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## RESEARCH INTERESTS

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My research is on **Trustworthy Machine Learning**, with a focus on debiasing large pretrained models using efficient and minimally invasive approaches that maintain downstream performance.

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## EDUCATION

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<b>Worcester Polytechnic Institute</b> , <i>Worcester, MA</i>	2017 - 2023
PhD, Data Science	2023
MS, Data Science	
GPA: 4.0/4.0	
<b>SUNY Geneseo</b> , <i>Geneseo, NY</i>	2013 - 2017
BS, Mathematics	
Edgar Fellows Honors Program	

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## RESEARCH EXPERIENCE

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<b>MIT CSAIL</b> , Postdoctoral Associate	10/2023 – Current
<ul style="list-style-type: none"><li>Working under Prof. Ghassemi in CSAIL's HealthyML group.</li><li>Researching methods to debias large pretrained models, developing robust uncertainty measures, and auditing LLMs for clinical applications.</li></ul>	
<b>Worcester Polytechnic Institute</b> , Research Assistant	06/2018 – 10/2023
<i>Advisors: Elke Rundensteiner, Emmanuel Agu</i> <ul style="list-style-type: none"><li>Research included noisy label learning, positive unlabeled learning, machine learning for human activity recognition, outlier detection, open set detection, model debiasing</li></ul>	
<b>IBM Research</b> , Research Scientist Intern	05/2023 – 08/2023
<i>Mentor: Yara Rizk, Manager: Vatche Isahagian</i> <ul style="list-style-type: none"><li>Conducted research into measuring confidence of large language models (LLMs)</li><li>Developed unsupervised system to select the optimal LLM and prompt template for each user query</li><li>Submitted paper at AAAI 2024 on research carried out during internship (<i>accepted for publication</i>)</li><li>Submitted patent disclosure on system developed during internship<ul style="list-style-type: none"><li>Title: "A Method For Selecting Foundation Model-Prompt Pairs Using Estimated Confidences"</li><li>Inventors: Yara Rizk, Walter Gerych, Vinod Muthusamy, Vatche Isahagian, Praveen Venkateswaran, Evelyn Duesterwald</li></ul></li></ul>	
<b>MIT Lincoln Lab</b> , Intern	05/2022 – 10/2023
<i>Advisor: John Moores</i> <ul style="list-style-type: none"><li>Developed deep models to forecast optical turbulence timeseries</li><li>Created novel multi-stream Seq2Seq network to incorporate asynchronous exogenous variable streams for optical turbulence prediction</li></ul>	

- 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

## PUBLICATIONS

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

**1. *Who Knows the Answer? Finding the Best Model & Prompt Using Confidence-Based Search.***

**Walter Gerych**, Yara Rizk, Vatche Isahagian, Vinod Muthusamy, Evelyn Duesterwald, Praveen Venkateswaran. **AAAI**, 2024.

**2. *BendVLM: Test-Time Debiasing of Vision-Language Embeddings.***

**Walter Gerych** Haoran Zhang, Kimia Hamidieh, Eileen Pan, Maanas Sharma, Thomas Hartvigsen, Marzyeh Ghassemi. **NeurIPS**, 2024.

**3. *Identifying implicit social biases in vision-language models***

Kimia Hamidieh, Haoran Zhang, Walter Gerych, Thomas Hartvigsen, Marzyeh Ghassemi. **AIES**, 2024.

**4. *TAXI: Evaluating Categorical Knowledge Editing for Language Models.***

Derek Powell, **Walter Gerych**, Thomas Hartvigsen. **ACL**, 2024.

**5. *Who Knows the Answer? Finding the Best Model & Prompt Using Confidence-Based Search.***

**Walter Gerych**, Yara Rizk, Vatche Isahagian, Vinod Muthusamy, Evelyn Duesterwald, Praveen Venkateswaran. **AAAI**, 2024.

**6. *Amalgamating Multi-Task Models with Heteogeneous Architectures.***

Jidapa Thadajarassiri, **Walter Gerych**, Xiangnan Kong, Elke Rundensteiner. **AAAI**, 2024.

**7. *Debiasing Pretrained Generative Models By Uniformly Sampling Semantic Attributes.***

**Walter Gerych**, Kevin Hickey, Luke Buquicchio, Kavin Chandrasekaran, Abdulaziz Alajaji, Emmanuel Agu, Elke Rundensteiner. **NeurIPS**, 2023

**8. *Stabilizing Adversarial Training for Generative Networks.***

**Walter Gerych\***, Kevin Hickey\* (Joint First Author), Thomas Hartvigsen, Luke Buquicchio, Abdulaziz Alajaji, Kavin Chandrasekaran, Hamid Mansoor, Emmanuel Agu, Elke Rundensteiner. **IEEE Big Data MLDB**, 2023.

**9. *Population-Level Visual Analytics of Smartphone Sensed Health Using Community Phenotypes.***

Hamid Mansoor, **Walter Gerych**, Abdulaziz Alajaji, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **IEEE ICHI**, 2023.

**10. *Adversarial Human Context Recognition: Evasion Attacks and Defenses.***

Abdulaziz Alajaji, **Walter Gerych**, Kavin Chandrasekaran, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **IEEE COMPSAC**, 2023.

**11. *Knowledge Amalgamation for Multi-Label Classification via Label Dependency Transfer.***

Jidapa Thadajarassiri, Thomas Hartvigsen, **Walter Gerych**, Xiangnan Kong, Elke Rundensteiner. **AAAI**, 2023. **Oral spotlight.**

**12. *Domain Adaptation Methods for Lab-to-Field Human Context Recognition.***

Abdulaziz Alajaji, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Hamid Mansoor, Emmanuel Agu, Elke Rundensteiner. **Sensors 23(6)**, 2023.

**13. *INPHOVIS: Interactive Visual Analytics For Smartphone-Based Digital Phenotyping.***

Hamid Mansoor, **Walter Gerych**, Abdulaziz Alajaji, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner, Angela Incollingo Rodriguez. **Visual Informatics**, 2023.

**14. *HAR-CTGAN: A Mobile Sensor Data Generation Tool for Human Activity Recognition.***

Joshua DeOliveira, **Walter Gerych**, Aruzhan Koshkarova, Elke Rundensteiner, Emmanuel Agu. **IEEE Big Data 4th Special Session on HealthCare Data**, 2022.

**15. *Text Generation to Aid Depression Detection: A Comparative Study of Conditional Sequence GANs***

ML Tlachac, **Walter Gerych**, Kratika Agrawal, Benjamin Litterer, Nicholas Jurovich, Saitheeraj Thatigotla, Jidapa Thadajarassiri, Elke Rundensteiner. **IEEE Big Data 4th Special Session on HealthCare Data**, 2022.

**16. *Positive Unlabeled Learning with a Sequential Selection Bias.***

**Walter Gerych**, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **SDM**, 2022.

**17. *Robust Recurrent Classifier Chains for Multi-Label Learning with Missing Labels.***

**Walter Gerych**, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **CIKM**, 2022.

**18. *Stop&Hop: Early Classification of Irregular Time Series***

Thomas Hartvigsen, **Walter Gerych**, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner. **CIKM**, 2022.

**19. *Recovering The Propensity Score From Biased Positive Unlabeled Data.***

**Walter Gerych**, Thomas Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **AAAI**, 2022. **Oral spotlight.**

**20. *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.

**21. *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.

**22. *Recurrent Bayesian Classifier Chains for Exact Multi-Label Classification.***

Walter Gerych, Tom Hartvigsen, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **NeurIPS**, 2021.

**23. *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.

**24. *Variational Open Set Recognition.***

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

**25. *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.

**26. *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.

**27. *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.

**28. *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.

**29. *Measuring Group Advantage: A Comparative Study of Fair Ranking Metrics.***

Caitlin Kuhlman\*, Walter Gerych\* (Joint First Author), Elke A. Rundensteiner. **AIES**, 2021.

**30. *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.

**31. *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.

**32. *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.

**33. *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.

- 34. *DeepContext: Parameterized Compatibility-Based Attention CNN for Human Context Recognition.***  
 Abdulaziz Alajaji, **Walter Gerych**, Kavin Chandrasekaran, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner. **ICSC**, 2020.
- 35. *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.
- 36. *COMEX: Identifying Mislabeled Human Behavioral Context Data Using Visual Analytics.***  
 Hamid Mansoor, **Walter Gerych**, Luke Buquicchio, Kavin Chandrasekaran, Emmanuel Agu, Elke Rundensteiner. **COMPSAC**, 2019.
- 37. *Classifying Depression in Imbalanced Datasets Using Autoencoder-Based Anomaly Detection.***  
**Walter Gerych**, Emmanuel Agu, Elke Rundensteiner. **ICSC**, 2019.

#### 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

#### SELECTED HONORS & AWARDS

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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	

#### 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 – Conferences and Workshops**


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Senior Area Chair for CHIL 2024

Organization Committee for TS4H@ICLR 2021

Reviewer for NeurIPS, AAI, ICLR, KDD, ML4H, CHIL

**SERVICE - Departmental**


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Data Science Student Council, WPI 2019-2023

*President of Council* 2021-2023

*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