

# Tom Hartvigsen

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[thartvigsen.github.io](https://github.com/thartvigsen)

Cambridge, Massachusetts

INTERESTS: Data Mining, Time Series, Deep Learning, Reinforcement Learning, Explainability, AI for Medicine

## EDUCATION

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### Worcester Polytechnic Institute, Worcester, MA

Ph.D., Data Science

Expected 2022

Dissertation: *Observation and Prediction Timing in Time Series Classification*.

Committee: Elke Rundensteiner (Advisor), Xiangnan Kong (Advisor), Randy Paffenroth, Jenna Wiens.

M.S., Data Science

2018

Advisors: Elke Rundensteiner, Xiangnan Kong

### SUNY Geneseo, Geneseo, NY

B.A., Applied Mathematics, minor in Biomathematics

2016

## EXPERIENCE

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### Intern, UMass Medical School, Worcester, MA

2019

Developed an automatic text summarization tool for clinical trial eligibility criteria to recommend inclusion and exclusion criteria for new clinical trials.

Supervisor: Dr. Jomol Matthew

### Intern, University of Arizona, Tucson, AZ

2015

Built an instance-segmentation model for camera trap images of creosote bushes to model the effects of drought over time in the Sonoran desert.

Supervisor: Prof. Shirley Papuga

## GRANTS

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### 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 (KDD'19 and KDD'20) and I am responsible for 90% of the writing.*

## PUBLICATIONS

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

### UNDER REVIEW

27. **Thomas Hartvigsen**, Walter Gerych, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner. *Early Classification of Irregular Time Series*.
26. **Thomas Hartvigsen**, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner. *Continuous-Time Attention Network for Irregularly-Sampled Time Series Classification*.
25. Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Elke Rundensteiner. *Recovering The Propensity Score from Biased Positive Unlabeled Data*.
24. Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, Elke Rundensteiner, Emmanuel Agu. *Positive Unlabeled Learning with a Sequential Selection Bias*.
23. Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Elke Rundensteiner, Emmanuel Agu. *Exact Multi-Label Classification with Incompletely Labeled Data*.
22. Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Elke Rundensteiner. *Recurrent Bayesian Classifier Chains for Exact Multi-label Classification*.

21. Dongyu Zhang, Cansu Sen, Jidapa Thadajarassiri, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *Human-like Explanation for Text Classification with Limited Attention Supervision*.
20. Hang Yin, Xinyue Liu, Xiangnan Kong, **Thomas Hartvigsen**, Yanhua Li. *Multi-State Brain Network Discovery*.
19. Luke Buquicchio, Walter Gerych, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, **Thomas Hartvigsen**, Elke Rundensteiner. *Variational Open-Set Recognition*.

#### REFEREED

18. Prathyush Parvatharaju, Ramesh Doddaiiah, **Thomas Hartvigsen**, Elke Rundensteiner. *Learning Saliency Maps to Explain Deep Time Series Classifiers*. ACM International Conference on Information and Knowledge Management (**CIKM**), 2021 (271/1251 = 21% acceptance rate).
17. Hang Yin, John Boaz Lee, Xiangnan Kong, **Thomas Hartvigsen**, Sihong Xie. *Energy-Efficient Models for High-Dimensional Spike Train Classification using Sparse Spiking Neural Networks*. ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**), 2021 (238/1541 = 15.4% acceptance rate).
16. Jidapa Thadajarassiri, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *Semi-Supervised Knowledge Amalgamation for Sequence Classification*. AAAI Conference on Artificial Intelligence (**AAAI**), 2021 (1692/7911 = 20% acceptance rate).
15. **Thomas Hartvigsen**, Cansu Sen, Xiangnan Kong, Elke Rundensteiner. *Recurrent Halting Chain for Early Multi-label Classification*. ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**), 2020 (216/1279 = 16.9% acceptance rate).
14. Cansu Sen, **Thomas Hartvigsen**, Biao Yin, Xiangnan Kong, Elke Rundensteiner. *Human Attention Maps for Text Classification: Do Humans and Neural Networks Focus on the Same Words?* Annual Meeting of the Association for Computational Linguistics (**ACL**), 2020 (571/2244 = 17.6 acceptance rate%).
13. **Thomas Hartvigsen**, Cansu Sen, Xiangnan Kong, Elke Rundensteiner. *Learning to Selectively Update State Neurons in Recurrent Networks*.
12. Jidapa Thadajarassiri, Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *Learning Similarity-Preserving Word Meta-Embedding*. IEEE International Conference on Big Data (**BigData**), 2020 (15.5% acceptance rate).
11. Erin Teeple, **Thomas Hartvigsen**, Cansu Sen, Kajal Claypool, Elke Rundensteiner. *Clinical Performance Evaluation of a Machine Learning System for Predicting Hospital-Acquired Clostridium Difficile Infection*. International Conference on Health Informatics (**HEALTHINF**), 2020. 🏆 **Best Poster**.
10. **Thomas Hartvigsen**, Cansu Sen, Xiangnan Kong, Elke Rundensteiner. *Adaptive-Halting Policy Network for Early Classification*. ACM SIGKDD Conference on Knowledge Discovery and Data Mining (**KDD**), 2019 (170/1200 = 14.2% acceptance rate).
9. Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *Patient-Level Classification of Clinical Note Sequences Guided by Attributed Hierarchical Attention*. IEEE International Conference on Big Data (**BigData**), 2019 (19.3% acceptance rate).
8. Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *Learning Temporal Relevance in Longitudinal Medical Notes*. IEEE International Conference on Big Data (**BigData**), 2019 (19.3% acceptance rate).
7. Jidapa Thadajarassiri, Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *Comparing General and Locally-Learned Word Embeddings for Clinical Text Mining*. IEEE International Conference on Biomedical and Health Informatics (**BHI**), 2019.
6. Daniel Johnston<sup>†</sup>, Liubou Klindziuk<sup>†</sup>, Lolita Nazarov<sup>†</sup>, **Thomas Hartvigsen**, Elke Rundensteiner. *Early Diagnosis Prediction with Recurrent Neural Networks*.<sup>\*</sup> IEEE MIT Undergraduate Research Technology Conference (**URTC**), 2019. 🏆 **Best Paper runner up**.

5. **Thomas Hartvigsen**, Cansu Sen, Elke Rundensteiner. *Detecting MRSA Infections by Fusing Structured and Unstructured Electronic Health Record Data*. International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC), 2018.
4. Julia Friend<sup>†</sup>, Alec Hauck<sup>†</sup>, Sruthi Kurada<sup>†</sup>, Cansu Sen, **Thomas Hartvigsen**, Elke Rundensteiner. *Handling Missing Values in Multivariate Time Series Classification*.<sup>\*</sup> IEEE MIT Undergraduate Research Technology Conference (URTC), 2018.
3. **Thomas Hartvigsen**, Cansu Sen, Sarah Brownell<sup>†</sup>, Erin Teeple, Xiangnan Kong, Elke Rundensteiner. *Early Prediction of MRSA Infections using Electronic Health Records*. International Conference on Health Informatics (HEALTHINF), 2018. 🏆 **Best Student Paper finalist**.
2. Sarah Brownell<sup>†</sup>, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner. *MRSA Infection Prediction System*.<sup>\*</sup> IEEE MIT Undergraduate Research Technology Conference (URTC), 2018.
1. Cansu Sen, **Thomas Hartvigsen**, Kajal Claypool, Elke Rundensteiner. *CREST - Risk Prediction for Clostridium Difficile Infection Using Multimodal Data Mining*. European Conference on Machine Learning (ECML), 2017.

<sup>†</sup>undergraduate advisee.

<sup>\*</sup>undergraduate paper under my supervision (3 total).

## SELECTED HONORS & AWARDS

CIKM Student Travel Award, ACM	2020
KDD Student Travel Award, NSF and ACM	2020
Graduate Student Travel Award (\$1000), WPI	2020
IMA Travel Award (\$500), University of Minnesota	2019
KDD Student Travel Award (\$500), NSF and ACM	2019
Graduate Student Travel Award (\$1000), WPI	2019
Outstanding Graduate Research Award, WPI Data Science	2019
🏆 Best Poster (\$500), Graduate Research Innovation and Exchange, WPI	2019
Graduate Student Travel Award (\$1000), WPI	2018
Graduate Student Travel Award (\$1000), WPI	2017
GAANN Fellowship (Tuition Award + Annual Stipend), U.S. Department of Education	2016

## SELECTED TALKS

<b>Harvard University, invited speaker</b> <i>Adaptive-Halting Policy Networks for Early Classification</i> Host: Prof. Finale Doshi-Velez	Cambridge, MA 2020
<b>Florida State University, invited speaker</b> <i>Adaptive-Halting Policy Networks for Early Classification</i> Host: Prof. Karen Works	Panama, FL 2020
<b>The MITRE Corporation, invited speaker</b> <i>Adaptive-Halting Policy Networks for Early Classification</i>	Bedford, MA 2020
<b>Computational Sustainability Doctoral Consortium</b> <i>Adaptive-Halting Policy Networks for Early Classification</i>	Virtual Event 2020
<b>Worcester Polytechnic Institute, 3MT Competition</b> <i>Early Classification of Clinical Time Series</i>	Worcester, MA 2020
<b>University of Minnesota, Institute for Mathematics and its Applications</b> <i>Adaptive-Halting Policy Networks for Early Classification</i>	Minneapolis, MN 2019
<b>Northeastern University, New England Machine Learning Day</b> <i>Adaptive-Halting Policy Networks for Early Classification, poster</i>	Boston, MA 2019

## TEACHING

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I have been the primary advisor for two Masters Theses and three NSF-funded REU groups.

### Students Advised

- Prathyush Parvatharaju (MS Thesis), Worcester Polytechnic Institute 2019-Now  
 – **Masters Thesis:** *Learned Saliency Maps to Explain Deep Time Series Classifiers*
- Ramesh Doddaiiah (PhD student), Worcester Polytechnic Institute 2020-Now
- Aleksa Perucic (MS Thesis), Worcester Polytechnic Institute 2020  
 – **Masters Thesis:** *SIFT - A Deep Network for Irregular Multivariate Time Series*
- Liubuo (Yuuna) Klindziuk (Undergraduate), Amherst College, NSF REU 2019
- Daniel Johnston (Undergraduate), Columbia University, NSF REU 2019
- Lolita Nazarov (Undergraduate), StonyBrook University, NSF REU 2019
- Julia Friend (Undergraduate), Oberlin College, NSF REU 2018
- Alex Hauck (Undergraduate), Valporaiso University, NSF REU 2018
- Sruthi Kurada, Advanced Math & Science Academy Charter School, NSF REU 2018
- Sarah Brownell (Undergraduate), Simmons University, NSF REU 2017
- Sean Tocci (Undergraduate), UMass Dartmouth, NSF REU 2017

**Developed and led workshop on Deep Learning with PyTorch for Undergrads, WPI.** 2019

## SERVICE

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**Program Committee:** AAAI ('21), CVPR ('21), ICCV ('21), ACL ('21), EMNLP ('21)  
**External Reviewer:** KDD ('18, '19, '20)  
**Conference Volunteer:** KDD ('19, '20, '21), NeurIPS ('20)  
**Organized Deep Learning Reading Group, 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