

# Minghao Liu

## *Curriculum Vitae*

Department of Computer Science  
University of Oxford  
Oxford, UK

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<https://minghao-liu.github.io/>

## RESEARCH INTERESTS

Automated reasoning; Constraint programming; SAT/SMT solving; Combinatorial optimization; Neuro-symbolic methods.

## APPOINTMENT

**Research Associate**, University of Oxford  
Supervised by Dr. Andrew Cropper at the Logic and Learning group.

*Oct. 2023 – Now*

## EDUCATION

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

Beijing, China  
*Sep. 2017 – June 2023*

**Northeast Normal University**  
*B.Sc. in Computer Science*  
GPA: 3.9, Rank: 2/73.

Changchun, China  
*Sep. 2013 – June 2017*

## 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**)
7. Pei Huang, Yuting Yang, **Minghao Liu**, Fuqi Jia, Feifei Ma, and Jian Zhang. “ $\epsilon$ -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

Lecturer: Prof. Tian Liu (Peking University)

### **Logic and Proof**

Hilary 2024

Class Tutor, University of Oxford

Lecturer: Prof. James Worrell (University of Oxford)

**Design and Analysis of Algorithms**

Hilary 2024

Practical Demonstrator, University of Oxford

Lecturer: Prof. Elias Koutsoupias (University of Oxford)

**SELECTED AWARDS AND SCHOLARSHIPS**

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

**ACADEMIC SERVICE**

**PC Member:** AAAI 2023, 2024; ICTAI 2023.

**Reviewer:** TNNLS, TKDE.

Last updated: Mar. 17th, 2024