

KRISTJAN GREENEWALD

University of Michigan \diamond Electrical Engineering and Computer Science

RESEARCH INTERESTS

Signal processing, statistical learning, computer vision. Low rank models, graphical models, sparsity.

EDUCATION

University of Michigan September 2012-Present

Ph.D. in Electrical Engineering (Signal Processing) in progress

Advisor: Prof. Alfred Hero III

GPA: 3.99

Wright State University September 2011-August 2012

M.S. in Electrical Engineering (Signal Processing)

Thesis: Prediction of Optimal Bayesian Classification Performance for LADAR ATR

Advisor: Prof. Brian Rigling

GPA: 4.0

Wright State University September 2010-June 2011

B.S. in Electrical Engineering

Concentration: Signal Processing

Magna cum Laude

GPA: 3.81

POSITIONS

University of Michigan, EECS Department September 2012 - Present

Graduate Research Assistant

Ann Arbor, MI

- Dissertation Advisor: Prof. Alfred Hero III.
- PhD research on Kronecker PCA and multiresolution graphical models for high dimensional covariance estimation, with associated learning algorithms and performance prediction results.
- Applied to solving problems including modeling of spatio-temporal processes, video/sensor network anomaly detection, and activity based clustering/segmentation of human crowds.

Wright State University, ATR Center (at Air Force Research Lab) July - September 2015

Air Force Research Lab (AFRL) Summer Intern

Dayton, OH

- AFRL (Sensors Directorate) Mentor: Edmund Zelnio.
- Continued work on development and GPU implementation of low-rank Kronecker PCA algorithms for covariance based spatio-temporal clutter removal and target detection in synthetic aperture radar imagery.

MIT Lincoln Laboratory

Summer Intern

May - July 2015

Lexington, MA

- Developed adaptive online learning algorithms with strong performance guarantees for learning optimal data metrics in dynamic environments, with applications to semisupervised clustering and classification.

Wright State University, ATR Center (at Air Force Research Lab) May - August 2014

Air Force Research Lab (AFRL) Summer Intern

Dayton, OH

- AFRL (Sensors Directorate) Mentor: Edmund Zelnio.

- Developed low-rank Kronecker PCA algorithms for covariance based spatio-temporal clutter removal and target detection in synthetic aperture radar imagery.

Wright State University, ATR Center (at AFRL)
AFRL Summer Intern

June - August 2013
 Dayton, OH

- AFRL (Sensors Directorate) Mentor: Edmund Zelnio.
- Developed algorithms for the detection of crowd behavior anomalies in video, based on efficient learning of sparse and low rank high-dimensional spatio-temporal models.

Wright State University, EE Department
Graduate Research Assistant

September 2011 - August 2012
 Dayton, OH

- Thesis Advisor: Prof. Brian Rigling.
- MS thesis research in the area of Laser Radar target classification performance prediction.
- Worked as intern at AFRL Sensors Directorate June - August 2012.

Wright State University, ATR Center (at AFRL)
AFRL Summer Intern

June 2011 - August 2011
 Dayton, OH

- Worked with developing/improving software to efficiently create physically accurate, model-based synthetic Flash Laser Radar imagery.
- Part of a team that developed a unified multi-sensor synthetic imagery generation system to enable more efficient evaluation of exploitation algorithms.

Wright State University, EE Department
Undergraduate Research Assistant

September 2010 - June 2011
 Dayton, OH

- Research Advisor: Prof. Brian Rigling.
- Developed algorithms to compute 3D imagery from sets of 2D images using tomographic backprojection followed by expectation maximization.

Wright State University, ATR Center (at AFRL)
AFRL Summer Intern

June 2010 - August 2010
 Dayton, OH

- Worked in the area of radar image formation with work involving implementation of the monostatic Polar Format Algorithm for Synthetic Aperture Radar (SAR) as a MATLAB program, as well as working with several other SAR image formation algorithms.

PUBLICATIONS

K. Greenewald, E. Zelnio, and A. Hero, "Kronecker PCA Based Robust SAR STAP," Submitted to *IEEE AES*, available as arXiv 1501.07481, 2015.

K. Greenewald and A. Hero, "Robust Kronecker Product PCA for Spatio-Temporal Covariance Estimation," *IEEE Transactions on Signal Processing*, 2015.

K. Greenewald and A. Hero, "Regularized Block Toeplitz Covariance Matrix Estimation via Kronecker Product Expansions," *IEEE Workshop on Statistical Signal Processing (SSP)*, 2014 (invited).

K. Greenewald and A. Hero, "Robust Kronecker Product PCA for Spatio-Temporal Covariance Estimation," *International Conference on Partial Least Squares and Related Methods (PLS)*, 2014 (invited).

K. Greenewald and A. Hero, "Kronecker PCA based spatio-temporal modeling of video for dismount classification," *Proceedings of SPIE*, 2014.

K. Greenewald, T. Tsiligkaridis, and A. Hero, "Kronecker Sum Decompositions of Space-Time Data," *IEEE Workshop on Computational Advances in Multi-Sensor Adaptive Processing (CAMSAP)*, December 2013 (invited).

K. Greenewald and B. Rigling, "Prediction of Optimal Bayesian Classification Performance for LADAR ATR," MS Thesis, August 2012.

PRESENTATIONS

"Robust Kronecker Product PCA for Spatio-Temporal Covariance Estimation," given with variations at:

University of Michigan, Graduate Student Statistical Topics Seminar Series, November 2014.
University of Michigan, Michigan Student Symposium for Interdisciplinary Statistical Sciences, March 2015.

"Kronecker PCA Based Space-Time Adaptive Processing," given with variations at:

Sensors Directorate, Air Force Research Laboratory, Dayton, OH, Aug. 2014.
ATR Center Workshop, Wright State University, Dayton, OH, Aug. 2014.

"Regularized Block Toeplitz Covariance Matrix Estimation via Kronecker Product Expansions," given at:

University of Michigan, Michigan Student Symposium for Interdisciplinary Statistical Sciences, March 2014.

"Kronecker PCA for Spatio-Temporal Data," given with variations at:

Royal Observatory of Belgium, Brussels, Belgium, Nov. 2013.
Ecole Supérieur d'Electricite (Supelec), Gif-sur-Yvette, France, Nov. 2013.
University of Michigan, Engineering Graduate Symposium, Nov. 2013.

"Detection of Anomalous Crowd Behavior Using Spatio-Temporal Kronecker Sum Decompositions," given with variations at:

Sensors Directorate, Air Force Research Laboratory, Dayton, OH, Aug. 2013.
ATR Center Workshop, Wright State University, Dayton, OH, Aug. 2013.

"Prediction of Optimal Bayesian Classification Performance for LADAR ATR," given at:

Sensors Directorate, Air Force Research Laboratory, Dayton, OH, Aug. 2012.

OTHER

Programming Languages: Matlab, Python, C/C++/Objective C.