Jiaoyang Li

Curriculum Vitae

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Education

2017-Present	**Ph.D. in Computer Science**, *University of Southern California (USC)*, Los Angeles, CA, USA.
	- Advisor: Sven Koenig.
	- Viterbi/Graduate School Fellowship.
2013-2017	**B.Eng. in Automation**, *Tsinghua University (THU)*, Beijing, China.
	- GPA: 91/100; Rank: 5/118.
	- Excellent Graduate Awards of Department of Automation, Tsinghua and of Beijing.

Research Interests

I am interested in many topics related to Artificial Intelligence, such as combinatorial algorithms, heuristic search, constraint reasoning, machine learning, scheduling and planning for robotics and transportation. My current research topic focuses on multi-agent planning.

Professional Skills

Programming	Proficient in C/C++, Python and MATLAB. Familiar with C#, Java and R.
Languages	Proficient in English. Native in Mandarin Chinese.

Research and Work Experience

2017-Present	PhD student,	**University of Southern California**, USA
	- Advisor: Sven Koenig, Department of Computer Science.	
02/2020	Visiting Researcher (6 months),	**Monash University**, Australia
	- Advisor: Daniel Harabor and Peter J. Stuckey, Faculty of Information Technology.	
	- Project: Symmetry-breaking for Multi-Agent Path Finding.	
05/2019	Research Intern (14 weeks),	**Amazon Robotics**, USA
	- Mentor: Andrew Tinka.	
	- Project: Large-Scale Multi-Agent Path Finding for Warehouse Applications. Extended abstract published at AAMAS 2020.	
12/2018, 11/2019	Visiting Student (5 weeks in total),	**Ben-Gurion University**, Israel
	- Advisor: Ariel Felner, Department of Software and Information Systems Engineering.	
	- Project: Heuristics for Multi-Agent Path Finding. Paper published at IJCAI 2019.	
08/2016	Visiting Student (5 weeks),	**University of California, Berkeley**, USA
	- Advisor: Zuojun (Max) Shen, Department of Industrial Engineering and Operations Research.	
	- Supported by Tsinghua Top Open Program and Tsinghua Spark Talents Program.	
	- Project: Electric Taxi Fleets Dispatching System. Paper published at ITEC-AP 2017.	
06/2016	Visiting Student (6 weeks),	**University of Southern California**, USA
	- Advisor: Sven Koenig, Department of Computer Science.	
	- Supported by USC-Tsinghua Summer Research Program.	
	- Project: Lifelong Multi-Agent Pickup and Delivery Problem. Paper published at AAMAS 2017.	

2014–2017	Research Assistant,	**Tsinghua University**, China

- Advisor: Jianming Hu, Department of Automation.
- Project 1: Bus Routing and Scheduling Problem. Paper published at TST 2017.
- Project 2 (Bachelor Thesis): Decision Making and Trajectory Planning for Teams of Autonomous Vehicles. Nominated for Best Bachelor Thesis Award in Tsinghua.

Publications

Conferences

2020   [C16]   D. Atzmon, **J. Li**, A. Felner, E. Nachmani, S. Shperberg, N. R. Sturtevant and S. Koenig. **Multi-Directional Heuristic Search**. In *Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**)*, (int print), 2020. Acceptance rate: 592/4717=12.6%.

[C15]   E. Boyarski, A. Felner, D. Harabor, P. Stuckey, L. Cohen, **J. Li** and S. Koenig. **Iterative-Deepening Conflict-Based Search**. In *Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**)*, (int print), 2020. Acceptance rate: 592/4717=12.6%.

[C14]   **J. Li**, G. Gange, D. Harabor, P. Stuckey, H. Ma and S. Koenig. **New Techniques for Pairwise Symmetry Breaking in Multi-Agent Path Finding**. In *Proceedings of the International Conference on Automated Planning and Scheduling (**ICAPS**)*, (int print), 2020. Acceptance rate: 69/216=31.9%.

[C13]   H. Zhang, **J. Li**, P. Surtnek, S. Koenig and T. K. S. Kumar. **Multi-Agent Pathfinding with Mutex Propagation**. In *Proceedings of the International Conference on Automated Planning and Scheduling (**ICAPS**)*, (int print), 2020. Acceptance rate: 69/216=31.9%.

[C12]   **J. Li**, K. Sun, H. Ma, A. Felner, T. K. S. Kumar and S. Koenig. **Moving Agents in Formation in Congested Environments**. In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**)*, (in print), 2020. Acceptance rate: 186/808=23.0%.

2019   [C11]   **J. Li**, E. Boyarski, A. Felner, H. Ma and S. Koenig. **Improved Heuristics for Conflict-Based Search for Multi-Agent Path Finding**. In *Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**)*, pages 442-449, 2019. acceptance rate: 850/4752=17.9%.

[C10]   **J. Li**, A. Felner, S. Koenig and T. K. S. Kumar. **Using FastMap to Solve Graph Problems in a Euclidean Space** (short paper). In *Proceedings of the International Conference on Automated Planning and Scheduling (**ICAPS**)*, pages 273-278, 2019.

[C9]   **J. Li**, D. Harabor, P. Stuckey, A. Felner, H. Ma and S. Koenig. **Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search** (short paper). In *Proceedings of the International Conference on Automated Planning and Scheduling (**ICAPS**)*, pages 279-283, 2019.

[C8]   M. Liu, H. Ma, **J. Li** and S. Koenig. **Task and Path Planning for Multi-Agent Pickup and Delivery**. In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (**AAMAS**)*, pages 1152-1160, 2019. Acceptance rate: 189/781=24.2%.

[C7]   **J. Li**, P. Surynek, A. Felner, H. Ma, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding for Large Agents**. In *Proceedings of the AAAI Conference on Artificial Intelligence (**AAAI**)*, pages 7627-7634, 2019. Acceptance rate: 1150/7095=16.2%.

[C6]   **J. Li**, D. Harabor, P. Stuckey, H. Ma and S. Koenig. **Symmetry Breaking Constraints for Grid-Based Multi-Agent Path Finding**. In *Proceedings of the AAAI Conference on Artificial Intelligence (**AAAI**)*, pages 6087-6095, 2019. Acceptance rate: 1150/7095=16.2%.

[C5]   H. Ma, D. Harabor, P. Stuckey, **J. Li** and S. Koenig. **Searching with Consistent Prioritization for Multi-Agent Path Finding**. In *Proceedings of the AAAI Conference on Artificial Intelligence (**AAAI**)*, pages 7643-7650, 2019. Acceptance rate: 1150/7095=16.2%.

2018   [C4]   A. Felner, **J. Li**, E. Boyarski, H. Ma, L. Cohen, T. K. S. Kumar and S. Koenig. **Adding Heuristics to Conflict-Based Search for Multi-Agent Path Finding** (short paper). In *Proceedings of the International Conference on Automated Planning and Scheduling (**ICAPS**)*, pages 83-87, 2018. Acceptance rate: 69/209=33.0%.

[C3] H. Ma, G. Wagner, A. Felner, **J. Li**, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding with Deadlines**. In *Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI)*, pages 417-423, 2018. Acceptance rate: 710/3470=20.5%.

2017 [C2] H. Ma, **J. Li**, T. K. S. Kumar and S. Koenig. **Lifelong Multi-Agent Path Finding for Online Pickup and Delivery Tasks**. In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 837-845, 2017. Acceptance rate: 155/595=26.1%.

[C1] Y. Jia, H. Chen, **J. Li**, F. He, M. Li, Z. Hu, and Z. Shen. **Planning for Electric Taxi Charging System from the Perspective of Transport Energy Supply Chain: A Data-Driven Approach in Beijing**. In *Proceedings of IEEE Transportation Electrification Conference & EXPO Asia-Pacific (ITEC-AP)*, pages 1-6, 2017.

Journals

2017 [J1] **J. Li**, J. Hu and Y. Zhang. **Optimal Combinations and Variable Departure Intervals for Micro Bus System**. *Tsinghua Science and Technology (TST)*, 22(3):282-292, 2017.

Symposiums, Forums and Workshops

* Symposium, forums and workshop papers with a conference version are not listed below.

2020 [W4] T. Neller, S. Keeley, M. Guerzhoy, W. Hoenig, **J. Li**, S. Koenig, A. Soni, K. Thomason, L. Zhang, B. Sebatian, C. Resnick, A. Oliver, S. Bhupatiraju, K. Agrawal, J. Allingham, S. Yoon, J. Chen, T. Larsen, M. Neumann, N. Norouzi, R. Hausen and M. Evett. **Model AI Assignments 2020**. In *Proceedings of the Symposium on Educational Advances in Artificial Intelligence (EAAI)*, 2020.

2019 [W3] E. Boyarski, L. Cohen, **J. Li**, A. Felner and S. Koenig. **Using Incremental Search for the Low Level of Conflict-Based Search**. In *the IJCAI-19 Workshop on Multi-Agent Path Finding (WoMAPF)*, 2019.

[W2] R. Stern, N. R. Sturtevant, A. Feler, S. Koenig, H. Ma, T. Walker, **J. Li**, D. Atzmon, L. Cohen, T. K. S. Kuamr, E. Boyarski and R. Bartak. **Multi-Agent Pathfinding: Definitions, Variants, and Benchmarks** (position paper). In *Proceedings of the Symposium on Combinatorial Search (SoCS)*, pages 151-159, 2019. Acceptance rate: 14/31=45.2%.

[W1] **J. Li**, H. Zhang, M. Gong, Z. Liang, W. Liu, Z. Tong, L. Yi, R. Morris, C. Pasareanu and S. Koenig. **Scheduling and Airport Taxiway Path Planning under Uncertainty**. In *Proceedings of the AIAA Aviation and Aeronautics Forum and Exposition (AIAA AVIATION Forum)*, 2019.

Extended Abstracts

* Extended abstracts with a conference version are not listed below.

2020 [E3] **J. Li**, A. Tinka, S. Kiesel, J. W. Durham, T. K. S. Kumar and S. Koenig. **Lifelong Multi-Agent Path Finding in Large-Scale Warehouses** (extended abstract). In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, (in print), 2020.

2019 [E2] J. Wang, **J. Li**, H. Ma, S. Koenig and T. K. S. Kumar. **A New Constraint Satisfaction Perspective on Multi-Agent Path Finding: Preliminary Results** (extended abstract). In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 2253-2255, 2019.

2018 [E1] H. Ma, G. Wagner, A. Felner, **J. Li**, T. K. S. Kumar and S. Koenig. **Multi-Agent Path Finding with Deadlines: Preliminary Results** (extended abstract). In *Proceedings of the International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 2004-2006, 2018.

Honors and Awards

Fellowships and Scholarships

2019 Technology Commercialization Award, *USC Stevens Center for Innovation Technology*.

2018 Nomination of Microsoft Research Ada Lovelace Fellowship, *CS Department, USC*.

2017 Viterbi/Graduate School Fellowship, *USC*.

2017	Excellent Graduate Award of Beijing, *Beijing Municipal Education Commission*.
2016	Fellowship of USC-Tsinghua Summer Research Program, *Tsinghua and USC*.
2016	Top Open Program Summer Research Funding, *Tsinghua*, (200/3500).
2016	Tsinghua-AVIC Scholarship, *Tsinghua*, (top 5%).
2014-2016	3x Academic Excellence Award, *Tsinghua*.
2015	Fellowship of Spark Talents Program, *Tsinghua*, (50/3500) .
2015	"12.9" Scholarship, *Tsinghua*, (1/560).
2015	Weimin Zheng Scholarship, *Tsinghua*, (2/560).
2014	Tsinghua-Evergrande Scholarship, *Tsinghua*, (top 5%).

Competition Awards

2016	Honorable Mention of Interdisciplinary Contest in Modeling.
2015	Third Price of the 26th Beijing College Students Math Competition.
2014	Third Price of the 31th Chinese National College Physics Competition.
2013	Silver Medal of the 28th Chinese Mathematical Olympiad (CMO) (ranked 4th in Gansu Province).
2012	Silver Medal of the 26th Chinese Chemistry Olympiad (CChO) (ranked 2nd in Gansu Province).
2012	First Price of the 29th Chinese Physics Olympiad in Gansu Province (ranked 22nd in Gansu Province).
2012	Silver Medal of the 11th Chinese Girls' Mathematical Olympiad (CGMO).

Teaching and Mentoring Experience

Teaching Assistant

Fall 2019	Introduction to Artificial Intelligence, CSCI360 at USC.

Student Mentor

Fall 2019	Moli Yang (Master Student in Computer Science at Melbourne University), *Visiting student*.
Summer, Fall 2018	Jiangxing Wang (Undergraduate Student in Computer Science at USC), *Directed Research Project*. Paper published at AAMAS, 2019.
Summer 2018	Minghua Liu (Undergraduate Student in Computer Science at Tsinghua University, Now a PhD student at UCSD), *USC-Tsinghua Summer Research Program*. Paper published at AAMAS, 2019.

Academic Activities

Conference and Workshop Organizing Committee

2020	IJCAI Workshop on Multi-Agent Path Finding (WoMAPF)

Conference and Workshop Program Committee

2020	International Joint Conference on Artificial Intelligence (IJCAI)
2019, 2020	International Conference on Autonomic and Autonomous Systems (ICAS)
2019	IJCAI Workshop on Multi-Agent Path Finding (WoMAPF)

Conference and Workshop Reviewer

2020	Workshop on the Algorithmic Foundations of Robotics (WAFR)
2019	Global Conference on Artificial Intelligence (GCAI)
2019	International Joint Conference on Artificial Intelligence (IJCAI)
2019	International Conference on Automated Planning and Scheduling (ICAPS)
2019	International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)
2018, 2019	AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)
2018, 2019	International Symposium on Combinatorial Search (SoCS)

2018	AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)
2018	ACM Siggraph Conference on Motion, Interaction and Games (MIG)
2018	IEEE Conference on Computational Intelligence and Games (CIG)
2018	ICAPS Workshop on Planning and Robotics (PlanRob)

Journal Reviewer

2020	Aerospace Lab (AL)
2019, 2020	IEEE Robotics and Automation Letters (RA-L)
2017	Tsinghua Science and Technology (TST)

Talks and Presentations

Invited Talks

10/2019	**Fast and Realistic Multi-Agent Path Finding**. Amazon Research Awards - Robotics Symposium.

Presentations at Conferences

05/2020	**Moving Agents in Formation in Congested Environments**. Symposium on Combinatorial Search (SoCS).
05/2020	**New Techniques for Pairwise Symmetry Breaking in Multi-Agent Path Finding**. Symposium on Combinatorial Search (SoCS).
05/2020	**Moving Agents in Formation in Congested Environments**. International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS).
05/2020	**Lifelong Multi-Agent Path Finding in Large-Scale Warehouses**. International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS).
02/2020	**A Project on Multi-Agent Path Finding**. Educational Advances in Artificial Intelligence (EAAI).
08/2019	**Improved Heuristics for Conflict-Based Search for Multi-Agent Path Finding**. International Joint Conference on Artificial Intelligence (IJCAI).
08/2019	**Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search**. IJCAI-19 Workshop on Multi-Agent Path Finding (WoMAPF).
07/2019	**Using FastMap to Solve Graph Problems in a Euclidean Space**. International Conference on Automated Planning and Scheduling (ICAPS).
07/2019	**Disjoint Splitting for Multi-Agent Path Finding with Conflict-Based Search**. International Conference on Automated Planning and Scheduling (ICAPS).
01/2019	**Multi-Agent Path Finding for Large Agents**. AAAI Conference on Artificial Intelligence (AAAI).
01/2019	**Symmetry Breaking Constraints for Grid-Based Multi-Agent Path Finding**. AAAI Conference on Artificial Intelligence (AAAI).