Walter Gerych
Framingham, MA wgerych@wpi.edu

RESEARCH INTERESTS

Machine Learning, Deep Learning, Semi-Supervised Learning, Generative Modeling, Human Activity Recognition

EDUCATION

Worcester Polytechnic Institute, *Worcester, MA* 12/2017 - Current
PhD, Data Science Expected 05/2023
MS, Data Science; GPA: 4.0/4.0 12/2019

SUNY Geneseo, *Geneseo, NY* 08/2013 - 04/2017
BS, Mathematics
Edgar Fellows Honors Program

RESEARCH EXPERIENCE

Worcester Polytechnic Institute, Research Assistant 06/2018 –Current
Advisors: Elke Rundensteiner, Emmanuel Agu

- Working on DARPA WASH project
  - Team of five students, two professors, and four medical collaborators
  - Developed methods to detect physical activity using mobile sensors
  - Created deep-learning classifiers to detect symptoms of influenza from sensor data
  - Proposed generative model to synthesize user-specific activity data
  - Developed generative methods for activity data augmentation
  - Developed method for detecting depression from changes in activity data

- Developing methods for stabilizing GAN training
- Proposed first study of and algorithms for identifiable biased positive-unlabeled learning
- Created Bayesian Network-based recurrent approach for multi-label learning
- Developed first deep-learning formulation of Maximum Variance Unfolding
- Proposed method to perform classification from biased sequential partially labeled data
- Developed deep anomaly detection technique based on Wasserstein autoencoders

- Collaborated on the following research projects:
  - Knowledge amalgamation for multi-label and multi-task learning
  - Mathematically rigorous theoretical comparison of fair-ranking metrics
  - Conditional generative models for text
  - Early classification of irregularly sampled time series
  - Few-shot learning for human activity data
  - Open-set classification using likelihood-based generative models
  - Visualization tools for human activity data and health

MIT Lincoln Lab, Intern 05/2022 –08/2022
Advisor: John Moores

- Developed deep models to forecast optical turbulence timeseries
- Created novel multi-stream Seq2Seq network to incorporate asynchronous exogenous variable streams for optical turbulence prediction
- Designed next-frame prediction network for optical turbulence phase screen prediction
- Performed robust analysis on scintillation for multiple wavelengths of real-world optical link

Kansas State University, Research Intern 05/2015 - 08/2015
PI: Jeremy LeCrone

- Developed cellular automata method for modeling mean curvature flow

SELECTED HONORS & AWARDS

DARPA Riser, *DARPA* 2022
DARPA award for early-career scientists identified as up-and-coming in their field
Data Science Leadership Award, *WPI,* 2021, 2020
Best Poster, *Graduate Research Innovation and Exchange, WPI* 2022, 2021
Best Poster Finalist, *Graduate Research Innovation and Exchange, WPI* 2020
V. Ambujamma Memorial Scholarship, *SUNY Geneseo* 2016
For outstanding achievement as a student of mathematics

PUBLICATIONS

I have first-author publications in NeurIPS, AAAI, SDM, CIKM, AIES, Big Data, ICMLA, and ICSC.

1. ***Recovering The Propensity Score From Biased Positive Unlabeled Data.***
Walter Gerych, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **AAAI**, 2022.
Oral spotlight.

2. ***Robust Recurrent Classifier Chains for Multi-Label Learning with Missing Labels.***
Walter Gerych, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **CIKM,** 2022.

3. ***Stop&Hop: Early Classification of Irregular Time Series***
Thomas Hartvigsen, **Walter Gerych**, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner. **CIKM,** 2022.

4. ***Positive Unlabeled Learning with a Sequential Selection Bias.***
Walter Gerych, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **SDM**, 2022.

5. ***On Detecting COVID-Risky Behavior from Smartphones.***
Thomas Hartvigsen*, **Walter Gerych* (Joint First Author)**, Marzyeh Ghassemi. **Workshop on Epidemiology meets Data Mining and Knowledge Discovery, KDD,** 2022.

6. ***Triplet-based Domain Adaptation (Triple-DARE) for Lab-to-field Human Context Recognition.***

Abdulaziz Alajaji, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Hamid Mansoor, Emmanuel Agu, Elke Rundensteiner. **IEEE PerCom Industry Track**, 2022.

7. ***Recurrent Bayesian Classifier Chains for Exact Multi-Label Classification.***
Walter Gerych, Tom Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **NeurIPS**, 2021.

8. ***GAN For Generating User-Specific Human Activity Data From An Incomplete Training Corpus.***
Walter Gerych, Harrison Kim, Joshua DeOliveira, MaryClare Martin, Luke Buquicchio, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, Emmanuel Agu, Elke Rundensteiner. **IEEE Big Data** 4th Special Session on HealthCare Data, 2021.

9. ***Variational Open Set Recognition.***
Luke Buquicchio, **Walter Gerych**, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, Thomas Hartvigsen, Elke Rundensteiner, Emmanuel Agu. **IEEE Big Data**, 2021.

10. ***Local Geometry Preserving Deep Networks For Featurizing High-Dimensional Datasets.***
Walter Gerych, Jessica Bader, Declan Nelson, Thalia Chai-Zhang, Luke Buquicchio, Abdulaziz Alajaji, Kevin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **IEEE ICMLA**, 2021.

11. ***Few-Shot Classification for Human Context Recognition Using Smartphone Data Traces.***
Luke Buquicchio, **Walter Gerych**, Abdulaziz Alajaji, Kavin Chandrasekaran, Hamid Mansoor, Emmanuel Agu, and Elke Rundensteiner. **IEEE ICMLA**, 2021.

12. ***Visual Analytics of SmartphoneSensed Human Behavior and Health.***
Hamid Mansoor, **Walter Gerych**, Abdulaziz Alajaji, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **IEEE Computer Graphics and Applications**, 2021.

13. ***Smartphone Health Biomarkers: Positive Unlabeled Learning of In-the-Wild Contexts.***
Abdulaziz Alajaji, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **Pervasive Computing**, 2021.

14. ***Measuring Group Advantage: A Comparative Study of Fair Ranking Metrics.***
Caitlin Kuhlman*, **Walter Gerych* (Joint First Author)**, Elke A. Rundensteiner. **AIES**, 2021.

15. ***PLEADES: Population Level Observation of Smartphone Sensed Symptoms for In-the-wild Data***
Hamid Mansoor, **Walter Gerych**, Abdulaziz Alajaji, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **VISIGRAPP**, 2021.

16. ***Complex Activity Recognition Using Topic Models for Feature Generation from Wearable Sensor Data.***
Kavin Chandrasekaran, **Walter Gerych**, Luke Buquicchio, Abdulaziz Alajaji, Emmanuel Agu, Elke Rundensteiner. **SMARTCOMP**, 2021.

17. ***BurstPU: Classification of Weakly Labeled Datasets with Sequential Bias.***
Walter Gerych, Luke Buquicchio, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor,

Aidan Murphy, Emmanuel Agu, Elke Rundensteiner. **IEEE Big Data**, 2020.

18. ***INTOSIS: Interactive Observation of Smartphone Inferred Symptoms for In-The-Wild Data.***
Hamid Mansoor, **Walter Gerych**, Luke Buquicchio, Abdulaziz Alajaji, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **IEEE Big Data**, 2020.

19. ***DeepContext: Parameterized Compatibility-Based Attention CNN for Human Context Recognition.***
Abdulaziz Alajaji, **Walter Gerych**, Kavin Chandrasekaran, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **ICSC**, 2020.

20. ***ARGUS: Interactive Visual Analytics Framework for the Discovery of Disruptions in Bio-Behavioral Rhythms.***
Hamid Mansoor, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **EuroVis** (Short Papers), 2020.

21. ***COMEX: Identifying Mislabeled Human Behavioral Context Data Using Visual Analytics.***
Hamid Mansoor, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **COMPSAC**, 2019.

22. ***Classifying Depression in Imbalanced Datasets Using an Autoencoder- Based Anomaly Detection Approach.***
Walter Gerych, Emmanuel Agu, Elke Rundensteiner. **ICSC**, 2019.

IN SUBMISSION:

Conditional Sequence Generative Adversarial Networks for Text Generation.
ML Tlachac, **Walter Gerych**, Kratika Agrawal, Nicholas Jurovich, Benjamin Litterer, Saitheeraj Thatigotla, Jidapa Thadajarassiri, Elke Rundensteiner.

Knowledge Amalgamation for Multi-Label Classification via Label Dependency Transfer.
Jidapa Thadajarassiri, Thomas Hartvigsen, **Walter Gerych**, Xiangnan Kong, Elke Rundensteiner.

SUPERVISED UNDERGRADUATE PAPERS:

Human Context Recognition: A Controllable GAN Approach
Joshua DeOliveira, Harrison Kim, MaryClare Martin, **Walter Gerych**, Elke Rundensteiner. **IEEE URTC**, 2021

Positive Unlabeled Gradient Boosting
Caitlin Timmons, Andrea Boskovic, Sreeharsha Lakamsani, **Walter Gerych**, Luke Buquicchio, Elke Rundensteiner. **IEEE URTC**, 2020

Neural Network for Nonlinear Dimension Reduction Through Manifold Recovery
Jessica Bader, Declan Nelson, Thalia Chai-Zhang, **Walter Gerych**, Elke Rundensteiner. **IEEE URTC**, 2019

TEACHING/MENTORING

I have mentored teams of REU students every summer since 2019. I have also mentored three teams of students on their "Major Qualifying Projects" (year-long capstone projects). I typically give the students a research topic and direction, and then meet with them at least twice a week to resolve any issues and provide next steps.

Students Advised:

- Joshua DeOliveira, MS, WPI 05/2021–Current
- Cindy Trac, BS, WPI 08/2022–Current
- Sirut Buasai 08/2022–Current
- Jason Dykstra 08/2022–Current
- Dillon McCarthy 08/2022–Current
- Aruzhan Koshkarova 05/2022–08/2022
- Alek Lewis, BS, WPI 08/2021–05/2022
- Ryan Astor, BS, WPI 08/2021–05/2022
- Kyle Costello, BS, WPI 08/2021–05/2022
- Harrison Kim, BS, Northeastern University 05/2021–08/2021
- MaryClare Martin, BS, Holy Cross 05/2021–08/2021
- Jesse Abeyta, BS, WPI 08/2020–05/2021
- Vinay Nair, BS, WPI 08/2020–05/2021
- Nicholas Cheng, BS, WPI 08/2020–05/2021
- Bryan Gass, BS, WPI 08/2020–05/2021
- Caitlin Timmons, BS, Smith College 05/2020–08/2020
- Andrea Boskovic, BS, Amherst College 05/2020–08/2020
- Sreeharsha Lakamsani, BS, Arizona State University 05/2020–08/2020
- Jessica Bader, BS, Iowa State University 05/2019–08/2019
- Declan Nelson, BS, Georgia Institute of Technology 05/2019–08/2019
- Thalia Chao-Zhang, BS, Bard College 05/2019–08/2019

Developed workshop on Engaging Research Presentations for Graduate Students, WPI 01/2022
Lead workshop on Creating Engaging Presentations for Undergrads, WPI 06/2021
Developed workshop on Deep Learning with PyTorch for Undergrads, WPI 05/2019

Teaching assistant for Introduction to Data Science graduate class, WPI 01/2018-05/2018

SERVICE

Data Science Student Council, WPI 2019-Current
President of Council 2021-Current
Vice President 2020-2021
Judge for Graduate Qualifying Project Research Exchange, WPI 2021
Volunteer at Women in Data Science Conference @ WPI, WPI 2020, 2021
Organized Deep Learning Reading Group, WPI 2019-2020
Founder and President of Data Science Club, SUNY Geneseo 2016-2017