

# MAX TOROP

[maxtorop.github.io](https://maxtorop.github.io)

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## EDUCATION

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- Northeastern University**, Boston, MA 09/2020–Current  
- PhD in Electrical Engineering (GPA: 4.00/4.00)  
- Advised by Professor Jennifer Dy
- Washington University in St. Louis**, St. Louis, MO 09/2018–12/2019  
- M.S. in Computer Science (GPA: 3.97/4.00)  
- Advised by Professor Ulugbek Kamilov
- The University of Rochester**, Rochester, NY 09/2014–05/2018  
- B.S. in Data Science (GPA: 3.40/4.00)

## RESEARCH EXPERIENCE

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- Machine Learning Lab** 09/2020 – Current  
*Northeastern* Boston, MA  
- **Interpretability:** Developed SmoothHess, a method for interpreting neural network predictions through quantifying input feature interactions. SmoothHess was used to interpret predictions from a network trained on spiromograms to predict biomarkers related to lung disease. To appear in **NeurIPS 2023**.  
- **Out-of-Distribution Detection:** Collaborated with scientists at **Memorial Sloan Kettering Cancer Center** to evaluate and improve the capability of unsupervised out-of-distribution detection methods for dermoscopy data. Published in the NeurIPS 2021 Workshop: Medical Imaging Meets NeurIPS.
- Computational Imaging Group** 05/2019 – 12/2019  
*Washington University in St. Louis* St. Louis, MI  
- Collaborated with radiologists to develop a self-supervised deep learning model which reconstructs quantitative R2\* images from MRI data. R2\* is a metric which gives insight into the iron contents of the brain. Published in the journal **Magnetic Resonance in Medicine (MRM)**.  
- Mentored an undergraduate student in the lab for her senior thesis project.

## WORK EXPERIENCE

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- ID Tech Camps** 07/2018 – 08/2018  
*Instructor* New York, NY  
- Taught teenagers to create deep neural networks in TensorFlow as well as basic machine learning practices such as data splitting and preprocessing.
- Clarapath** 05/2015 – 09/2015  
*Intern* New York, NY  
- Developed a web-facing application for clients to host medical image data.

## PUBLICATIONS AND TALKS

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- Published*
- **Max Torop\***, Aria Masoomi\*, Davin Hill, Kivanc Kose, Stratis Ioannidis, Jennifer Dy. "SmoothHess: ReLU Network Feature Interactions via Stein's Lemma," to appear in **NeurIPS 2023**.
  - Davin Hill, **Max Torop**, Aria Masoomi, Peter J. Castaldi, Michael H. Cho, Jennifer Dy, Brian D. Hobbs. "Deep Learning Utilizing Discarded Spirometry Data to Improve Lung Function and Mortality Prediction in the UK Biobank," ATS 2022 (Oral, ~5% of submissions).
  - **Max Torop**, Sandesh Ghimire, Wenqian Liu, Dana H. Brooks, Octavia Camps, Milind Rajadhyaksha, Jennifer Dy, Kivanc Kose, "Unsupervised Approaches for Out-Of-Distribution Dermoscopic Lesion Detection," NeurIPS 2021: Medical Imaging Meets NeurIPS Workshop.

- **Max Torop**, Satya V.V.N. Kothapalli, Yu Sun, Jiaming Liu, Sayan Kahali, Dmitriy A. Yablonskiy, Ulugbek S. Kamilov, "Deep learning using a biophysical model for robust and accelerated reconstruction of quantitative, artifact-free and denoised images," **Magnetic Resonance in Medicine**, vol. 84, no. 6, pp. 2932–2942, 2020.

### *Preprints*

- Davin Hill, **Max Torop**, Aria Masoomi, Peter J. Castaldi, Edwin K. Silverman, Sandeep Bodduluri, Surya P. Bhatt, Taedong Yun, Cory Y. McLean, Farhad Hormozdiari, Jennifer Dy, Michael H. Cho, Brian D. Hobbs, "Deep learning utilizing suboptimal spirometry data to improve lung function and mortality prediction in the UK Biobank," medRxiv 2023. In Submission.
- Davin Hill, Aria Masoomi, Sandesh Ghimire, **Max Torop**, Jennifer Dy, "Boundary-Aware Uncertainty for Feature Attribution Explainers," ArXiv 2022. In Submission.

### *Invited Talks*

- "Unsupervised representation learning for detecting out of distribution samples in dermoscopy images of eight types of skin lesions," SPIE BIOS, San Francisco, CA, 03/2022.

## TEACHING AND LEADERSHIP

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- Worked as the teaching assistant for the graduate level Advanced Machine Learning course at Northeastern University (Spring 2022).
- Organized the purchase and setup of a server for our group. Created documentation detailing usage guidelines.
- Co-organize a bi-weekly seminar for the SPIRAL group at Northeastern. Responsibilities include selecting and reaching out to speakers, advertisement and facilitating one-on-one post-seminar meetings between the speaker and interested faculty. Speakers: Fei Miao (UConn), Amin Karbasi (Yale), Brian Kulis (BU, Upcoming), Jonathan Huggins (BU, Upcoming) and David Rosen (NEU, upcoming).

## SKILLS AND SERVICE

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- **Research:** Out-of-Distribution Detection, Interpretable Machine Learning.
- **Languages / Tools:** Python, PyTorch, pandas, NumPy, scikit-learn,  $\text{\LaTeX}$ , SLURM.
- **Familiar:** MATLAB, Java.
- **Service:** Reviewer for AISTATS, AAAI and SIVP.

## AWARDS

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| - Dean's Fellowship (Northeastern)          | 2020-2024 |
| - Dean's List, 5 Terms (Rochester)          | 2014-2018 |
| - Research and Innovation Grant (Rochester) | 2014      |