Thomas Magelinski

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Summary of Interests

My research seeks to develop methods of better understanding the social dynamics of online communities. I develop new methodologies through graph machine learning and network approaches, leveraging state of the art techniques in natural language processing. I am particularly interested in methods which can promote healthy online communities and maintain the integrity of the information space. Broadly speaking, my interests are in the Responsible Social AI space.

Education

Carnegie Mellon University — Pittsburgh, PA
PhD Societal Computing *GPA: 3.9* — August 2017 - August 2022

University of Oxford — Oxford, UK
Visiting Student — January 2015 - April 2015

Virginia Tech — Blacksburg, VA
Honors Baccalaureate Engineering Science and Mechanics *GPA: 3.9* — August 2013 - May 2017
Minors in Math and Physics

Research Experience

Spotify Research — New York, NY
Research Scientist Intern — June 2021 - September 2021

- Trained heterogeneous social network embeddings using tensorflow and StellarGraph in a transformer-based pipeline to give social representations of content, creators, and users.
- Demonstrated the potential of social signals to improve podcast search and recommendation
- Examined the implications of trust-based recommendations for podcasts from user connections

CASOS Lab — Pittsburgh, PA
Graduate Research Assistant — August 2017 - Present

- Created an unsupervised multilingual Tweet representation pipeline using Spacy, pre-trained langiage-aligned FastText embeddings, and H-GNNs (Heterogeneous Graph Neural Networks)
- Trained custom heterogeneous graph neural networks on GPU using PyG (Pytorch Geometric)
- Developed scalable models to detect and characterize coordinated information operations on Twitter using networks constructed and analyzed in igraph
- Developed techniques for detecting and characterizing changes in network communities. Tools were applied to Ukraine's parliament to understand political factions and their change over time
- Took a leadership role in a multi-university collaboration, leading to publications and talks with researchers across 5 universities

Ross Dynamics Lab — Blacksburg, VA
Undergraduate Research Assistant — November 2015 - May 2017

- Wrote simulations of military airdrops to investigate sources of uncertainty in landing location

Mathematical Institute — Oxford, UK
Undergraduate Research Assistant — January 2015 - April 2015

Bio-Inspired Fluids Lab — Blacksburg, VA
Undergraduate Research Assistant — September 2014 - December 2014

Awards

Knight Foundation Fellow — August 2020 - December 2020

ARCS Foundation Scholar — August 2017 - August 2020

Outstanding Senior: Engineering Science and Mechanics — May 2017

Virginia Tech Rhode Scholar Nominee — November 2016

Virginia Tech Marshall Scholar Nominee — November 2016

Tau Beta Pi: Engineering Honors Society — September 2015 - May 2017

Activities

Societal Computing Seminar Chair — September 2020 - Present

Co-Organizer: Ethics for Technologists Lecture Series — November 2018 - Present

Faculty Hiring Committee Member November 2020 - Present

PhD Admissions Committee Member 2018, 2019

Biomedical Engineering and Mechanics Ambassador August 2016 - May 2017

Projects

Distributed Network Embedding & Analysis *PySpark, PyTorch-BigGraph*
Distributed construction and embedding of communication networks from over 400GB of Twitter Data on COVID-19 and the 2020 Elections.

Weakly Supervised Twitter Bot Classification *Python*
Implemented an Adaptive Graph Filter model to classify 87k Twitter users as human or bot with 79% accuracy given 10% of labels

Convolutional Neural Network for Image Classification on CIFAR-10 *Python, NumPy*
Hand-coded a 2 convolutional + 1 fully connected layer neural network using only NumPy to classify images in CIFAR-10 with 54% validation accuracy

Crowd Dynamics Robot *Arduino, MATLAB*
Led a 6-member team to build, program, and deploy a robot that interacts with moving crowds based on a real-time data stream of individual's locations

Teaching

I enjoy teaching and mentoring students. I have been a teaching assistant for graduate level Dynamic Network Analysis, and the CASOS Summer Institute from 2018 to 2021, which is a week-long course in Network Science tools and applications, open to members of academia, industry, and government. I have also tutored students in AP Physics, AP Calculus, and Calculus 2.

Review Activities

I believe serving as a peer reviewer is an important act of service as a researcher. I have reviewed multiple papers in Applied Network Science, Social Network Analysis and Mining, Quality & Quantity, PLOS ONE, ICWSM, Computer Networks, Computational and Mathematical Organization Theory, IEEE Access, and SBP-BRiMS.

Publications - Journals

Magelinski, T., Ng, L., & Carley, K. M. (2022). A Synchronized Action Framework for Detection of Coordination on Social Media. Journal of Online Trust and Saftey.
Magelinski, T., Bartulovic, M., & Carley, K. M. (2021). Measuring Node Contribution to Community Structure with Modularity Vitality. IEEE Transactions on Network Science and Engineering.
Uyheng, J., **Magelinski, T.**, Villa-Cox, R., Sowa, C., & Carley, K. M. (2019). Interoperable pipelines for social cyber-security: assessing Twitter information operations during NATO Trident Juncture 2018. Computational and Mathematical Organization Theory.
Magelinski, T., & Carley, K. M. (2019). Community-based time segmentation from network snapshots. Applied Network Science.
Magelinski, T., & Carley, K. M. (2019). Analytic Models of Roll Call Voting Dynamics. IEEE Transactions on Computational Social Systems.

Publications - Conferences

Magelinski, T., Beskow, D. M., & Carley, K. M. (2020). Graph-Hist: Graph Classification from Latent Feature Histograms with Application to Bot Detection. In AAAI (pp. 5134-5141).
Magelinski, T., Bartulovic, M., & Carley, K. M. (2020). Canadian Federal Election and Hashtags That Do Not Belong. In International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation. (pp. 161-170).
Magelinski, T., Stine, Z., Marcoux, T., Agarwal, N., & Carley, K.M (2020). Artifacts of Crisis: Textual Analysis of Euromaidan. In International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation. (pp. 329-339).

Magelinski, T., Hou, J., Mylovanov, T., & Carley, K. M. (2019). Detecting Disruption: Identifying Structural Changes in the Verkhovna Rada. In International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation (pp. 194-203).

Magelinski, T., & Carley, K. M. (2018). Legislative voting dynamics in Ukraine. In International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior

Representation in Modeling and Simulation (pp. 82-88).

Talks, Posters, and Workshop Papers

Magelinski, T. & Carley, K. M. (2022). Contextualized Networks. Oral. Sunbelt 2022 (scheduled).

Magelinski, T. & Carley, K. M. (2022). Community Prototypes in Large Twitter Conversations. Oral. Sunbelt 2022 (scheduled).

Magelinski, T. & Carley, K. M. (2021). Discovering Prototypical Attributes of Online Communities Through MultiView Modularity Vitality. Oral. IDeaS Conference 2021.

Magelinski, T., Ng, L., & Carley, K. M. (2021). A Synchronized Action Framework for Responsible Detection of Coordination on Social Media. Workshop paper. Responsible Social Media Mining - MAISoN, Co-Located with IJCAI.

Magelinski, T. & Carley, K. M. (2021). Modularity Vitality for Bipartite Networks and Projections. Oral. Networks 21.

Magelinski, T. & Carley, K. M. (2020). Detecting Coordinated Behavior in the Twitter Campaign to Reopen America. Extended Abstract. IDeaS Conference on Social-Cybersecurity in Times of Crisis and Change.

Bartulovic, M. & **Magelinski, T.** (2020). Networked Time Series Analysis and Clustering. Tutorial. International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction and Behavior Representation in Modeling and Simulation.

Angelopoulos, S., Brik, T., **Magelinski, T.**, & Carley, K. M. (2020). What you gonna do when they come for you? Network effect of information exposure on coalition formation. Sunbelt.

Harder, N., Brashears, M., Brik, T., Carley, K.M., **& Magelinski, T.** (2020). Understanding and Predicting Legislative Behavior in the Verkhovna Rada through New Methods of Ecological Modeling. Sunbelt.

Bhutani, M., **Magelinski, T.**, & Kolter, Z. (2019). Sinkhorn-Flow: Predicting Probability Mass Flow in Dynamical Systems Using Optimal Transport. Optimal Transport & Machine learning Workshop at NeurIPS.

Uyheng, J., **Magelinski, T.**, Cox, R. V., Sowa, C., & Carley, K. M. (2019). Information Operations Analysis of NATO Trident Juncture Exercise 2018. International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction and Behavior Representation in Modeling and Simulation.

Hou, J., **Magelinski, T.**, & Mylovanov, T. (2019). Minsk II Agreement between Russia and Ukraine and Polarization of the Ukrainian Parliament. Advancing Research through Computing Student Poster Contest. **Winning Entry**.

Magelinski, T., Cruickshank, I., & Carley, K. M. (2018). Comparison of faction detection methods in application to Ukrainian parliamentary data. International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction and Behavior Representation in Modeling and Simulation.

Magelinski, T., & Carley, K. M. (2019). Effects of Network Aggregation in Simple Diffusion Simulations. International Conference on Social Computing, Behavioral-Cultural Modeling, and Prediction and Behavior Representation in Modeling and Simulation.

Magelinski, T., & Ross, S. (2016). Sources of uncertainty and inaccuracy in airdrop operations. Fall Fluid Mechanics Symposium.