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Haolin Chen

education

Ph.D in Applied Mathematics, UC Davis, 2017 - *Present*.
GPA: *3.73/4*

B.S. in Physics, Nankai University, 2012 - 2017.
Thesis: *Simulation of Zitterbewegung Effects*

B.S. in Mathematics, Nankai University, 2014 - 2017.
Thesis: *Robust Dimensionality Reduction Algorithms*

research interests

Mathematical foundation of data science and machine learning.
Convex and nonconvex optimization.

research projects

Provable tensor methods in high dimensional statistics and latent variable model learning, *Spring 2019 - Ongoing*
Advisor: Luis Rademacher, Professor of Mathematics, UC Davis.

I study the problem of learning a high-dimensional Gaussian mixture model, under minimum additional assumptions. I am developing a provable and efficient algorithm of learning Gaussian mixture model, with application to latent variable models, using techniques combining overcomplete tensor decomposition, sum-of-squares proof system, and nonconvex optimization.

Optical properties of PT-symmetric systems, Winter 2015 - Spring 2017
Advisor: Jing Chen, Professor of Physics, Nankai University.

Conducted numerical simulation of optical properties, such as Zitterbewegung effects, in PT-symmetric lattices model. These results provided numerical evidence of novel phenomena in optical lattice whose properties such as reflection rate are carefully manually adjusted. The research leads to discoveries in Moire lattice, and influenced the research in PT-symmetric optical system.

Manifold learning and dimensionality reduction algorithms, Fall 2016 - Spring 2017
Advisor: Chunlin Wu, Professor of Mathematics, Nankai University.

Studied both linear and non-linear manifold learning and implemented various dimensionality reduction algorithms on both synthetic and real-life datasets and tested their robustness against noise or adversarial attack.

publications

Journal articles

Wei Wang, Luqi Wang, Ruidong Xue, Haolin Chen, Ruipeng Guo, Yongmin Liu, and Jing Chen, (2017). Unidirectional Excitation of Radiative-Loss-Free Surface Plasmon Polaritons in PT-Symmetric Systems. *Physical review letters*, 119(7), 077401.

Ruidong Xue, Wei Wang, Luqi Wang, Haolin Chen, Ruipeng Guo, and Jing Chen (2017). Localization and oscillation of optical beams in Moiré lattices. *Optics express*, 25(5), 5788-5796.

Preprints

Haolin Chen, Luis Rademacher. Learning Gaussian Mixtures in High Dimension, *in preparation*.

programming skills

Prominent in numerical simulation and building machine learning or deep learning models using MATLAB.

Familiar with building machine learning pipeline using Python, as well as TensorFlow or PyTorch.

Familiar with C++, and implementation of traditional algorithms