

Curriculum Vitæ—Mianzhi Wang

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EDUCATION

Washington University in St. Louis, St. Louis, MO Aug. 2013 – Aug. 2018
Ph.D. in Electrical Engineering
Advisor: Prof. Arye Nehorai

Fudan University, Shanghai, China Sept. 2009 – June 2013
B.S. in Electronic Engineering (GPA: 3.82/4.00, Top 3)
Advisor: Prof. Tao Yang and Bo Hu

RESEARCH EXPERIENCE

Graduate Research Assistant Aug. 2013 – Present
Washington University in St. Louis St. Louis, MO

- *Machine Learning for Graph-structured Data*
 - Collaborated with labmates on developing machine learning algorithms for graph-structured data with applications to node representation, link prediction, graph classification, etc.
 - Accelerated simulations using MEX and OpenMP, enabling the processing of large graphs over multicore servers, resulting more than 100x speed up compared with the pure MATLAB implementation..
- *Domain Adaptation Using Optimal Transport*
 - Collaborated with labmates on the theoretical derivations that enable cross-domain learning.
 - Developed tools to extract and process feature vectors from deep layers in VGG, AlexNet, etc.
- *Robust Direction Finding Using Sparse Linear Arrays*
 - Considered both the deterministic error model and the stochastic error model.
 - Derived closed-form asymptotic MSE expressions of SS-MUSIC for both error models.
 - Derived and analyzed the Cramér-Rao bound for the deterministic error model.
 - Implemented robust estimation algorithms using optimization toolbox and CVX.
- *Statistical Performance Analysis of Sparse Linear Arrays*
 - First to derive a closed-form asymptotic MSE expression for DA-MUSIC and SS-MUSIC.
 - Thoroughly analyzed the Cramér-Rao bound for general sparse linear arrays.
 - Successfully interpreted various unusual experimental results via the derived theorems.
 - Developed an open source MATLAB toolbox for array performance analysis.

Student Advisor for Undergraduate Research July 2016 – Dec. 2016
Washington University in St. Louis St. Louis, MO

- Guided two undergraduate research projects on microphone array applications.
- Provided hands-on tutorials on signal acquisition and processing using MATLAB.

- *LabVIEW-based Automatic Protein Refolding Control System Design*
 - Led a 3-student undergraduate research group and gave the final presentation.
 - Developed a user-friendly protein refolding procedure designer using WinForms in C#.
 - Developed hardware control and monitoring software using LabVIEW.

TEACHING EXPERIENCE

Teaching Assistant Sept. 2017 – Dec. 2018
Washington University in St. Louis St. Louis, MO

- Assisted the teaching of ESE 351 Signals and Systems.
- Held weekly recitation sessions for class of 30 students.

JOURNAL PUBLICATIONS

- [1] **M. Wang**, Z. Zhang, and A. Nehorai, “Further results on coarrays, MUSIC, and the Cramér Rao bound,” in revision for *IEEE Trans. Signal Process.*
- [2] **M. Wang**, Z. Zhang, and A. Nehorai, “Performance analysis of coarray-based MUSIC in the presence of sensor location errors,” *IEEE Trans. Signal Process.*, vol. 66, pp. 3074-3085, June 2018.
- [3] Z. Zhang, **M. Wang**, and A. Nehorai, “Optimal transport in reproducing kernel Hilbert spaces: theory and applications,” in revision for *IEEE Trans. Pattern Anal. Mach. Intell.*
- [4] **M. Wang** and A. Nehorai, “Coarrays, MUSIC, and the Cramér Rao bound,” *IEEE Trans. Signal Process.*, vol. 65, no. 4, pp. 933–946, Feb. 2017.

CONFERENCE PUBLICATIONS

- [1] Z. Zhang, **M. Wang**, Y. Huang, and A. Nehorai, “Aligning infinite-dimensional covariance matrices in reproducing kernel Hilbert spaces for domain adaptation,” *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Salt Lake City, USA, June 22–28, 2018.
- [2] G. Jiang, X. Mao, **M. Wang**, Y. Liu and A. Nehorai, “Underdetermined DOA estimation with unknown source number in nonuniform noise,” *2018 IEEE Radar Conference (RadarConf18)*, Oklahoma City, OK, pp. 1422–1426, Apr. 2018.
- [3] **M. Wang**, Z. Zhang, and A. Nehorai, “Performance analysis of coarray-based MUSIC and the Cramér-Rao bound,” *Proc. 42nd IEEE Int. Conf. Acoustics, Speech, Signal Processing (ICASSP)*, New Orleans, LA, Mar. 5–9, 2017.
- [4] **M. Wang**, Z. Zhang, and A. Nehorai, “Direction finding using sparse linear arrays with missing data,” *Proc. 42nd IEEE Int. Conf. Acoustics, Speech, Signal Processing (ICASSP)*, New Orleans, LA, Mar. 5–9, 2017.
- [5] Z. Zhang, **M. Wang**, Y. Xiang, A. Nehorai, “Geometry-adapted Gaussian random field regression,” *Proc. 42nd IEEE Int. Conf. Acoustics, Speech, Signal Processing (ICASSP)*, New Orleans, LA, Mar. 5-9, 2017.

TECHNICAL SKILLS

- 5 years of experience in numerical simulations, data modeling and analysis using MATLAB/Python.

- Familiar with other programming languages including C, C++, Java, C#, TypeScript, Assembly.
- Familiar with both Windows and Linux operating systems.
- Hands on experience with deep learning models. Familiar with PyTorch and TensorFlow.
- Experience in front-end development. Maintaining a personal website with >2k views per month.

TECHNICAL PROJECTS

- **doa-tools**: A MATLAB library for statistical performance analysis of linear arrays.
 - Implemented commonly used DOA estimation algorithms including MUSIC, ESPRIT, MVDR, etc.
 - Implemented functions for CRB and asymptotic MSE computations.
- **jasmal**: A numpy like framework for numerical computing in JavaScript.
 - Feature rich tensor library with built-in complex number support written purely in TypeScript.
 - Implemented broadcasting, numpy-like slicing, and advanced linear algebra operations (EVD, QR, etc.).
 - Developed more than 700 test cases to ensure the correctness of each operation.

HONORS AND AWARDS

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| • People's Scholarship | 2011 - 2012 |
| • SCSK Scholarship | 2011 - 2012 |
| • National Scholarship (Awarded to the top one student in the department) | 2009 - 2010 |

EXTRACURRICULAR ACTIVITIES

Front-end Development Group Lead of STU Fudan University	Dec. 2010 – June. 2013 Shanghai, China
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- Responsible for the front-end development and maintenance of more than 3 Fudan students' websites.
- Collaborated with the back-end group and the design group to turn concepts into reality.
- Held regular workshops and presented new front-end technologies to group members.