Matthew Nokleby

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http://github.com/docnok/

Summary of Qualifications

- **Extensive technical knowledge.** Authored/co-authored 40+ peer-reviewed publications in machine learning and signal processing, including deep learning and stochastic optimization.
- **Solid programming chops.** Implement machine learning and signal processing solutions in Python, MATLAB, C++, R, etc. Frequent user of scikit-learn, Tensorflow, Keras, and PyTorch.
- **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.
- **Meaningful leadership experience.** Direct a university research lab, organize conferences, and oversee peer review of technical papers.

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

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

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 `http://nokleby.eng.wayne.edu`.

- **Learning deep convolutional networks from datasets with corrupted labels.**
  I. Jindal, **MN**, X. Chen, "Learning Deep Networks from Noisy Labels with Dropout Regularization," IEEE International Conference on Data Mining, 2016.
- **Deep learning of taxi travel time for rideshare applications.**
  I. Jindal, Z. Qin, X. Chen, **MN**, J. Ye, "End-to-End Learning of Taxi Trip Travel Time and Distance Through a Unified Neural Network Approach," International Conference on Machine Learning and Data Mining, 2018.
- **Algorithms and fundamental performance limits for classifying subspaces and tensors.**
  MN, M. Rodrigues, R. Calderbank, "Discrimination on the Grassmann Manifold: Fundamental Limits of Subspace Classifiers," IEEE Transactions on Information Theory, 2015.

  I. Jindal and **MN**, "Classification and Representation via Separable Subspaces: Performance Limits and Algorithms," IEEE Journal on Special Topics in Signal Processing, in press.
- **Distributed machine learning over "slow" Internet-of-things networks.**
  MN and W. Bajwa, "Stochastic Optimization from Distributed, Streaming Data in Rate-limited Networks," IEEE Transactions on Signal and Information Processing over Networks, in press.
- **Information-theoretic sample complexity bounds for supervised learning.**
  MN, A. Beirami, R. Calderbank, "Rate-distortion bounds on Bayes risk in supervised learning," under review at IEEE Transactions on Information Theory. (Short version at ISIT 2016.)
- **Efficient estimation of channel state in 5G heterogeneous networks.**
  N. Michelusi, **MN**, U. Mitra, R. Calderbank "Multi-scale Spectrum Sensing in 5G Cognitive Networks," under review at IEEE Transactions on Communications. (Short version at ICC 2017.)

Educational Achievements

- **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

- Direct the **Information Processing Lab** in the Department of Electrical Engineering at Wayne State University. Personnel include five M.S./Ph.D. students. Total budget in excess of $100K/yr. Mentor graduate students, coordinate and revise papers for peer review, requisition and maintain equipment and computational resources, and write grant proposals.
- Mentor 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/LSTMs); linear classification and regression models; feature extraction via principal components, deep auto-encoders, 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; stochastic gradient descent; Nesterov acceleration; Adagrad, RMSProp, ADAM, etc.; distributed optimization.
- **Information Theory.** Lossy and lossless compression; error control coding; digital communications; wireless communications networks.
- **Programming.** Python, MATLAB, C++, R; Java, HTML, CSS, LaTeX; Jupyter notebooks and MATLAB Live; scikit-learn, Tensorflow, Keras, Pandas, and PyTorch; Git/GitHub and JIRA.

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

"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.