERSITY OF
WINNIPEG

Faculty of
Graduate Studies

**The University of
Winnipeg's Faculty of
Graduate Studies
Fifth Annual
3-Minute Thesis
Competition**

April 3, 2018: Eckhardt-Gramatté Hall, 2:30-4:00pm



3-Minute Thesis Presentation Schedule

| | Name | Program |
|---|-----------------------|------------|
| 1 | Kushagra Trivedi | ACS |
| 2 | Apurva Bhardwaj | BioScience |
| 3 | Serena Sung Young Lim | ACS |
| 4 | Laura Cameron | MAIG |
| 5 | Victor Alhassan | ACS |
| 6 | Cassandra Szabo | MDP |
| 7 | Dean Reddick | BioScience |

Judges:

Senator Marilou McPhedran

Senate of Canada

Dr. Manish Pandey

Acting Vice-President Research and Innovation,
University of Winnipeg

Melissa Martin

Reporter, Winnipeg Free Press

Participants

Kushagra Trivedi

Master of Science student in Applied Computer Science and Society

Detecting Overlapping Communities in Social Networks with Voronoi and Soft Computing Techniques

Identifying social network communities allow us to discover functionally related groups such as communities interested in promoting a social cause. Discovering such network communities can be viewed as a community detection problem where a node can belong to multiple communities reflecting the real-world. Solutions to such a problem has consequences for real-world networks in diverse fields such as neuroscience, biology, transportation and cellular networks. Our research proposes a novel method for detecting overlapping communities in social networks that combines computational geometry (via Voronoi diagrams) with tolerance relations. Voronoi diagrams are well-known for partitioning metric spaces and tolerance-based approximation operators make it possible to induce soft partitions, leading to solutions for detecting overlapping nodes. Our graph-based algorithm (VTRSM) has been tested with two real-world network datasets. Initial results based on extended modularity and dense communities measure demonstrate promising results when compared with two other published soft computing methods.



Apurva Bhardwaj

Master of Science student in Bioscience, Technology and Public Policy
Supervisor/Co-author: Dr Shailly Varma Shrivastav

Rapamycin: Can We Say It Affects IGFBP3 Localisation?

Insulin-like growth factor binding protein-3 (IGFBP-3) is a key protein in the insulin-like growth factor (IGF) pathway and helps to regulate cellular functions such as cell growth, survival and apoptosis. Known to mediate both the IGF-dependent and IGF-independent pathways, IGFBP-3 is believed to translocate into the nucleus in mammalian cancer cell lines. The involvement of nuclear IGFBP-3 in transcriptional regulation, DNA damage and induction of apoptosis support its role in cancer progression. Rapamycin, a known inhibitor of mammalian target of rapamycin (mTOR), is hypothesized to affect IGFBP-3 levels in the nucleus. To validate the same, we treated mammalian breast cancer, MCF-7 cells with rapamycin at different time points, and determined the IGFBP-3 levels. As hypothesized, rapamycin treatment increased the translocation of IGFBP-3 in the nucleus. The overreaching goal of our research is to determine if localisation of IGFBP-3 can be used as a diagnostic marker for better prognosis and treatment regimen of cancer.

Serena Sung Young Lim

Master of Science student in Applied Computer Science and Society

A Study on the Modeling for Obesity

According to the World Health Organization, the number of obese people has tripled since 1975. To solve this problem, it is important to find out what are the main factors of obesity and the relationship among each of the risk factors. In this study, a variety of factors affecting obesity have been identified by using a NetLogo multi-agent software model. This model is based on complex adaptive systems that can simulate obesity (cont'd)

rates. Most of the previous studies are focused on one risk factor but this model uses various risk factors. To find out which factor mainly affects obesity, the model sets several risk factors, and the user can choose risk factors to manipulate and determine what percent of these factors are affecting obesity. This will help to identify factors affecting obesity that can reduce it, and potentially assist to save some costs of preventing and curing obesity.

Laura Cameron

Master of Arts student in Indigenous Governance

Indigenous Knowledge, Climate Change, and Communications: Participatory Video and the Onjisay Aki Climate Summit

In June 2017, the Turtle Lodge – an Indigenous knowledge centre in Sagkeeng First Nation - convened the Onjisay Aki International Summit on Climate Change. This initiative was an unparalleled opportunity for cross-cultural dialogue on climate change with participants from around the world. In collaboration with Turtle Lodge, our research team was invited to support the documentation and communication of the knowledge and perspectives shared at the climate summit. This process of community-based research used participatory video to support the communication of Indigenous knowledge on climate change. Taking these important considerations into account, the research team supported organizing and documenting of the summit, and collaboratively have produced several short videos highlighting the perspectives shared at the gathering. These videos – and the underlying community-based processes that derived them - facilitate respectful mobilization of Indigenous knowledge in a manner that allows it to be shared with a wider audience across cultures and geographies.

Victor Alhassan

Master of Science student in Applied Computer Science and Society

Automated Map Production Using Deep Neural Networks

The problem considered in this work is the use of deep neural networks for producing land-use / land classification (LULC) maps from satellite images. In this process, each pixel in a satellite image must be classified into a number of land-use classes (e.g. deciduous forest, marshland, fens, and water). Due to decreasing cost and increasing resolution of satellite imagery, many government and private industries are turning to LULC maps as an important tool for large-scale monitoring of land resource changes. For example, these maps are now vital in areas such as flood forecasting, urban and rural land-use planning, resource management, and disaster management and planning. Consequently, the production of accurate and timely maps is becoming increasingly important. The presented solution is by way of deep neural networks that were developed to perform semantic segmentation of digital images. Initial results demonstrate high accuracies and substantial reduction of time when compared to semi-automated methods.

Cassandra Szabo

Master of Arts student in Master's in Development Practice

How a Hybridized Approach leads to Self Determination

The hybrid economic theory is a model theorized by John Altman which suggests that an approach in which there is the ability for communities to engage in various and diverse sectors of the economy freely is an approach that leads to successful community development outcomes. This theory allows for communities to place time and effort into community socio-economic development activities that they see as viable and important, thus leading to deeper self-determination. Self-determination is not only a right for Indigenous peoples and nations it is also one of the central tenants of UNDRIP, (cont'd)

thus community development initiatives and theories need to be rooted and grounded in this. A careful examination of this theory and its applicability shows that the hybrid economic approach could lead to important community development and self-determination realizations.

Dean Reddick

Master of Science student in BioScience, Technology, and Public Policy

Co-authors: Shiby Kuriakose, David Datzkiw, and Anuraag Shrivastav

N-myristoyltransferase as a Predictive Biomarker for Endocrine Therapy Resistance in Estrogen Receptor Positive Breast Cancer

Tamoxifen is a very effective form of endocrine therapy for the treatment of Estrogen Receptor positive (ER+) breast cancers. However, approximately 50% of all patients develop a resistance to the drug. There are reports suggesting involvement of the PI3K/mTOR pathway in endocrine resistance and that N-myristoyltransferase (NMT) phosphorylation by mTOR may play a role. The overreaching goal of my research is to determine the potential role of NMT in endocrine therapy resistance development and to determine if NMT subcellular expression patterns can be used as a predictive biomarker. Several putative phosphorylation sites in NMT have been identified and mutated to alanine (phospho dead) or glutamic acid (phospho mimic). Various NMT mutants along with wild type (wt) NMT plasmids were prepared and expressed in ER+ breast cancer cells. Future studies are directed towards treating these cells with tamoxifen to investigate whether NMT phosphorylation by mTOR confers resistance to endocrine therapy.

View past 3MT videos here:

<https://www.uwinnipeg.ca/graduate-studies/research/three-minute-thesis-videos.html>



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