Minghao Liu

Curriculum Vitae

Department of Computer Science
University of Oxford
Oxford OX1 3QD, UK

Email: minghao.liu@cs.ox.ac.uk
Phone: ***
`https://minghao-liu.github.io/`

RESEARCH INTERESTS

Automated reasoning; Constraint programming; SAT/SMT solving; Inductive logic programming; Graph neural networks; Combinatorial optimization; Neuro-symbolic methods.

APPOINTMENT

University of Oxford   Oxford, UK
Research Associate   *Oct. 2023 – Now*
Supervised by Prof. Marta Kwiatkowska on EPSRC project FAIR (since Oct. 2024).
Supervised by Dr. Andrew Cropper on EPSRC project AutoCS (Oct. 2023 – Sep. 2024).

EDUCATION

University of Chinese Academy of Sciences   Beijing, China
Ph.D. in Computer Science   *Sep. 2017 – June 2023*
Supervised by Prof. Jian Zhang at Institute of Software, CAS.
Thesis: Symbolic and Neural Methods for Constraint Solving.

Northeast Normal University   Changchun, China
B.Sc. in Computer Science   *Sep. 2013 – June 2017*
GPA: 3.9, Rank: 2/73.

PUBLICATIONS

Conference Papers

1. Fuqi Jia, Yuhang Dong, **Minghao Liu**, Pei Huang, Feifei Ma, and Jian Zhang. "Suggesting Variable Order for Cylindrical Algebraic Decomposition via Reinforcement Learning", *Advances in Neural Information Processing Systems 36 (NeurIPS)*, 2023.

2. **Minghao Liu**, Rui Han, Fuqi Jia, Pei Huang, Feifei Ma, Hantao Zhang, and Jian Zhang. "Investigating the Existence of Holey Latin Squares via Satisfiability Testing", *The 20th Pacific Rim International Conference on Artificial Intelligence (PRICAI)*, 2023.

3. **Minghao Liu**, Kunhang Lv, Pei Huang, Rui Han, Fuqi Jia, Yu Zhang, Feifei Ma, and Jian Zhang. "NRAgo: Solving SMT(NRA) Formulas with Gradient-Based Optimization", *The 38th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, 2023.

4. Fuqi Jia, Rui Han, Xutong Ma, Baoquan Cui, **Minghao Liu**, Pei Huang, Feifei Ma, and Jian Zhang. "PSMT: Satisfiability Modulo Theories Meets Probability Distribution", *The 38th IEEE/ACM International Conference on Automated Software Engineering (ASE)*, 2023.

5. Fuqi Jia, Rui Han, Pei Huang, **Minghao Liu**, Feifei Ma, and Jian Zhang. "Improving Bit-Blasting for Nonlinear Integer Constraints", *The 32nd ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*, 2023. (**ACM SIGSOFT Distinguished Paper Award**)

6. **Minghao Liu**, Pei Huang, Fuqi Jia, Fan Zhang, Yuchen Sun, Shaowei Cai, Feifei Ma, and Jian Zhang. "Can Graph Neural Networks Learn to Solve the MaxSAT Problem?", *The 37th AAAI Conference on Artificial Intelligence (AAAI), Student Abstract and Poster Program*, 2023. (**Best Student Abstract Honorable Mention Award**)

7. Pei Huang, Yuting Yang, **Minghao Liu**, Fuqi Jia, Feifei Ma, and Jian Zhang. "ϵ-weakened Robustness of Deep Neural Networks", *The 31st ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA)*, 2022.

8. Pei Huang, Yuting Yang, Fuqi Jia, **Minghao Liu**, FeiFei Ma, and Jian Zhang. "Word Level Robustness Enhancement: Fight Perturbation with Perturbation", *The 36th AAAI Conference on Artificial Intelligence (AAAI)*, 2022.

9. Pei Huang, Rundong Li, **Minghao Liu**, Feifei Ma, and Jian Zhang. "Efficient SAT-Based Minimal Model Generation Methods for Modal Logic S5", *The 24th International Conference on Theory and Applications of Satisfiability Testing (SAT)*, 2021.

10. **Minghao Liu**, Fan Zhang, Pei Huang, Shuzi Niu, Feifei Ma, and Jian Zhang. "Learning the Satisfiability of Pseudo-Boolean Problem with Graph Neural Networks", *The 26th International Conference on Principles and Practice of Constraint Programming (CP)*, 2020.

11. Pei Huang, **Minghao Liu**, Ping Wang, Wenhui Zhang, Feifei Ma, and Jian Zhang. "Solving the Satisfiability Problem of Modal Logic S5 Guided by Graph Coloring", *The 28th International Joint Conference on Artificial Intelligence (IJCAI)*, 2019.

12. Pei Huang, **Minghao Liu**, Cunjing Ge, Feifei Ma, and Jian Zhang. "Investigating the Existence of Orthogonal Golf Designs via Satisfiability Testing", *The 44th International Symposium on Symbolic and Algebraic Computation (ISSAC)*, 2019.

13. **Minghao Liu**, Feifei Ma, and Jun Yan. "A Community-Division Based Algorithm for Finding Relations Among Linear Constraints", *The 11th International Conference on Knowledge Science, Engineering and Management (KSEM)*, 2018.

Journal Papers

14. Jian Gao, Yiqi Lv, **Minghao Liu**, Shaowei Cai, and Feifei Ma. "Improving Simulated Annealing for Clique Partitioning Problems", *Journal of Artificial Intelligence Research (JAIR)*, 2022.

15. Yupeng Zhou, **Minghao Liu**, Feifei Ma, Na Luo, and Minghao Yin. "Modelling and Solving the Supply Marketing Order Allocation Problem with Time Consistency and Bundle Discounts", *Journal of the Operational Research Society (JORS)*, 2021.

PRESENTATIONS

1. "Investigating the Existence of Holey Latin Squares via Satisfiability Testing", Presentation at *PRICAI 2023*, Online. Nov. 2023.

2. "Can Graph Neural Networks Learn to Solve the MaxSAT Problem?", Presentation at *AAAI 2023*, Online. Feb. 2023.

3. "Automated Reasoning: Principle and Application", Presentation at *ByteDance AI Lab*, Beijing, China. Oct. 2022.

4. "Learning the Satisfiability of Pseudo-Boolean Problem with Graph Neural Networks", Presentation at *CP 2020*, Online. Sep. 2020.

5. "Learning the Satisfiability of Pseudo-Boolean Problem with Graph Neural Networks", Presentation at *Northeast Normal University*, Changchun, China. July 2020.

6. "A Community-Division Based Algorithm for Finding Relations Among Linear Constraints", Presentation at *KSEM 2018*, Changchun, China. Aug. 2018.

TEACHING

Foundations of Theoretical Computer Science   Spring 2020; Spring 2021
Teaching Assistant, University of Chinese Academy of Sciences

Logic and Proof   Hilary 2024; Michaelmas 2024
Class Tutor, University of Oxford

Design and Analysis of Algorithms Hilary 2024

Practical Demonstrator, University of Oxford

Group Design Practical Hilary 2024

Supervisor, University of Oxford

Financial Computing with C++ Part I Michaelmas 2024

Teaching Assistant, University of Oxford

SELECTED AWARDS AND SCHOLARSHIPS

SMT Competition, Nonlinear Real Arithmetic (QF_NRA) Track, 2nd Place	Aug. 2022
First Prize Scholarship of UCAS (*Top 10%*)	Oct. 2021
Guangdong Intelligent Manufacturing Innovation Contest, 3rd Place	Dec. 2019
The NENU Medalist (*The highest honor for undergraduate students; Top 0.5%*)	June 2017
ACM International Collegiate Programming Contest (Asia Regional), Gold Medal	Sep. 2016
National Scholarship of China (*Top 2%*)	Nov. 2014

ACADEMIC SERVICES

PC Member: AAAI 2023, 2024, 2025; ECAI 2024; ICTAI 2023.
Journal Reviewer: IEEE TNNLS; IEEE TKDE; CSSE.

Last updated: November 10, 2024