

Can Chen

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EDUCATION

UNIVERSITY OF MICHIGAN, ANN ARBOR (UMICH)

9/2016 – 5/2021

- Ph.D. in Applied & Interdisciplinary Mathematics (GPA: 4.00/4.00)
- M.S. in Electrical & Computer Engineering with Control Systems Track (GPA: 4.00/4.00)
- Research Interests: Control Theory, Network Theory, Numerical Analysis, Bioinformatics
- Course Highlights: Nonlinear Programming, Fast Algorithms, Stochastic Control, Nonlinear Control, Feedback Control, Digital Control, Hybrid Control, Machine Learning, Deep Learning, Self-Driving Cars, Biological Networks

UNIVERSITY OF CALIFORNIA, IRVINE (UCI)

9/2013 – 6/2016

- B.S. Major in Mathematics & Minor in Statistics, Summa Cum Laude (GPA: 3.84/4.00)
- Course Highlights: Linear Algebra, Numerical Analysis, ODE, PDE, Probability, Statistics, Data Analysis, Python
- Thesis: Two Branched Cell Lineages for Proliferative Control, supervised by Dr. John Lowengrub

EXPERIENCE

DEPARTMENT OF MATHEMATICS, UMICH

9/2016 – 5/2021

GRADUATE STUDENT RESEARCHER

- Developed fast computational framework for model reduction/identification using tensor decompositions and applied these techniques to high-dimensional biological and engineering datasets
- Investigated the controllability of the dynamical systems inspired by hypergraphs and proposed a new notion of hypergraph entropy for high-dimensional network anomaly detection

(GENOME + CELL) REPROGRAMMING LAB, UMICH

1/2018 – 5/2021

BIOINFORMATICS LAB RESEARCHER

- Applied machine learning and statistics techniques to large time series data capturing the evolution of chromosome structure and gene expression (4D Nucleome) in **MATLAB**
- Developed a mathematical theory of learning guided in the context of the immune system to create novel forms of machine learning parallel to neural networks

THE MATHWORKS, INC., NATICK

5/2020 – 8/2020

MATLAB MATH NUMERICAL METHODS INTERN

- Collected MATLAB users' experiences and workflows regarding the functionality in the MATLAB graph/digraph library and researched the underlying numerical algorithms to meet the customers' requests
- Developed and maintained the MATLAB graph/digraph library in **MATLAB** and **C++** by working with quality engineering to develop test plans and with documentation groups

UNIDATA TECHNOLOGY CO., LTD, SHANGHAI

6/2019 – 7/2019

ALGORITHM ENGINEER INTERN

- Adapted image recognition algorithms with **Python Keras** using convolutional neural network (CNN) and gated recurrent unit (GRN) for online registration captchas recognition
- Crawled public accounts' information from commercial websites with help of the online registration captchas recognition to determine accounts' credibility for a mortgage company

DEPARTMENT OF PHYSICAL SCIENCES, UCI

9/2015 – 8/2016

UNDERGRADUATE STUDENT RESEARCHER

- Performed stability and sensitivity analysis on models of stem cell self-renewal and differentiation focusing on the tradeoff between robustness and rapid regeneration in cell lineages
- Simulated the production of final-stage cells in cell lineages with different feedback choices, disturbances and perturbations in **MATLAB** and **MATHEMATICA**

PUBLICATIONS

APPLIED MATHEMATICS

- Data-Driven Model Reduction for Multilinear Control Systems via Tensor Trains (under revision)
- Controllability of Hypergraphs (under review)
- Multilinear Control Systems Theory, SIAM Journal on Control and Optimization (2021)
- Tensor Entropy for Uniform Hypergraphs, IEEE Transactions on Network Science and Engineering (2020)
- Multilinear Time Invariant System Theory, Proceedings of SIAM Conference on Control and its Applications (2019)

BIOLOGY/BIOINFORMATICS

- Deciphering Genome Structure and Function (in preparation)
- Network Dynamics of Hypothalamic Feeding Neurons (under review)
- Functional Organization of the Maternal and Paternal Human 4D Nucleome (under review)
- Cellular Reprogramming: Mathematics Meets Medicine, WIREs Systems Biology and Medicine (2020)

CONFERENCES

- Multilinear Time Invariant System Theory, SIAM Conference on Control and its Applications (2019)
- DMD Based Control of Multiway Dynamical Systems, SIAM Conference on Applications on Dynamical Systems (2019)

COURSE PROJECTS

DEEP LEARNING, UMICH

1/2019 – 4/2019

REINFORCEMENT LEARNING IN STOCK TRADING GAMES

- Investigated two different trading strategies, a single-asset task and a portfolio management task, with deep reinforcement learning methods including deep Q-network and policy gradient
- Adapted associated reinforcement learning algorithms and tested their performance in stock market trading games under different market environments using **Python Tensorflow**

MACHINE LEARNING, UMICH

9/2018 – 12/2018

MANIFOLD LEARNING IN DIFFERENTIATING CANCER CELLS

- Analytically reviewed and implemented two manifold learning methods, Laplacian Eigenmaps and t-Distributed Stochastic Neighbor Embedding (tSNE) in **Python Numpy**
- Applied both methods to a real world high-dimensional genomic dataset driven from a breast cancer research in UMICH and compared their performances

EXTRACURRICULARS

CONFERENCE ORGANIZATION COMMUNITY MEMBER

1/2019 – 7/2020

- Cooperated with other members to invite students and friends of the Fields Medalist Dr. Steve Smale to his 90th birthday celebration conference - DYNAMICS, TOPOLOGY, COMPLEXITY, AND BIOLOGY

COVID-19 SIMULATOR

4/2020

- Worked with Dr. Cleve Moler, the founder of MathWorks, on building a COVID-19 simulator using network and control theory in **MATLAB**

COMPUTER SKILLS

- Software: MATLAB, Python, Mathematica, SQL, R; MS Office, LaTeX (package: tikz)
- MATLAB Toolboxes: Control System Toolbox, Tensor Toolbox, TT-Toolbox, CVX
- Python Packages: NumPy, PyTorch, Keras, Matplotlib, TensorLy, Pandas, Selenium, etc

TEACHING

GRADUATE STUDENT INSTRUCTOR

- MATH 105: Data, Functions and Graphs (Fall 2016, Winter 2017)
- MATH 115: Calculus I (Fall 2017, Winter 2018, Fall 2018, Fall 2019, Fall 2020)
- MATH 216: Introduction to Differential Equations Lab (Winter 2020)

GUEST LECTURER

- MATH 540: Mathematics of Data (Winter 2019, Winter 2020)

REFERENCES

- Dr. Anthony Bloch, Alexander Ziwet Collegiate Professor and Chair, Department of Mathematics, University of Michigan (abloch@umich.edu)
- Dr. Indika Rajapakse, Associate Professor, Department of Computational Medicine & Bioinformatics and Department of Mathematics, University of Michigan (indikar@umich.edu)
- Dr. Amit Surana, Technical Fellow, Raytheon Technologies Research Center (amit.surana@rtx.com)