Chunyan Li

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Education

University of South Carolina – Columbia, SC, US — Anticipated Aug. 2023
Ph.D. in Applied and Computational Mathematics | Advisor: Professor Qi Wang

Xiangtan University – Xiangtan, Hunan, P. R. China — May 2018
Bachelor of Science in Mathematics in honors class

Research Areas

Numerical Mathematics and Computational Mathematics

- Numerical Methods such as structure preserving methods, asymptotic preserving methods, invariant energy quadratization method (IEQ) and scalar auxiliary variable method (SAV) for Partial Differential Equations
- Non-equilibrium theories for Thermodynamics, Generalized Onsager principle, thermodynamically consistent dynamic boundary conditions

Machine Learning, Deep Learning, Meta Learning, Data Science

- Data Science and Machine Learning with applications in various fields such as medicine, life sciences, chemistry and materials science
- Neural Networks, Contrastive Learning, Variational Autoencoder, Neural ODE, Physics-informed Neural Network, Recurrent Neural Network (LSTM) SVM, RF, XGBoost
- Dimensionality Reduction Method for machine learning and Sampling Strategies for class-imbalanced dataset

Publications

1. Wetthasinghe, Shehani T.,**Chunyan Li**, Huina Lin, Tianyu Zhu, Chuanbing Tang, Vitaly Rassolov, Qi Wang, and Sophya Garashchuk. *Correlation between the Stability of Substituted Cobaltocenium and Molecular Descriptors.* The Journal of Physical Chemistry A 126, no. 1 (2022): 80-87. (Impact factor: 2.781).
2. **Li, Chunyan**, Shehani T. Wetthasinghe, Huina Lin, Tianyu Zhu, Chuanbing Tang, Vitaly Rassolov, Qi Wang, and Sophya Garashchuk. *Stability Analysis of Substituted Cobaltocenium [Bis (cyclopentadienyl) cobalt (III)] Employing Chemistry-Informed Neural Networks.* Journal of Chemical Theory and Computation 18, no. 5 (2022): 3099-3110. (Impact factor: 6.006)
3. Hou, Jianguo, Jun Deng, **Chunyan Li**, and Qi Wang. *Tracing and Forecasting Metabolic Indices of Cancer Patients Using Patient-Specific Deep Learning Models.* Journal of Personalized Medicine 12, no. 5 (2022): 742. (Impact factor: 4.453)
4. **Chunyan Li**, Lu Wang, Kexun Li, Hongfei Deng, Yu Wang, Li Chang, Pin Zhou, Jun Zeng, Mingwei Sun, Hua Jiang, and Qi Wang. *An Machine Learning Prognostic Framework for Septic Patients with Small Data* (Submitted to Computer Methods and Programs in Biomedicine, impact factor: 7.027)
5. Lu Wang, **Chunyan Li**, Kexun Li, Hongfei Deng, Yu Wang, Li Chang, Pin Zhou, Jun Zeng, Mingwei Sun, Hua Jiang, and Qi Wang. *An Artificial Intelligence-enabled Diagnostic Model for Septic Patients* (Submitted to Critical Care, impact factor: 19.334)

Presentations

1. ***Title: An introduction of Principal Component Analysis (PCA)*** — Oct.15th 2021
   ACM Student Seminar, University of South Carolina, Columbia, SC, US

2. ***Title: An introduction of Variational Autoencoder (VAE)*** — Feb.25th 2021
   ACM Student Seminar, University of South Carolina, Columbia, SC, US

3. ***Title: Applications of deep learning in Chemistry and Life Science and the experience of pursuing my Ph.D*** **(invited talk)** May 14th 2022
   Department of Mathematics, Xiangtan University, Xiangtan, Hunan, P.R. China

4. ***Title: Stability analysis of cobaltcocenium employing chimstry-informed neural networks and quadratic neural networks*** **(poster presentation)** Oct.28th 2022
   The 2022 Made in SC Research Fellows and Faculty Conference and Celebration, Greenville, SC, US

5. ***Title: Tracing and Forecasting Metabolic Indices of Cancer Patients Using Patient-Specific Deep Learning Models*** Nov.12th 2022
   The 40th Southeastern-Atlantic Regional Conference on Differential Equations, Raleigh, NC, US

Awards and Honors

University of South Carolina – Columbia, SC

1. **SEC Emerging Scholars Fellowship** (UofSC) 2022 – 2023 AY
   Assistantship stipend up to $\$35,000$ and extra \$3000 for professional development
2. **George W.Johnson Graduate Fellowship** \$2000 (UofSC) May 2022
   Given annually by the Department of Mathematics at the University of South Carolina.
3. **C.C. Royal Fellowship** \$2000 (UofSC) Apr. 2022
   C.C. Royal Fellowship is one of the Trustee Fellowships that are awarded to full-time graduate students who exhibit excellence in graduate study, research and scholarship. Given annually by the Graduate school at the University of South Carolina.
4. **George W.Johnson Graduate Fellowship** \$2000 (UofSC) Apr. 2020
5. **Outstanding First-Year ACM Student** (UofSC) Apr. 2019
   Given annually by the Department of Mathematics at the University of South Carolina

Xiangtan University – Xiangtan, Hunan, China

1. Xiangjiang Scholarships for excellent students, \$500 (XTU) Dec 2017
   - Given annually for the top student by the Department of Mathematics at the Xiangtan University
2. Scholarships for excellent students in honors class, 4-year tuition fellowship (XTU) Sept. 2014-Jun 2018
3. National Encouragement Scholarship, \$800 (XTU) Nov 2016
   - Given annually for the top student by the Department of Mathematics at the Xiangtan University
4. Second class scholarship (Top 2/19) (XTU) May 2015

Teaching

University of South Carolina – Columbia, SC, US

Math 141 Calculus I (TA) Spring 2019
- Conducted recitation sessions and demonstrated how to use Maple to solve mathematical problems for undergraduate.
- Math Tutor for undergraduate in Math Tutoring Center

Math 142 Calculus II (TA) Fall 2019

Math 115 PreCalculus (Instructor of Record) Spring 2020
- Compositions of Functions, Inverse Functions, Trigonometric Functions in a Right Triangle, Using Inverse Trigonometric Functions, Solving Trigonometric Equations, Using Trigonometric identities, Graphing Elementary Functions

Math 141 Calculus I (TA and online) Fall 2020

Math 528 Mathematical Foundation of Data Science and Machine Learning (TA) Fall 2021
- Lectures on PyTorch and scikit-learn programming.

Mentor Experience

University of South Carolina – Columbia, SC, US

Mentor in REU Summer School Jun.6th – Jul.15th 2022

Research Experience for Undergraduates (REU): Summer School on Mathematical Foundation of Data Science 2022 is supported by the NSF RTG grant at the University of South Carolina

- Lectures on PyTorch and scikit-learn programming.
- Meet at least 2 hours every day to update the research projects for each groups (5 undergraduate students in 2 groups).
- Help 3 students in group I understand Neural Ordinary Differential Equation (NODE) and how to program using its package, and guide students to do research on "predicting biomarkers of cancer patients using NODE".
- Help 2 students in group II understand Physics Informed Neural Network (PINN) and how to program using DeepXDE package and guide students to do research on "solving a Partial Differential Equation using PINN".

Xiangtan University – Xiangtan Hunan, P.R. China
Mentor for class 2 in Department of Mathematics Fall 2016
Mentor for Honor class in Business School Spring 2017

Service

Organizer of the ACM Student Seminar in UofSC Sept. 2021 – Present

- Organize the applied and computational mathematics seminar with McKenzie Black, Thomas Hamori.
- Invite Professors and Graduate students especially, underrepresented groups to give talks.

Vice president at SIAM student chapter of UofSC Sept.2020 – Sept.2022
Proctor for the annual UofSC High School Math Contest 2019 – 2020

Membership

- Society for Industrial and Applied Mathematics (SIAM)
- American Mathematical Society (AMS)
- Association for Women in Mathematics (AWM)

Skills

Programming

- Proficient in Matlab, Python (PyTorch), LaTeX, Markdown.
- Experience with DeepXDE, Neural ODE, HTML.