Matthew Nokleby

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SUMMARY OF QUALIFICATIONS

- **Extensive technical knowledge.** Authored/co-authored 40+ peer-reviewed publications in machine learning and signal processing, including deep learning, information theory, and stochastic optimization.

- **Proven leadership experience.** Lead a team of 10+ scientists and engineers, identifying business needs, defining technical strategy, and coordinating efforts across international teams. Mentor/train junior scientists and graduate interns. Previously directed a university research lab, organized conferences, mentored graduate students.

- **Solid engineering chops.** Design, train, and productize multi-stage machine learning systems using Python/Tensorflow/etc. Build solutions that meet business needs and practical constraints on computation power and inference time. Work in a wide variety of application spaces, including visual search/style, visual tracking, and augmented reality.

- **Strong oral and written communication.** Given dozens of conference and invited seminar talks. Led or contributed to a dozen federal grant proposals. Award-winning university teacher.

EDUCATION

Ph.D., Electrical and Computer Engineering, Rice University, 2012.
(Winner of the ECE **Best Ph.D. Thesis Award**.)

M.S., Electrical and Computer Engineering, Brigham Young University, 2008.

B.S., Electrical and Computer Engineering *(cum laude)*, Brigham Young University, 2006.

POSITIONS HELD

Director of Artificial Intelligence for Advanced Machine Learning, Target Corporation, 2019 – present.

Lead AI Scientist, Target Corporation, 2018 – 2019.

Assistant Professor, Department of Electrical Engineering, Wayne State University, 2015 – 2018.

Post-doctoral Associate, Information Initiative at Duke (iiD), Duke University, 2013 – 2015.

Research Assistant, Center for Multimedia Communications, Rice University, 2008 – 2012.

Research Assistant, Brigham Young University, 2005 – 2008.

Software Engineer, WingateWeb LLC, 2003 – 2005.

RECENT RESEARCH CONTRIBUTIONS

A complete list of publications is available at `https://docnok.github.io`.

- **Learning deep convolutional networks from datasets with corrupted labels.**
  I. Jindal, **MN**, D. Pressel, X. Chen, "A Nonlinear, Noise-aware, Quasi-clustering Approach to Learning Deep CNNs from Noisy Labels," CVPR Workshop on Uncertainty and Robustness in Deep Learning, Long Beach, CA, 2019.

  I. Jindal, **MN**, D. Pressel, and B. Lester, "An Effective Label Noise Model for DNN Text Classification," Conference of the North American Chapterof the Association for Computational Linguistics, Minneapolis, MN, 2019.

  I. Jindal, **MN**, X. Chen, "Learning Deep Networks from Noisy Labels with Dropout Regularization," IEEE International Conference on Data Mining, 2016.

- **Algorithms and fundamental performance limits for classifying subspaces and tensors.**

  I. Jindal and **MN**, "Classification and Representation via Separable Subspaces: Performance Limits and Algorithms," IEEE Journal on Special Topics in Signal Processing, 2019.

MN, M. Rodrigues, R. Calderbank, "Discrimination on the Grassmann Manifold: Fundamental Limits of Subspace Classifiers," IEEE Transactions on Information Theory, 2015.

- **Distributed machine learning over "slow" Internet-of-things networks.**
  N. Ferdinand, S. Draper, H. Al-Lawati, **MN**, "Anytime Minibatch: Exploiting Stragglers in Online Distributed Optimization," International Conference on Learning Representations, New Orleans, LA, 2019.

  MN and W. Bajwa, "Stochastic Optimization from Distributed, Streaming Data in Rate-limited Networks," IEEE Transactions on Signal and Information Processing over Networks, 2019.

EDUCATIONAL CONTRIBUTIONS

- **Developed a new course in statistical signal processing and machine learning.** Graduate-level course titled "Detection, Estimation, and Learning." Covers fundamental topics, including Bayesian/maximum-likelihood estimation, principal components analysis, regression, clustering, and Kalman filtering. Developed 15+ Jupyter Notebooks for in-class demonstration of concepts and applications. Course materials available at `http://github.com/docnok/`.

- **Re-architected an undergraduate course in signal processing and linear systems.** Developed a dozen MATLAB Live scripts for in-class demonstration of course concepts, including Fourier transforms, filtering of images, Nyquist sampling, and feedback control. Course materials available at `http://github.com/docnok/`.

LEADERSHIP ACTIVITIES

- Directed the **Information Processing Lab** in the Department of Electrical Engineering at Wayne State University. Personnel included five M.S./Ph.D. students. Total budget in excess of \$100K/yr. Mentored graduate students, coordinated and revised papers for peer review, requisitioned and maintained equipment and computational resources, and wrote grant proposals.

- Mentored the IEEE Student Branch at WSU. Co-organized the **IEEE Region 4 Student Leadership Conference**. Attracted student participants from nine states, sought out industry sponsors and participants, judged student competitions.

- Organize peer review and special sessions for multiple technical conferences. Select and coordinate invited speakers, find peer reviewers, ensure timely completion of reviews.

TECHNICAL SKILLS

- **Machine learning.** Deep neural networks (CNNs/RNNs/Transformers) for visual search, image classification, and natural language processing; linear classification and regression models; feature extraction via principal components, deep metric learning, and non-negative matrix factorization; sparse coding and models; sample complexity and model selection.

- **Probability and Statistical Signal Processing.** Bayesian and maximum-likelihood estimation; hypothesis testing; signal detection in noise; random processes; graphical models and hidden Markov models.

- **Optimization.** First- and second-order methods; SGD/Adam/etc.; distributed optimization.

- **Information Theory.** Lossy and lossless compression; error control coding; digital communications; wireless communications networks.

- **Programming and Software Engineering.** Python, MATLAB, C++, R; scikit-learn, Tensorflow, and PyTorch; Javascript, iOS/Swift; Hive/HQL, Mongo; Docker/K8s, Drone.

SELECTED AWARDS
Excellence in Teaching Award, WSU College of Engineering, 2018.

Best Dissertation Award, Rice ECE Department, 2012.

AUVSI Student UAV competition, 2nd place, 2006.

Nokia/BYU Research Seminar, 2nd place, 2006.

Invited Talks   "How to Train Your Fine-grained Classifier," presented at the University of Minnesota, Dec. 2019.

"Distributed Machine Learning via the Information Bottleneck," IEEE Communications Theory Workshop, May 2018.

"Bits through Sensors: Bounds on Classification and Learning Performance via Information Content," Michigan Institute for Data Science (MIDAS), University of Michigan, Dec. 2017.

"Distributed Approaches to Mirror Descent for Stochastic Learning over Rate-limited Networks," DIMACS Seminar on Distributed Learning and Optimization, Aug. 2017.

"Information-theoretic Performance Limits in Machine Learning," University of Illinois-Chicago, Michigan State University, and the University of Toronto, 2016-2017.

"Rate-distortion Bounds on the ell-1 Bayes Risk," Laboratory of Decision and Information Sciences (LIDS), MIT, Sept. 2015.