

# 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 2021

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

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

### **SUNY Geneseo**, Geneseo, NY

B.A., Applied Mathematics, minor in biomathematics

2016

Advisors: Prof. Chris Leary, Prof. Kirk Anne

## EXPERIENCE

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### **Research 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

### **Research Intern**, NSF REU, University of Arizona, Department of Environmental Science, Tucson AZ

2015

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

Supervisor: Prof. Shirley Papuga

## PUBLICATIONS

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### PAPERS UNDER REVIEW

25. *Continuous-Time Attention Networks for Irregularly-Sampled Time Series Classification*.

**Thomas Hartvigsen**, Jidapa Thadajarassiri, Xiangnan Kong, Elke Rundensteiner.

In submission to KDD 2021.

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

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

In submission to KDD 2021.

23. *Exact Multi-Label Classification with Incompletely Labeled Data*.

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

In submission to KDD 2021.

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

Walter Gerych, **Thomas Hartvigsen**, Luke Buquicchio, Elke Rundensteiner.

In submission to KDD 2021.

21. *Learning Saliency Maps to Explain Deep Time Series Classifiers*.

Prathyush Parvatharaju, Ramesh Doddiah, **Thomas Hartvigsen**, Elke Rundensteiner.

In submission to KDD 2021.

20. *Explainable Text Classification with Partially-Labeled Human Attention*.

Dongyu Zhang, Cansu Sen, Jidapa Thadajarassiri, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.

In submission to KDD 2021.

19. *Multi-State Brain Network Discovery*.  
Hang Yin, Xinyue Liu, Xiangnan Kong, **Thomas Hartvigsen**, Yanhua Li.  
In submission to KDD 2021.
18. *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.  
In submission to KDD 2021.
17. *Variational Open-Set Recognition*.  
Luke Buquicchio, Walter Gerych, Kavin Chandrasekaran, Abdulaziz Alajaji, Hamid Mansoor, **Thomas Hartvigsen**, Elke Rundensteiner.

#### PEER-REVIEWED

16. *Semi-Supervised Knowledge Amalgamation for Sequence Classification*.  
Jidapa Thadajarassiri, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.  
AAAI Conference on Artificial Intelligence (AAAI), 2021.
15. *Recurrent Halting Chain for Early Multi-label Classification*.  
**Thomas Hartvigsen**, Cansu Sen, Xiangnan Kong, Elke Rundensteiner.  
ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2020.
14. *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.  
Annual Meeting of the Association for Computational Linguistics (ACL), 2020.
13. *Learning to Selectively Update State Neurons in Recurrent Networks*.  
**Thomas Hartvigsen**, Cansu Sen, Xiangnan Kong, Elke Rundensteiner.  
ACM International Conference on Information and Knowledge Management (CIKM), 2020.
12. *Learning Similarity-Preserving Word Meta-Embedding*.  
Jidapa Thadajarassiri, Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.  
IEEE International Conference on Big Data (BigData), 2020.
11. *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.  
International Conference on Health Informatics (HEALTHINF), 2020. 🏆 Best Poster.
10. *Adaptive-Halting Policy Network for Early Classification*.  
**Thomas Hartvigsen**, Cansu Sen, Xiangnan Kong, Elke Rundensteiner.  
KDD 2019. ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2019.
9. *Patient-Level Classification of Clinical Note Sequences Guided by Attributed Hierarchical Attention*.  
Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.  
IEEE International Conference on Big Data (BigData), 2019.
8. *Learning Temporal Relevance in Longitudinal Medical Notes*.  
Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.  
IEEE International Conference on Big Data (BigData), 2019.
7. *Comparing General and Locally-Learned Word Embeddings for Clinical Text Mining*.  
Jidapa Thadajarassiri, Cansu Sen, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.  
IEEE International Conference on Biomedical and Health Informatics (BHI), 2019.
6. *Early Diagnosis Prediction with Recurrent Neural Networks*.  
Daniel Johnston<sup>†</sup>, Liubou Klindziuk<sup>†</sup>, Lolita Nazarov<sup>†</sup>, **Thomas Hartvigsen**, Elke Rundensteiner.  
IEEE URTC 2019. 🏆 Best Paper runner up.
5. *Detecting MRSA Infections by Fusing Structured and Unstructured Electronic Health Record Data*.  
**Thomas Hartvigsen**, Cansu Sen, Elke Rundensteiner.

International Joint Conference on Biomedical Engineering Systems and Technologies (**BIOSTEC**), 2018.

4. *Handling Missing Values in Multivariate Time Series Classification.*

Julia Friend<sup>†</sup>, Alec Hauck<sup>†</sup>, Sruthi Kurada<sup>†</sup>, Cansu Sen, **Thomas Hartvigsen**, Elke Rundensteiner.  
IEEE URTC 2018.

3. *Early Prediction of MRSA Infections using Electronic Health Records.*

**Thomas Hartvigsen**, Cansu Sen, Sarah Brownell<sup>†</sup>, Erin Teeple, Xiangnan Kong, Elke Rundensteiner.  
International Conference on Health Informatics (**HEALTHINF**), 2018. 🏆 Best Student Paper finalist.

2. *MRSA Infection Prediction System.*

Sarah Brownell<sup>†</sup>, **Thomas Hartvigsen**, Xiangnan Kong, Elke Rundensteiner.  
IEEE URTC 2017.

1. *CREST - Risk Prediction for Clostridium Difficile Infection Using Multimodal Data Mining.*

Cansu Sen, **Thomas Hartvigsen**, Kajal Claypool, Elke Rundensteiner.  
European Conference on Machine Learning (**ECML**), 2017.

<sup>†</sup>undergraduate advisee.

## HONORS & AWARDS

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

## GRANTS

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**NSF-IIS: Timely Classification for Actionable Predictions** (Under Review)

*This grant is written based on my research (KDD'19 and KDD'20) and I am responsible for 95% of the writing.*

## SELECTED TALKS

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<b>Harvard University, invited speaker</b>	Cambridge, MA
<i>Adaptive-Halting Policy Networks for Early Classification</i>	2020
<b>Florida State University, invited speaker</b>	Panama, FL
<i>Adaptive-Halting Policy Networks for Early Classification</i>	2020
<b>The MITRE Corporation, invited speaker</b>	Bedford, MA
<i>Adaptive-Halting Policy Networks for Early Classification</i>	2020
<b>Computational Sustainability Doctoral Consortium</b>	Virtual Event
<i>Adaptive-Halting Policy Networks for Early Classification</i>	2020
<b>Worcester Polytechnic Institute, 3MT Competition</b>	Worcester, MA
<i>Early Classification of Clinical Time Series</i>	2020
<b>University of Minnesota, Institute for Mathematics and its Applications</b>	Minneapolis, MN
<i>Adaptive-Halting Policy Networks for Early Classification</i>	2019
<b>Worcester Polytechnic Institute, NSF REU Tutorial</b>	Worcester, MA
<i>Introduction to Deep Learning with PyTorch</i>	2019

Northeastern University, New England Machine Learning Day  
*Adaptive-Halting Policy Networks for Early Classification*, poster

Boston, MA  
2019

Worcester Polytechnic Institute, Arts and Sciences Week, invited speaker  
*Recurrent Models for Clinical Time Series*

Worcester, MA  
2019

## TEACHING

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I have been the primary advisor for five projects including two MS 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 2019-2020
    - **Masters Thesis:** *SIFT - A Deep Network for Irregular Multivariate Time Series*
  - Liubuo 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/Reviewing:** AAAI ('21), CVPR ('21), ICCV ('21), ACL ('21)

**External Reviewer:** KDD ('18, '19, '20)

**Organized and led 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