Haolin Chen

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EDUCATION

University of California, Davis   Davis, CA
PhD Candidate in Applied Mathematics. Advisor: Luis Rademacher.   *Sep. 2017 – Expected Summer 2022*

Nankai University   Tianjin, China
Bachelor of Science in Physics and Bachelor of Science in Mathematics.   *Sep. 2012 – Jun. 2017*

WORK EXPERIENCE

Data Scientist Intern at Outreach   July 2021 – Dec 2021
- Drive the project from 0 to 1 with product managers as the main stakeholder. Define the technical problem, draft the technical design document, conduct experiments and write production-level code.
- Collect, validate and analyze *million-level* complicated and dirty data with distributed computing framework. Collaborate with multiple teams and design the annotation protocols of the project.
- Build domain-specific NLP models to solve the underlying business problem.
- *Championship* in Outreach Hackathon: Prototype topic classification, topic-based sentiment analysis, and summarization with business email/meeting data to monitor the history of deals.

Teaching Assistant   Fall 2017 – Present
- Lead discussions, office hours and give lectures in multiple undergraduate math courses.
- Courses taught: Calculus; Linear Algebra; Differential Equations; Real Analysis; Probability Theory; Advanced Linear Algebra

SKILLS AND COURSEWORK

Skills: Python, MATLAB, R, TensorFlow, PyTorch, Pandas, Scikit-Learn, Git, GCP, AWS, SQL, PySpark, Databricks.
Coursework: Numerical Optimization; Statistical Learning; Math Foundation of Data Sciences; Optimal Transport; Natural Language Processing; Specialization in Deep Learning(Coursera)

RESEARCH AND PROJECTS

Tensor Recovery, Approximation and Efficient Computation   Fall 2020 – Present
- Designed and implemented an algorithm in MATLAB for low rank symmetric tensor recovery.
- Developing efficient tensor decomposition algorithm via nonconvex optimization in TensorFlow with applications for efficient data storing.
- Developing efficient algorithms for best-rank tensor approximation and dimensionality reduction.

Clinically Interpretable Thyroid Cancer Classification   Fall 2020 – Spring 2021
- Collaborate with the thyroid lab of Department of General Surgery, Xiangya Hospital, Central South University to explore interpretable ML solutions in healthcare.
- Implemented CNN based models for classification of the thyroid cancer in PyTorch.
- Achieved 92% accuracy on the private test set of thousands of thyroid ultrasound images.
- Developed multi-modal, and clinically interpretable models for computer-aided diagnosis.

Question Answering System Based on BERT   Fall 2020
- Designed a new attention module in the system that captures possible unanswerable questions.
- Implemented the system in PyTorch and deployed on GCP. Designed experiments on over 100K texts.
- Achieved a 7% performance increase compared to the BERT baseline.

Provable Tensor Methods in High Dimensional Statistics Spring 2019 – Spring 2020

- Designed an *efficient* and *theoretically-provable* algorithm for *overcomplete* tensor decomposition that expands the family of decomposable tensors.
- Designed a *state-of-the-art* algorithm for learning Gaussian mixture models based on tensor decomposition, expanding the family of mixture models that can have provably-correct estimation from samples.

Numerical Simulation of Optical Lattices 2016-2017

- Conducted numerical simulation of multiple optical phenomena in optical lattices.
- Verified special properties of PT-symmetric systems and Moiré lattices and predicted new phenomena and applications.

RESEARCH TALKS

Machine Learning Summer School 2020 Summer 2020
Learning Gaussian Mixture Models via Tensor Decomposition

CACAO Seminar, Department of Mathematics, UC Davis Winter 2019
Overcomplete Tensor Decomposition

PUBLICATIONS

Preprints

- *Haolin Chen*, Luis Rademacher. Overcomplete order-3 tensor decomposition, blind deconvolution and Gaussian mixture models, *to appear, SIAM Journal on Mathematics of Data Science*.

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.

LEADERSHIP AND AWARDS

Awards

Departmental Fellowship, Department of Mathematics, UC Davis *Winter 2021*
Nankai University Student Fellowship *2016-2017*

Leadership

Vice President of Student Council, Department of Physics, Nankai University *2013-2014*