Robert DiPietro

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RESEARCH INTERESTS

My research focuses on machine learning for complex time-series data, applied primarily to health care. For example, is it possible to learn meaningful representations of surgical motion without supervision? And can we use these representations to improve automated skill assessment and automated coaching during surgical training?

EDUCATION

09/13 – current	**PhD Candidate, Computer Science** **Johns Hopkins University**, Baltimore, MD
09/08 – 05/10	**Master of Science, Electrical Engineering** **Northeastern University**, Boston, MA
	Thesis: "The Detection of Sub-Pixel Objects and Mitigation of False Alarms in Hyperspectral Imagery"
	GPA: 4.0 / 4.0
09/05 – 05/10	**Bachelor of Science, Applied Physics and Engineering**, *summa cum laude* **Northeastern University**, Boston, MA
	GPA: 4.0 / 4.0

RESEARCH AND PROFESSIONAL EXPERIENCE

09/13 – current	**Johns Hopkins University**, *Graduate Research Assistant / Teaching Assistant* Advisors: Prof. Gregory Hager and Prof. Nassir Navab
	Focus: Modeling complex time-series data, primarily for robot-assisted surgery
06/10 – 07/13	**MIT Lincoln Laboratory**, *Associate Research Staff* Advisors: Dr. Dimitris Manolakis and Dr. Gregory Berthiaume
	Focus: Detecting chemical warfare agents in long-wave hyperspectral imagery
05/09 – 05/10	**Northeastern University**, *Graduate Research Assistant* Advisors: Prof. Vinay Ingle and Dr. Dimitris Manolakis
	Focus: Detecting spatially-unresolved objects in short-wave hyperspectral imagery
07/08 – 05/09	**Northeastern University**, *Undergraduate Research Assistant* Advisor: Prof. Donald Heiman
	Focus: Obtaining the size distribution of nanoparticles using only magnetic measurements
05/07 – 12/07	**iRobot Corporation**, *Engineering Intern*
	Designed, drafted, and machined test fixtures for various robots

PUBLICATIONS

[1] Robert DiPietro, Christian Rupprecht, Nassir Navab, and Gregory D Hager. Analyzing and exploiting NARX recurrent neural networks for long-term dependencies. *arXiv preprint arXiv:1702.07805*, 2017.

[2] Christian Rupprecht, Iro Laina, Robert DiPietro, Maximilian Baust, Federico Tombari, Gregory D Hager, and Nassir Navab. Learning in an uncertain world: Representing ambiguity through multiple hypotheses. *International Conference on Computer Vision (ICCV)*, 2017.

[3] Huseyin Coskun, Felix Achilles, Robert DiPietro, Nassir Navab, and Federico Tombari. Long short-term memory kalman filters: Recurrent neural estimators for pose regularization. *International Conference on Computer Vision (ICCV)*, 2017.

[4] Robert DiPietro, Colin Lea, Anand Malpani, Narges Ahmidi, S Swaroop Vedula, Gyusung I Lee, Mija R Lee, and Gregory D Hager. Recognizing surgical activities with recurrent neural networks. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, 2016.

[5] D. Manolakis, S. Golowich, and R. DiPietro. Long-Wave Infrared Hyperspectral Remote Sensing of Chemical Clouds: A focus on signal processing approaches. *IEEE Signal Processing Magazine*, 31(4), 2014.

[6] C. Brett, R. DiPietro, D. Manolakis, and V. Ingle. Efficient Implementations of Hyperspectral Chemical-Detection Algorithms. *Proceedings of SPIE*, 8897, 2013.

[7] R. DiPietro, E. Truslow, D. Manolakis, S. Golowich, and R. Lockwood. False-Alarm Characterization in Hyperspectral Gas-Detection Applications. *Proceedings of SPIE*, 8515, 2012.

[8] R. DiPietro, D. Manolakis, R. Lockwood, T. Cooley, and J. Jacobson. Hyperspectral Matched Filter with False-Alarm Mitigation. *Optical Engineering*, 51(1), 2012.

[9] B. Plouffe, D. Nagesha, R. DiPietro, S. Sridhar, D. Heiman, S. Murthy, and L. Lewis. Thermomagnetic Determination of Fe_3O_4 Magnetic Nanoparticle Diameters for Biomedical Applications. *Journal of Magnetism and Magnetic Materials*, 323(17), 2011.

[10] B. Jugdersuren, S. Kang, R. DiPietro, D. Heiman, D. McKeown, I. Pegg, and J. Philip. Large Low Field Magnetoresistance in $La_{0.67}Sr_{0.33}MnO_3$ Nanowire Devices. *Journal of Applied Physics*, 109(1), 2011.

[11] R. DiPietro, H. Johnson, S. Bennett, T. Nummy, L. Lewis, and D. Heiman. Determining Magnetic Nanoparticle Size Distributions from Thermomagnetic Measurements. *Applied Physics Letters*, 96(22), 2010.

[12] S. Kang, G. Brewer, B. Jugdersuren, R. DiPietro, D. Heiman, A. Buechele, D. McKeown, I. Pegg, and J. Philip. Magnetotransport Properties of Mn-Si-C Based Nanostructures. *Journal of Applied Physics*, 107(10), 2010.

[13] R. DiPietro, D. Manolakis, R. Lockwood, T. Cooley, and J. Jacobson. Performance Evaluation of Hyperspectral Detection Algorithms for Sub-Pixel Objects. *Proceedings of SPIE*, 7695, 2010.

[14] S. Kang, G. Brewer, J. Battogtokh, R. DiPietro, D. Heiman, A. Buechele, D. McKeown, I. Pegg, and J. Philip. Growth and Characterization of Mn_5SiC Nanowires. *Nanoscience and Nanotechnology Letters*, 1(2), 2009.

Teaching Experience

Johns Hopkins University, Baltimore, MD

2018 Spring	Co-Instructor for EN.601.382, Machine Learning: Deep Learning Lab
2018 Spring	Co-Instructor for EN.601.482/682, Machine Learning: Deep Learning
2017 Fall	Teaching Assistant for EN.601.475/675, Introduction to Machine Learning
2015 Fall	Instructor for EN.500.111, HEART: Machine Learning for Surgical Workflow Analysis
2015 Spring	Teaching Assistant for EN.600.476/676, Machine Learning: Data to Models
2014 Spring	Co-Instructor for EN.600.120, Intermediate Programming
2014 Intersession	Instructor for EN.600.101, MATLAB for Data Analytics

Awards and Honors

2016   **Excellence in Teaching Award, Department of Computer Science, Johns Hopkins University**

2014   **Intuitive Surgical Fellowship (2014–2015), Johns Hopkins University**

2014   **International Exchange Program, Johns Hopkins University and Technical University of Munich**
US-Germany Research Collaboration on Medical Systems Engineering

2013   **Louis M. Brown Engineering Fellowship, Johns Hopkins University**

2012   **Team Award, MIT Lincoln Laboratory**

2009   **Eta Kappa Nu, Northeastern University**
Electrical and Computer Engineering Honor Society

2007   **Sigma Pi Sigma, Northeastern University**
Physics Honor Society

Miscellaneous Writing

2016   **A Friendly Introduction to Cross-Entropy Loss**   100,000+ views
`https://rdipietro.github.io/friendly-intro-to-cross-entropy-loss/`