Poster Abstracts WiDS Central Mass

A Multi-dimensional Evolving Contact Network Approach for Modeling Dynamics of Contagious Disease Spread

Buyannemekh Munkhbat, Chaitra Gopalappa. PhD., Dylan Shepardson. PhD., Hari Balasubramanian. PhD., Song Gao. PhD.

Current simulation models for outbreaks of re-emerging infectious diseases (EIDs) take an individual-level or a population-level approach to modeling contact dynamics. Each modeling technique is a trade-off between increased accuracy versus computational efficiency. We propose a novel Multi-dimensional Evolving Contact Network (MECN) algorithm that combines the attributes of both simulation modeling techniques. Considering the uncertainty in type and origin of future EIDs, our proposed methodology will be suitable for analyses of a range of potential EIDs for an integrated approach to disease prevention in low- and middle- income countries.

College Grant Determinants and Significance

Zixian Li, Zhu Shen

Higher education is seen as cornerstone to financial independence and social recognition. In recent years, college tuition prices have skyrocketed in both public and private institutions in the United States, making college grants an increasingly essential factor for students' economic progress. More specifically, determining the amount of grants and how the grants would influence students' future wage level will provide reference for both grant foundations and prospective college students, enabling them to make more informed decisions. We want to answer two questions using our models: what are the factors significantly influencing the grant amount received by US colleges which offer Bachelor degrees? How significant are the Pell grants to students' future wage level?

Combating Imbalanced Data with Generative Adversarial Networks

Rheeya Uppaal

Data is a highly important factor in Deep Learning. The presence of a large, labeled and balanced dataset is often essential for a model to perform optimally at a particular task. However, finding such data in the real world is rare, and creating these datasets is a tedious task. The aim of this project was to overcome one of the aspects of difficulties with datasets: unbalanced data across different classes. In more detail, Generative Adversarial Networks

(GANs) have been used on an existing unbalanced dataset to create synthetic data of the lesser represented classes. To my best knowledge, GANs have never been used for this purpose before. Using Deep Convolutional GANs after pretraining the Discriminator on the dataset gave promising results which surpassed the baseline method and almost matched the original dataset.

Comparing Songs using Matrix Pattern Preservation

Erin H. Bugbee, Katherine M. Kinnaird, Melissa R. McGuirl, Claire Savard

The cover song task in music information retrieval involves correctly matching songs which are versions of the same piece of music. Many attempts have been made to accomplish this, including structure-based approaches that examine the repeated structures in the song from a given signal. Existing methods using these repeated structures are rigid and computationally expensive. Inspired by topological data analysis, we consider the times and lengths of these repeated structures, and then apply two new mappings, namely the Surface Pattern Preservation and the Matrix Pattern Preservation, to transform the data into matrix space and simplify the comparison of two songs. We then calculate distances between the matrices to determine if the dissimilarity is small enough to declare the songs to be covers of the same piece. Current testing shows promising results, with comparable precision and higher recall values than previous methods also analyzing repeated structures in songs.

Gender and Parenthood Bias in Hiring Decisions

Paige Patrick, Joce Kofke, Sarah Leandro, Shaina Wallace

An important issue that has been researched for decades is how biases impact hiring decisions. This 3x2 between-subject factorial design was conducted to look at the effect of gender and parental status on hirability in the job market. In an online study we conducted, 83 participants, 78.31% of which identified as female, were given one of six mock cover letters and resumes at random and asked to rate the hirability of the applicant they received. Although there was no statistically significant main effect of parenthood on hirability, results showed that there was a significant main effect of gender on hirability. Female applicants were found to be more hirable than male applicants or applicants whose gender was not specified, and male applicants were found to be least hirable than both female and unspecified applicants. Given our participant pool and results, it can be concluded that biases towards women impact hiring decisions when the individual evaluating the job applicant also identifies as a woman. Further research should investigate to what extent biases impact hiring decisions when the gender of the applicant matches the gender of the interviewer.

Helping the Red Cross Predict Flooding in Togo

Angelica Estrada, Oumayma Koulouh, Jessica Wert

This project aims to help the Red Cross predict flooding occurrences in Togo due to overflow in the Nangbeto Dam. Flooding is a result of both high flow rate and the water level in the dam at any point in time. This project focuses specifically on predicting the flow rate into the dam using precipitation data from eight locations around the country. A Lasso model and cross validation were employed to evaluate the significance of the predictors and capture the variance of flow rate.

How To Better Predict Friendship Quality: Gender Differences in Mediation of the Relationship between Anxious Attachment and Friendship Quality by Self-Monitoring

Garcia Sun, Randi Garcia

The current study investigated the gender differences in the relationship between anxious attachment and friendship quality through the mediation of self-monitoring for both same-race and cross-race friendships. Participants were 268 college students, each selected a friend of the same gender, same school and approximate age, they were randomly assigned to select either a same-race or a different race friend. This research used multilevel modeling and the Actor-Partner Interdependence Model (APIM, Kenny, Katie, & Cook, 2006) to test its hypotheses. The results showed that the more anxiously attached the participant was, the less they and their friends reported their friendship quality. Importantly, self-monitoring mediated this effect only for the total actor effect for men, such that the more self-monitoring he did, the less negatively his anxious attachment related with his friendship quality. There was no main difference between same-race friendships and cross-race friendships in all of the models. These findings suggested that people should avoid being anxiously attached to their friends when trying to maintain their friendships.

Muse: Multi-level Shared Event Trend Aggregation

Allison Rozet, Olga Poppe, Chuan Lei, Elke A. Rundensteiner

Stream processing applications execute large workloads of Kleene pattern queries against high-rate streams to aggregate event trends, that is, event sequences of any length. Given a workload, the state-of-the-art approach processes each query independently and misses sharing opportunities. We are the first to introduce shared processing of these complex pattern queries with optimizations at two levels: static query-level optimizations at compile-time and adaptive instance-level optimizations at runtime. Our Multi-level Shared Event Trend Aggregation (Muse) approach shares incremental trend aggregation tasks maximally among

queries by uniquely exploiting "just-in-time" sharing opportunities. The Sharing Analyzer embeds sharing decision points into the Muse Template, which then guides runtime execution driven by dynamic stream characteristics.

nyctaxi - ETL-dependent R Package: Working with Medium Data

Wencong Li

New York City Taxi Cabs are widely recognized as the icons of New York City. The New York City Taxi & Limousine Commission provide publicly accessible yellow and green taxi trip records for people to do research with. Each taxi trip record is like a little piece of a gigantic puzzle, and all together they draw a picture of what is happening in New York City every day. This poster presents an efficient and easy-to-use way for users to retrieve information of both New York City taxi trip record and trip records of other ride-sharing services in New York City, such as Uber and Lyft. In order to achieve that, I, with the help of my professor Benjamin Baumer, wrote an R package called nyctaxi.

nyctaxi is a etl-dependent R package. etl package provides a CRAN-friendly framework that allows R users to work with medium data without any knowledge in SQL database. The end result is a populated SQL database, but the user interaction takes place solely within R. It has three operations — extract, transfer, and load— which bring real-time data into local or remote databases. The suite of etl-dependent packages makes medium data — too big to store in memory, but not so big that it won't fit on a hard drive — more accessible to a wider audience. Additionally, etl-dependent packages use SQL translation supported by dyplr.

Twitter Analysis of Neurodiversity in the Information Technology Workforce

Huimin Ren

Success in the digital economy requires that companies be agile, innovative, and astute. In order to meet these requirements, a diverse workforce with a variety of views and talents is essential. In particular, those who are neurodiverse offer a special skillset, which is beneficial to the IT field. This research looks at neurodiversity within Fortune 100 Information Technology companies. Specifically, it investigates, how these firms perceive neurodiversity and harness it. Understanding what they consider to be the benefits and stumbling blocks in managing a neurodiverse workforce is also important for those looking to hire neurodiverse workers.

Perceived Self-Skill and Childcare Tasks' Effects on One's Perception of their Partner's Parenting Skill Post-Adoption

Rutendo Madziwo

This study investigated the effects of individuals' perceived parenting self-skill on how they would perceive their significant other's parenting skills after adoption of a baby. It also investigated how these different perceptions of parenting skills eventually affected the couple's relationship quality. Both heterosexual and homosexual couples were investigated and the sample was well-educated, on average, with approximately 60% of the participants having had a college degree or higher. Sixty percent of the couples adopted via private domestic adoption. Results showed that assumed similarity between an actor's perceived skill and their perception of their partner's parenting skill exists such that the more one thinks they are skilled at parenting, the more likely they are to think that their partner is also skilled at parenting. Additionally, the more one's partner viewed themselves as skilled, the more one perceived their partner to be skilled at parenting. An increase in childcare tasks by an individual resulted in a lower perception of their partner's parenting skill and if a partner reported being better at parenting skills than the actor, the actor reported a lower relationship quality. This study shows that couples need to be better informed about parenting and difference in parental skills and styles before a child is adopted so as to maintain a more positive perception of each other, and a higher relationship quality post-adoption.

Predicting Friendship across Race, Intergroup Anxiety and Self-Monitoring

Xinyu Chu

The study examined the effect of racial composition of the friendship on friendship quality and felt authenticity. It also tested whether the relationship was moderated by self-monitoring and intergroup anxiety. The participants in the study were 306 college students. We used 2 (participant race: minority vs. White) × 2 (dyad composition: same- vs. cross-race) between-subjects design, and multilevel modeling and the Actor-Partner Interdependence Model (APIM; Kenny, Kashy, & Cook, 2006) were used to test the hypothesis. The study found that people in interracial friendships generally reported lower level of the friendship quality and felt authenticity. When people scored high in self-monitoring, the effect of racial composition of the friendship on friendship quality became weaker and the effect on felt authenticity became stronger. The results showed that personality traits did have an effect on interracial friendship. Intervention could be developed to help people balance their personality traits so that they could benefit from interracial friendship.