

## RESEARCH INTERESTS

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

## EDUCATION

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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

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Worcester Polytechnic Institute, Research Assistant	06/2018 –Current
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*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

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

## PUBLICATIONS

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

1. [Knowledge Amalgamation for Multi-Label Classification via Label Dependency Transfer.](#)  
Jidapa Thadajarassiri, Thomas Hartvigsen, **Walter Gerych**, Xiangnan Kong, Elke Rundensteiner. To appear in AAAI, 2023.
2. [Positive Unlabeled Learning with a Sequential Selection Bias.](#)  
**Walter Gerych**, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **SDM**, 2022.
3. [Robust Recurrent Classifier Chains for Multi-Label Learning with Missing Labels.](#)  
**Walter Gerych**, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **CIKM**, 2022.
4. [Stop&Hop: Early Classification of Irregular Time Series](#)  
Thomas Hartvigsen, **Walter Gerych**, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner. **CIKM**, 2022.
5. [Recovering The Propensity Score From Biased Positive Unlabeled Data.](#)  
**Walter Gerych**, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **AAAI**, 2022.  
**Oral spotlight.**
6. [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.**

7. *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.
8. *Recurrent Bayesian Classifier Chains for Exact Multi-Label Classification.*  
**Walter Gerych**, Tom Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **NeurIPS**, 2021.
9. *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.
10. *Variational Open Set Recognition.*  
Luke Buquicchio, **Walter Gerych**, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, Thomas Hartvigsen, Elke Rundensteiner, Emmanuel Agu. **IEEE Big Data**, 2021.
11. *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.
12. *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.
13. *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.
14. *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.
15. *Measuring Group Advantage: A Comparative Study of Fair Ranking Metrics.*  
Caitlin Kuhlman\*, **Walter Gerych\*** (Joint First Author), Elke A. Rundensteiner. **AIES**, 2021.
16. *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.
17. *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.

**18. *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.

**19. *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.

**20. *DeepContext: Parameterized Compatibility-Based Attention CNN for Human Context Recognition.***

Abdulaziz Alajaji, **Walter Gerych**, Kavin Chandrasekaran, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **ICSC**, 2020.

**21. *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.

**22. *COMEX: Identifying Mislabeled Human Behavioral Context Data Using Visual Analytics.***

Hamid Mansoor, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **COMPSAC**, 2019.

**23. *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.

**Support Aligment to Improve Stability of GAN CONvergence**

**Walter Gerych**, Kevin Hickey, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, 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

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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, BS, WPI	08/2022–Current
• Jason Dykstra, BS, WPI	08/2022–Current
• Dillon McCarthy, BS, WPI	08/2022–Current
• Aruzhan Koshkarova, BS, WPI	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

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Data Science Student Council, WPI	2019-Current
<i>President of Council</i>	2021-Current
<i>Vice President</i>	2020-2021

**Judge for Graduate Qualifying Project Research Exchange, WPI**  
**Volunteer at Women in Data Science Conference @ WPI, WPI**  
**Organized Deep Learning Reading Group, WPI**  
**Founder and President of Data Science Club, SUNY Geneseo**

2021  
2020, 2021  
2019-2020  
2016-2017