Thomas Hartvigsen
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Research Interests

Machine Learning, Data Mining, Time Series, Natural Language Processing, Healthcare, Fairness in AI systems

Academic Appointments

Massachusetts Institute of Technology, *Cambridge, MA* 01/2022 - present
Postdoctorial Associate, CSAIL, PI: Marzyeh Ghassemi

Education

Worcester Polytechnic Institute, *Worcester, MA* 08/2016 - 12/2021
PhD, Data Science
MS, Data Science 12/2018
Advised by Professor Elke Rundensteiner and Professor Xiangnan Kong

SUNY Geneseo, *Geneseo, NY*
BA, Applied Mathematics, minor in Biomathematics 08/2012 - 05/2016

Research Experience

MIT CSAIL, Postdoctoral Associate, PI: Prof. Marzyeh Ghassemi 01/2022 - present
Worcester Polytechnic Institute, Research Fellow, PI: Prof. Elke Rundensteiner 08/2016 - 12/2021
Microsoft, PhD Intern with Dr. Dipankar Ray and Dr. Hamid Palangi 05/2021 - 08/2021
UMass Medical School, Research Intern, PI: Dr. Jomol Matthew 08/2018 - 09/2019
University of Arizona, Research Intern, PI: Prof. Shirley Papuga 05/2015 - 08/2015

Grants

NSF-III: Timely Classification for Actionable Predictions (Under Review)
PI: Elke Rundensteiner, Co-PI: Xiangnan Kong.
This grant proposal is written based on my research and I am responsible for 90% of the writing.

Selected Honors & Awards

🏆 **Best Poster**, International Conference on Health Informatics 2020
🏆 **Outstanding Graduate Research Award**, WPI 2019
🏆 **Best Poster**, Graduate Research Innovation and Exchange, WPI 2019
IMA Travel Award, University of Minnesota 2019
🏆 **People's Choice Poster Award**, Graduate Research Innovation and Exchange, WPI 2017
GAANN Fellowship (Annual Tuition + Stipend Award), U.S. Dept. of Education 2016-2021

Publications

I have published in KDD, AAAI, ACL, NeurIPS, CIKM, SDM, ECML, BigData, HEALTHINF, and BHI.

Refereed

20. *Recovering the Propensity Score from Biased Positive Unlabeled Data*.
Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner.
AAAI, 2022.

19. *Positive Unlabeled Learning with a Sequential Selection Bias*.
Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, Elke Rundensteiner, Emmanuel Agu.
SDM, 2022.

18. *Recurrent Bayesian Classifier Chains for Exact Multi-label Classification*.
Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Emmanuel Agu, Elke Rundensteiner.
NeurIPS, 2021.

17. *Energy-Efficient Models for High-Dimensional Spike Train Classification using Sparse Spiking Neural Networks*.
Hang Yin, John Boaz Lee, Xiangnan Kong, **Thomas Hartvigsen**, Sihong Xie.
KDD, 2021.

16. *Semi-Supervised Knowledge Amalgamation for Sequence Classification*.
Jidapa Thadajarassiri, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.
AAAI, 2021.

15. *Learning Saliency Maps to Explain Deep Time Series Classifiers*.
Prathyush Parvatharaju, Ramesh Doddaiah, **Thomas Hartvigsen**, Elke Rundensteiner.
CIKM, 2021.

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

13. *Human-like Explanation for Text Classification with Limited Attention Supervision*.
Dongyu Zhang, Cansu Sen, Jidapa Thadajarassiri, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.
IEEE BigData, 2021.

12. *Recurrent Halting Chain for Early Multi-label Classification*.
Thomas Hartvigsen, Cansu Sen, Xiangnan Kong, Elke Rundensteiner.
KDD, 2020.

11. *Human Attention Maps for Text Classification: Do Humans and Neural Networks Focus on the Same Words?*
Cansu Sen, **Thomas Hartvigsen**, Biao Yin, Xiangnan Kong, Elke Rundensteiner.
ACL, 2020.

10. *Learning to Selectively Update State Neurons in Recurrent Networks*.
Thomas Hartvigsen, Cansu Sen, Xiangnan Kong, Elke Rundensteiner.
CIKM, 2020.

9. *Learning Similarity-Preserving Word Meta-Embedding*.
Jidapa Thadajarassiri, Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.
IEEE BigData, 2020.

8. *Clinical Performance Evaluation of a Machine Learning System for Predicting Hospital-Acquired Clostridium Difficile Infection*.
Erin Teeple, **Thomas Hartvigsen**, Cansu Sen, Kajal Claypool, Elke Rundensteiner.
HEALTHINF, 2020. 🏆 **Best Poster**.

7. *Adaptive-Halting Policy Network for Early Classification*.
Thomas Hartvigsen, Cansu Sen, Xiangnan Kong, Elke Rundensteiner.
KDD, 2019.

6. *Patient-Level Classification of Clinical Note Sequences Guided by Attributed Hierarchical Attention*.
Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.
IEEE BigData, 2019.

5. *Learning Temporal Relevance in Longitudinal Medical Notes*.
Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.
IEEE BigData, 2019.

4. *Comparing General and Locally-Learned Word Embeddings for Clinical Text Mining*.
Jidapa Thadajarassiri, Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.
IEEE BHI, 2019.

3. *Detecting MRSA Infections by Fusing Structured and Unstructured Electronic Health Record Data*.
Thomas Hartvigsen, Cansu Sen, Elke Rundensteiner.
BIOSTEC, 2018.

2. *Early Prediction of MRSA Infections using Electronic Health Records*.
Thomas Hartvigsen, Cansu Sen, Sarah Brownell, Erin Teeple, Xiangnan Kong, Elke Rundensteiner.
HEALTHINF, 2018. 🏆 **Best Student Paper runner up**.

1. *CREST - Risk Prediction for Clostridium Difficile Infection Using Multimodal Data Mining*.
Cansu Sen, **Thomas Hartvigsen**, Kajal Claypool, Elke Rundensteiner.
ECML, 2017.

IN-SUBMISSION

8. TOXIGEN: *Controlling Language Models to Generate Implied and Adversarial Toxicity*.
Thomas Hartvigsen, Saadia Gabriel, Hamid Palangi, Maarten Sap, Dipankar Ray, Ece Kamar.

7. *Continuous-Time Attention Network for Irregularly-Sampled Time Series Classification*.
Thomas Hartvigsen, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner.

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

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

4. *The Road to Explainability is Paved with Bias: Measuring the Fairness of Explanations*.
Aparna Balagopalan, Haoran Zhang, Kimia Hamidieh, **Thomas Hartvigsen**, Frank Rudzicz, Marzyeh Ghassemi.

3. *SAIL: Recurrent Classifier Chains with Incomplete Labels*.
Walter Gerych, **Thomas Hartvigsen**, Emmanuel Agu, Elke Rundensteiner.

2. *SkipSNN: Efficiently Classifying Sparse and Noisy Spike Trains*.
Hang Yin, Xiangnan Kong, Liping Liu, Xin Dai, **Thomas Hartvigsen**.

1. *Multi-State Brain Network Discovery*.
Hang Yin, Xinyue Liu, Xiangnan Kong, **Thomas Hartvigsen**, Yanhua Li.

SUPERVISED UNDERGRADUATE PAPERS

3. *Early Diagnosis Prediction with Recurrent Neural Networks*.
Daniel Johnston†, Liubou Klindziuk†, Lolita Nazarov†, **Thomas Hartvigsen**, Elke Rundensteiner.
IEEE URTC 2019. 🏆 Best Paper runner up.

2. *Handling Missing Values in Multivariate Time Series Classification*.
Julia Friend†, Alec Hauck†, Sruthi Kurada†, Cansu Sen, **Thomas Hartvigsen**, Elke Rundensteiner.
IEEE URTC 2018.

1. *MRSA Infection Prediction System*.
Sarah Brownell†, **Thomas Hartvigsen**, Elke Rundensteiner.
IEEE URTC 2017.

†undergraduate co-author

SELECTED TALKS

Harvard University, invited — Cambridge, MA
Adaptive-Halting Policy Networks for Early Classification — 2020
Host: Prof. Finale Doshi-Velez

Florida State University, invited — Panama, FL
Adaptive-Halting Policy Networks for Early Classification — 2020
Host: Prof. Karen Works

MITRE, invited — Bedford, MA
Adaptive-Halting Policy Networks for Early Classification — 2020

Computational Sustainability Doctoral Consortium — Virtual Event
Adaptive-Halting Policy Networks for Early Classification — 2020

University of Minnesota, Institute for Mathematics and its Applications — Minneapolis, MN
Adaptive-Halting Policy Networks for Early Classification — 2019

Northeastern University, New England Machine Learning Day — Boston, MA
Adaptive-Halting Policy Networks for Early Classification, poster — 2019

Worcester Polytechnic Institute, Arts and Sciences Week, invited — Worcester, MA
Recurrent Models for Clinical Time Series — 2019

TEACHING/MENTORING

I have supervised two Masters Theses and eight NSF-funded REU students.

Students Advised:

- Prathyush Parvatharaju, MS, WPI (Data Scientist @ CodaMetrix) — 2019-now
  - **Masters Thesis**: *Learning Saliency Maps to Explain Deep Time Series Classifiers*
- Ramesh Doddaiah, PhD, WPI — 2020-now
- Aleksa Perucic, MS, WPI — 2019-2020
  - **Masters Thesis**: *SIFT - A Deep Network for Irregular Multivariate Time Series*
- Liubuo (Yuuna) Klindziuk, BS, Amherst College — 2019
- Daniel Johnston, BS, Columbia University — 2019
- Lolita Nazarov, BS, StonyBrook University — 2019
- Julia Friend, BS, Oberlin College (SWE @ MSFT) — 2018
- Alex Hauck, BS, Valporaiso University — 2018
- Sruthi Kurada, Advanced Math & Science Academy Charter School — 2018
- Sarah Brownell, BS, Simmons University — 2017
- Sean Tocci, BS, UMass Dartmouth — 2017

Developed workshop on Deep Learning with PyTorch for Undergrads, WPI. — 2019

SERVICE

Conference Program Committee:

- AAAI ('21, '22)
- CVPR ('21)
- ICCV ('21)
- ACL ('21, '22)
- EMNLP ('21)
- NAACL ('22)

External Reviewer: KDD ('18, '19, '20)
Conference Volunteer: KDD ('19, '20, '21), NeurIPS ('20, '21)
Deep Learning Reading Group, Organizer, WPI — 2019-2020
Graduate Student Advisory Council to the Dean of Arts & Sciences, WPI — 2018-2020
Graduate Student Government Senate, WPI — 2018
Data Science Graduate Student Council, WPI — 2016-2019