

## **Akshat KUMAR**

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## **Education**

PhD, University of Massachusetts Amherst, United States of America, 2013

Master of Science, University of Massachusetts Amherst, United States of America, 2010

Bachelor of Technology, Indian Institute of Technology, Guwahati, India, 2005

## **Academic Appointments**

Associate Professor of Computer Science, School of Computing and Information Systems, SMU, Apr 2021 - Present

Associate Professor of Information Systems, School of Computing and Information Systems, SMU, Jul 2020 - Mar 2021

Assistant Professor of Information Systems, School of Computing and Information Systems, SMU, Mar 2014 - Jun 2020

## **Other Positions and Affiliations**

Research Scientist, Business Analytics and Mathematical Sciences Dept., IBM Research, India, Oct 2012 - Feb 2014

Subject Matter Expert, Amdocs Development Center, India, Sep 2005 - Jun 2006

## **Awards and Honors**

Best Demo Award, International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2021

AAAI Senior Member, AAAI Conference on Artificial Intelligence, 2020

Lee Kong Chian (LKC) fellowship, Singapore Management University, 2020

Early Career Spotlight Talk, International Joint Conference on Artificial Intelligence (IJCAI), 2019

Selected as one of the IEEE Intelligent System's AI ten to watch, IEEE Intelligent Systems, 2018

Best Paper Award, Computational Sustainability track, AAAI Conference, 2017

Visionary Paper award in the workshop on Optimization in Multi-Agent Systems (OptMAS), International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2016

Best Dissertation Award, International Conference on Automated Planning and Scheduling (ICAPS), 2014

Outstanding Application Paper Award, International Conference on Automated Planning and Scheduling (ICAPS), 2014

IFAAMAS Vistor Lesser Distinguished Dissertation Runner-up Award, International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2013

School of Computer Science Outstanding Dissertation Award, UMass Amherst, 2013

Phi Kappa Phi honor society member, Phi Kappa Phi Society, 2010

Awarded UMass graduate school fellowship, UMass, 2010

Passes PhD candidacy with distinction, awarded to only two students per year in the department, UMass Amherst, 2009

Received scholarships to attend IJCAI-07,09,11, AAAI-08, AAMAS-09,10, NIPS-10, UAI-11, IJCAI, AAI, AAMAS, NIPS, UAI, 2007

## RESEARCH

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### Research Interests

Artificial Intelligence and machine learning - Decision theoretic planning, multiagent systems, graphical models, probabilistic inference, mathematical optimization

### Publications

#### Journal Articles [Refereed]

Risk-Sensitive Stochastic Orienteering Problems for Trip Optimization in Urban Environments, by VARAKANTHAM, Pradeep; KUMAR, Akshat; LAU, Hoong Chuin. (2018). *ACM Transactions on Intelligent Systems and Technology*, 9(3), 1-25. <https://doi.org/10.1145/3080575> (Published)

Probabilistic Inference Techniques for Scalable Multiagent Decision Making, by KUMAR, Akshat; ZILBERSTEIN, Shlomo; TOUSSAINT, Marc. (2015). *Journal of Artificial Intelligence Research*, 53 223-270. <https://doi.org/10.1613/jair.4649> (Published)

#### Conference Proceedings

IOSTOM: Offline imitation learning from observations via state transition occupancy matching, by PHAM, Quang Anh; BRAHMANAGE, Janaka Chathuranga; MAI, Tien Anh; KUMAR, Akshat. (2025.0). *Proceedings of the 39th Conference on Neural Information Processing Systems (NeurIPS 2025), San Diego, CA, December 2-7*, (pp. 1-36) United States: Advances in Neural Information Processing Systems. <https://openreview.net/pdf?id=OEp1J4V2fN> (Advance Online)

ShipNaviSim: Data-driven simulation for real-world maritime navigation, by PHAM, Quang Anh; BRAHMANAGE, Janaka Chathuranga; KUMAR, Akshat. (2025.0). *AAMAS '25: Proceedings of the 24th International Conference on Autonomous Agents and Multiagent Systems, Detroit, MI, USA, May 19-23*, (pp. 1641-1649) New York : ACM. <https://doi.org/10.5555/3709347.3743799> (Published)

Leveraging constraint violation signals for action constrained reinforcement learning, by BRAHMANAGE, Janaka Chathuranga; LING, Jiajing; KUMAR, Akshat. (2025.0). *Proceedings of the 39th Annual AAAI Conference on Artificial Intelligence (AAAI25), Philadelphia, Pennsylvania, February 25 - March 4*, (pp. 15614-15621) Philadelphia, Pennsylvania : AAAI. <https://ojs.aaai.org/index.php/AAAI/article/view/33714/35869> (Published)

Offline safe reinforcement learning using trajectory classification, by GONG, Ze; KUMAR, Akshat; VARAKANTHAM, Pradeep. (2025.0). *Proceedings of the 39th Annual AAAI Conference on Artificial*

*Intelligence, Philadelphia, Pennsylvania, 2025 February 25 - March 4*, (pp. 16880-16887) Philadelphia, Pennsylvania: <https://doi.org/10.1609/aaai.v39i16.33855> (Published)

Unified training of universal time series forecasting transformers, by WOO, Gerald; LIU, Chenghao; KUMAR, Akshat; XIONG, Caiming; SAVARESE, Silvio; SAHOO, Doyen. (2024.0). *Proceedings of the 41st International Conference on Machine Learning (ICML 2024) : Vienna, Austria, July 21-27*, (pp. 53140-53164) Vienna, Austria: PMLR. (Published)

Difference of convex functions programming for policy optimization in reinforcement learning, by KUMAR, Akshat. (2024.0). *Proceedings of the 23rd International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2024): Auckland, New Zealand, May 6-10*, (pp. 2339-2341) Richland, SC: IFAAS. (Published)

Factored MDP based moving target defense with dynamic threat modeling, by BOSE, Megha; PARUCHURI, Praveen; KUMAR, Akshat. (2024.0). *Proceedings of the 23rd International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2024) : Auckland, New Zealand, May 6-10*, (pp. 2165-2167) Richland, SC: International Foundation for Autonomous Agents and Multiagent Systems. (Published)

FlowPG: Action-constrained policy gradient with normalizing flows, by BRAHMANAGE, Janaka Chathuranga; LING, Jiajing; KUMAR, Akshat. (2023.0). *Proceedings of the 37th Conference on Neural Information Processing Systems (NeurIPS 2023), New Orleans, December 10-16*, (pp. 1-15) New Orleans: NeurIPS . (Published)

Constrained multiagent reinforcement learning for large agent population, by LING, Jiajing; SINGH, Arambam James; THIEN, Nguyen Duc; KUMAR, Akshat. (2023.0). *Machine Learning and Knowledge Discovery in Databases: European Conference, ECML PKDD 2022, Grenoble, France, September, 19-23: Proceedings*, (pp. 183-199) Cham: Springer. [https://doi.org/10.1007/978-3-031-26412-2\\_12](https://doi.org/10.1007/978-3-031-26412-2_12) (Published)

Learning deep time-index models for time series forecasting, by WOO, Gerald; LIU, Chenghao; SAHOO, Doyen; KUMAR, Akshat; HOI, Steven. (2023.0). *Proceedings of the 40th International Conference on Machine Learning 2023, Honolulu, HI, July 23-29*, (pp. 1-21) Honolulu, Hawaii, USA: PMLR. (Published)

Safe MDP planning by learning temporal patterns of undesirable trajectories and averting negative side effects, by LOW, Siow Meng; KUMAR, Akshat; SANNER, Scott. (2023.0). *Proceedings International Conference on Automated Planning and Scheduling, ICAPS, Prague, Czech Republic*: (Published)

A mixed-integer linear programming reduction of disjoint bilinear programs via symbolic variable elimination, by JEONG, Jihwan; SANNER, Scott; KUMAR, Akshat. (2023.0). *Integration of Constraint Programming, Artificial Intelligence, and Operations Research: 20th International Conference, CPAIOR 2023, Nice, France, May 29-June 1: Proceedings*, (pp. 79-95) Cham: Springer. [https://doi.org/10.1007/978-3-031-33271-5\\_6](https://doi.org/10.1007/978-3-031-33271-5_6) (Published)

Planning and learning for Non-Markovian negative side effects using finite state controllers, by SRIVASTAVA, Aishwarya; Saisubramanian, Sandhya; Paruchuri, Praveen; KUMAR, Akshat; Zilberstein, Shlomo. (2023.0). *Proceedings of the 37th AAAI Conference on Artificial Intelligence, AAAI 2023, Washington, February 7-14*, (pp. 15144-15151) Washington: AAAI. <https://doi.org/10.1609/aaai.v37i12.26767> (Published)

Scalable and globally optimal generalized L1 K-center clustering via constraint generation in mixed integer linear programming , by CHEMBU, Aravinth; SANNER, Scott; KHURRAM, Hassan; KUMAR, Akshat. (2023.0). *Proceedings of the 37th AAAI Conference on Artificial Intelligence, Washington, USA, 2023 February 7-14*, (pp. 7015-7023) Washington: AAAI. <https://doi.org/10.1609/aaai.v37i6.25857> (Published)

Scalable and globally optimal generalized L1 K-center clustering via constraint generation in mixed integer linear programming, by CHEMBU, Aravinth; SANNER, Scott; KHURRAM, Hassan; KUMAR, Akshat. (2023.0). *Proceedings of the 37th AAAI Conference on Artificial Intelligence, AAAI 2023, Washington, February 7-14*, (pp. 7015-7023) Washington: AAAI Press. <https://doi.org/10.1609/aaai.v37i6.25857> (Published)

Constrained multiagent reinforcement learning for large agent population, by LING, Jiajing; SINGH, Arambam James; THIEN, Nguyen Duc; KUMAR, Akshat . (2022.0). *Machine Learning and Knowledge Discovery in Databases: European Conference ECML-PKDD 2022: Grenoble, France, September 19-23: Proceedings*, (pp. 183-199) Cham: Springer. [https://doi.org/10.1007/978-3-031-26412-2\\_12](https://doi.org/10.1007/978-3-031-26412-2_12) (Published)

Trajectory optimization for safe navigation in maritime traffic using historical data, by BASRUR, Chaithanya; SINGH, Arambam James; SINHA, Arunesh; KUMAR, Akshat; KUMAR, T. K. Satish. (2022.0).

*Proceedings of the 28th International Conference on Principles and Practice of Constraint Programming, Haifa, Israel, 2022 July 31 - August 5, Haifa, Israel: (Published)*

Using constraint programming and graph representation learning for generating interpretable cloud security policies, by KAZDAGLI, Mikhail; TIWARI, Mohit; KUMAR, Akshat. (2022.0). *IJCAI International Joint Conference on Artificial Intelligence, Vienna, Austria: (Published)*

CoST: contrastive learning of disentangled seasonal-trend representations for time series forecasting, by WOO, Gerald; LIU, Chenghao; SAHOO, Doyen; KUMAR, Akshat; HOI, Steven . (2022.0). *Proceedings of the 10th Conference on Learning Representations (ICLR), Virtual, 2022 April 25-29, Online: (Published)*

Sample-efficient iterative lower bound optimization of deep reactive policies for planning in continuous MDPs, by LOW, Siow Meng; KUMAR, Akshat; SANNER, Scott. (2022.0). *Proceedings of the 36th AAAI Conference on Artificial Intelligence, Virtual, Vancouver, Canada, 2022 February 22 - March 1., (pp. 9840-9848) Palo Alto, California USA: AAAI Press.*  
<https://www.aaai.org/Library/AAAI/aaai22contents.php#:~:text=Published%20by%20the-,AAAI%20Press,-%2C%20Palo%20Alto%2C%20California> (Published)

Learning and exploiting shaped reward models for large scale multiagent RL, by SINGH, Arambam James; KUMAR, Akshat; LAU, Hoong Chuin. (2021.0). *Proceedings of the Thirty-First International Conference on Automated Planning and Scheduling, Virtual Online, August 2-13, (pp. 588-596) California USA: AAAI Press. (Published)*

Integrating knowledge compilation with reinforcement learning for routes, by LING, Jiajing; CHANDAK, Kushagra; KUMAR, Akshat. (2021.0). *Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), Virtual Online, August 2-13, (pp. 542-550) California, USA : AAAI Press. (Published)*

Learning and exploiting shaped reward models for large scale multiagent RL, by SINGH, Arambam James; KUMAR, Akshat; LAU, Hoong Chuin. (2021.0). *Proceedings of the Thirty-First International Conference on Automated Planning and Scheduling 2021: August 2-13, Guangzhou, (pp. 588-596) Menlo Park. CA: AAAI Press. (Published)*

Action selection for composable modular deep reinforcement learning, by GUPTA, Vaibhav; ANAND, Daksh; PARUCHURI, Praveen; KUMAR, Akshat. (2021.0). *Conference of the International Conference on Autonomous Agents and Multiagent Systems, Virtual Online, May 3-7, (pp. 565-573) United Kingdom : IFAAMAS. (Published)*

Ship-GAN: Generative modeling based maritime traffic simulator, by BASRUR, Chaithanya; SINGH, Arambam James; SINHA, Arunesh; KUMAR, Akshat. (2021.0). *Proceedings of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS), Virtual Online, May 3-7, (pp. 1755-1757) United Kingdom: IFAAMAS. (Published)*

Ship-GAN: Generative modeling based maritime traffic simulator, by BASRUR, Chaithanya Shankaramurthy; SINGH, Arambam James; SINHA, Arunesh; KUMAR, Akshat . (2021.0). *Proceedings of 20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), Virtual Conference, 2021 May 3-7, (pp. 1755-1757) Virtual Conference: (Published)*

Approximate difference rewards for scalable multigent reinforcement learning, by ARAMBAM, James Singh; KUMAR, Akshat; LAU, Hoong Chuin. (2021.0). *Proceedings of the 20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2021): May 3-7, Virtual, (pp. 1655-1657) Richland, SC: IFAAMS. <https://doi.org/10.5555/3463952.3464191> (Published)*

Approximate difference rewards for scalable multigent reinforcement learning, by SINGH, Arambam James; KUMAR, Akshat, LAU, Hoong Chuin. (2021.0). *Proceedings of the International Conference on Autonomous Agents and Multiagent Systems, Online, May 3-7, (pp. 1655-1657) United Kingdom: IFAAMAS. (Published)*

Action selection for composable modular deep reinforcement learning, by GUPTA, Vaibhav; ANAND, Daksh; PARACHURI, Praveen; KUMAR, Akshat. (2021.0). *Proceedings of the 20th International Conference on Autonomous Agents and Multiagent Systems, Virtual Conference, 2021 May 3-7, (pp. 565-573) London, UK: (Published)*

Reinforcement learning for zone based multiagent pathfinding under uncertainty, by LING, Jiajing; GUPTA, Tarun; KUMAR, Akshat. (2020.0). *Proceedings of the International Conference on Automated Planning and Scheduling, ICAPS 2020: Nancy, France, October 26-30, (pp. 551-559) Menlo Park, CA: AAAI Press.*

(Published)

Hierarchical multiagent reinforcement learning for maritime traffic management, by SINGH, Arambam James Singh; KUMAR, Akshat; LAU, Hoong Chuin. (2020.0). *Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2020): Auckland, May 9-13*, (pp. 1278-1286) Richland, SC: IFAAMAS. (Published)

Multiagent decision making and learning in urban environments, by KUMAR, Akshat. (2019.0). *Proceedings of the 28th International Joint Conference on Artificial Intelligence (IJCAI), Macao, China, August 10-16*, (pp. 6398-6402) Macau: IJCAI. <https://doi.org/10.24963/ijcai.2019/895> (Published)

Decision making for improving maritime traffic safety using constraint programming, by BHATNAGAR, Saumya; KUMAR, Akshat; LAU, Hoong Chuin. (2019.0). *Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence 2019: Macau, August 10-16*, (pp. 5794-5800) Macau: IJCAI. <https://doi.org/10.24963/ijcai.2019/803> (Published)

Resource constrained deep reinforcement learning, by BHATIA, Abhinav; VARAKANTHAM, Pradeep; KUMAR, Akshat. (2019.0). *Proceedings of the 29th International Conference on Automated Planning and Scheduling (ICAPS 2019), Berkeley, CA, July 11-15*, (pp. 610-620) Palo Alto, CA: AAAI Press. (Published)

Graph based optimization for multiagent cooperation, by SINGH, Arambam James; KUMAR, Akshat. (2019.0). *Proceedings of the 18th International Conference on Autonomous Agents and Multiagent Systems (AAMAS), Montreal, Canada, May 13-17*, (pp. 1497-1505) Montreal, Canada: ACM. <https://doi.org/10.5555/3306127.3331863> (Published)

Multiagent decision making for maritime traffic management, by SINGH, Arambam James; NGUYEN, Duc Thien; KUMAR, Akshat; LAY, Hoong Chuin. (2019.0). *Proceedings of the Thirty-Third Conference on Artificial Intelligence 2019: Honolulu, HI, January 27 – February 1*, (pp. 6171-6178) Menlo Park, CA: AAAI Press. <https://doi.org/10.1609/aaai.v33i01.33016171> (Published)

Successor features based multi-agent RL for event-based decentralized MDPs, by GUPTA, Tarun; KUMAR, Akshat; PARUCHURI, Praveen. (2019.0). *AAAI Conference on Artificial Intelligence (AAAI)*, (pp. 6054-6061) Hawaii: (Published)

Credit assignment for collective multiagent RL with global rewards, by NGUYEN, Duc Thien; KUMAR, Akshat; LAU, Hoong Chuin. (2018.0). *Advances in Neural Information Processing Systems (NIPS 2018): Montreal, Canada, December 2-8*, (pp. 8102-8113) Cambridge: MIT Press. (Published)

Integrated cooperation and competition in multi-agent decision-making, by WRAY, Kyle Hollins; KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2018.0). *Proceedings of 32nd AAAI Conference on Artificial Intelligence 2018, New Orleans, February 2-7*, (pp. 4735-4742) Palo Alto, CA: AAAI Press. (Published)

Resource-constrained scheduling for maritime traffic management, by AGUSSURJA, Lucas; AKSHAT, Kumar; LAU, Hoong Chuin. (2018.0). *Proceedings of the 32nd AAAI Conference on Artificial Intelligence 2018: New Orleans, February 2-7*, (pp. 6086-6093) Palo Alto, CA: AAAI Press. (Published)

Policy gradient with value function approximation for collective multiagent planning, by NGUYEN, Duc Thien; KUMAR, Akshat; LAU, Hoong Chuin. (2017.0). *Advances in Neural Information Processing Systems: Proceedings of NIPS 2017, December 4-9, Long Beach*, (pp. 4320-4330) La Jolla, CA: NIPS Foundation. (Published)

A multi-agent system for coordinating vessel traffic, by TENG, Teck-Hou; LAU, Hoong Chuin; KUMAR, Akshat. (2017.0). *Proceedings of the 16th International Conference on Autonomous Agents and Multiagent Systems AAMAS 2017: Sao Paulo, Brazil, May 8-12*, (pp. 1814-1816) Richland, SC: IFAAMAS. (Published)

Coordinating vessel traffic to improve safety and efficiency, by TENG, Teck Hou; LAU, Hoong Chuin; KUMAR, Akshat. (2017.0). *International Conference on Autonomous Agents and Multiagent Systems (AAMAS), Sao Paulo, Brazil, 2016, February 12-17*, Palo Alto: California AAAI Press. <http://worldcat.org/isbn/9781577357667> (Published)

Decentralized planning in stochastic environments with submodular rewards, by KUMAR, Rajiv Ranjan; VARAKANTHAM, Pradeep; KUMAR, Akshat. (2017.0). *Proceedings of the 31st AAAI Conference on Artificial Intelligence 2017: San Francisco, February 4-10*, (pp. 3021-3028) Menlo Park, CA: AAAI Press. (Published)

Collective multiagent sequential decision making under uncertainty, by NGUYEN, Duc Thien; KUMAR,

- Akshat; LAU, Hoong Chuin. (2017.0). *Proceedings of the 31st AAAI Conference on Artificial Intelligence AAAI-17: San Francisco, CA, February 4-10*, (pp. 3036-3043) Menlo Park, CA: AAAI Press. (Published)
- Robust optimization for tree-structured stochastic network design, by WU, Xiaojian; KUMAR, Akshat; SHELDON, Daniel, ZILBERSTEIN, Shlomo. (2017.0). *AAAI Conference on Artificial Intelligence (AAAI): San Francisco, USA, 2017 February 4*, (pp. 4545-4551) San Francisco, USA: AAAI. (Published)
- Dual formulations for optimizing Dec-POMDP controllers, by KUMAR, Akshat; MOSTAFA, Hala; ZILBERSTEIN, Shlomo. (2016.0). *Proceedings of the 26th International Conference on Automated Planning and Scheduling ICAPS 2016, London, June 12-17*, (pp. 202-210) Palo Alto, CA: AAAI Press. (Published)
- Robust influence maximization, by LOWALEKAR, Meghna; VARAKANTHAM, Pradeep; KUMAR, Akshat. (2016.0). *AAMAS '16: Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems, Singapore, May 9-13*, (pp. 1395-1396) Richland, NC: IFAAMAS. (Published)
- Approximate inference using DC programming for collective graphical models, by NGUYEN, Duc Thien; KUMAR, Akshat; LAU, Hoong Chuin; SHELDON, Daniel. (2016.0). *Proceedings of Machine Learning Research: 19th International Conference on Artificial Intelligence and Statistics AISTATS 2016, Cadiz, Spain, May 9-11*, (pp. 685-693) Cambridge, MA: JMLR. (Published)
- Simultaneous optimization and sampling of agent trajectories over a network, by MOSTAFA, Hala; KUMAR, Akshat; LAU, Hoong Chuin. (2016.0). *Autonomous agents and multiagent systems: AAMAS 2016 Workshops, visionary papers, Singapore, May 9-10*, (pp. 50-66) Cham: Springer Verlag. [https://doi.org/10.1007/978-3-319-46840-2\\_4](https://doi.org/10.1007/978-3-319-46840-2_4) (Published)
- Robust decision making for stochastic network design, by KUMAR, Akshat; SINGH, Arambam James; VARAKANTHAM, Pradeep; SHELDON, Daniel. (2016.0). *Proceedings of the 30th AAAI Conference on Artificial Intelligence 2016: Phoenix, Arizona, February 12-17*, (pp. 3857-3863) Palo Alto, CA: AAAI Press. (Published)
- Shortest path based decision making using probabilistic inference, by KUMAR, Akshat. (2016.0). *Proceedings of the 30th AAAI Conference on Artificial Intelligence AAAI 2016, Phoenix, AZ, February 12-17*, (pp. 3849-3856) Palo Alto, CA: AAAI Press. (Published)
- Learning and controlling network diffusion in dependent cascade models, by DU, Jiali; VARAKANTHAM, Pradeep; KUMAR Akshat; CHENG, Shih-Fen. (2015.0). *2015 IEEE/WIC/ACM International Joint Conference on Web Intelligence and Intelligent Agent Technology WI-IAT 2015: 6-9 December, Singapore, Piscataway, NJ: IEEE*. <https://doi.org/10.1109/WI-IAT.2015.126> (Published)
- Decomposition techniques for urban consolidation problems, by NGUYEN, Duc Thien; LAU, Hoong Chuin; KUMAR, Akshat. (2015.0). *2015 IEEE International Conference on Automation Science and Engineering (CASE): August 24-28, Gothenburg, Sweden: Proceedings*, (pp. 57-62) Piscataway, NJ: IEEE. <https://doi.org/10.1109/CoASE.2015.7294041> (Published)
- Probabilistic inference based message-passing for resource constrained DCOPs, by GHOSH, Supriyo; KUMAR, Akshat; VARAKANTHAM, Pradeep. (2015.0). *Proceedings of the 24th International Joint Conference on Artificial Intelligence IJCAI 2015: Buenos Aires, Argentina, 25-31 July*, (pp. 411-417) Palo Alto, CA: AAAI Press. (Published)
- Message passing for collective graphical models, by SUN, Tao; SHELDON, Daniel; KUMAR, Akshat. (2015.0). *Proceedings of the 32nd International Conference on Machine Learning, Lille, France, 2015, July 6-11*, (pp. 777-786) Cambridge, MA: JMLR. (Published)
- History-based controller design and optimization for partially observable MDPs, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2015.0). *Proceedings of the Twenty-Fifth International Conference on Automated Planning and Scheduling: Jerusalem, Israel, June 7-11, 2015*, (pp. 156-164) Menlo Park, CA: AAAI Press. (Published)
- Near-optimal decentralized power supply restoration in smart grids, by AGRAWAL, Pritee; KUMAR, Akshat; VARAKANTHAM, Pradeep. (2015.0). *AAMAS '15: Proceedings of the 2015 International Conference on Autonomous Agents and Multiagent Systems: Istanbul, Turkey, May 4-8*, (pp. 1275-1283) Richland, SC: IFAAMAS. (Published)
- Near-optimal nonmyopic contact center planning using dual decomposition, by KUMAR, Akshat; SINGH, Sudhanshu; GUPTA, Pranav; PARIJA, Gyana. (2014.0). *Proceedings of the 24th International Conference on Automated Planning and Scheduling: Portsmouth, New Hampshire, 21-26 June 2014*, (pp. 395-403) Palo

Alto, CA: AAI Press. (Published)

On understanding diffusion dynamics of patrons at a theme park, by DU, Jiali; KUMAR, Akshat; VARAKANTHAM, Pradeep Reddy. (2014.0). *AAMAS '14: Proceedings of the 2014 International Conference on Autonomous Agents and Multi-agent Systems: Paris, May 5-9*, (pp. 1501-1502) Richland, SC: AAMAS. (Published)

Optimization approaches for solving chance constrained stochastic orienteering problems, by VARAKANTHAM, Pradeep; KUMAR, Akshat. (2013.0). *Algorithmic Decision Theory: Third International Conference, ADT 2013, Bruxelles, Belgium, November 12-14, Proceedings*, (pp. 387-398) Cham: Springer Verlag. [https://doi.org/10.1007/978-3-642-41575-3\\_30](https://doi.org/10.1007/978-3-642-41575-3_30) (Published)

Parameter learning for latent network diffusion, by WU, Xiaojian; KUMAR, Akshat; SHELDON, Daniel; ZILBERSTEIN, Shlomo. (2013.0). *IJCAI '13: Proceedings of the 23rd International Joint Conference on Artificial Intelligence, Beijing, China, August 3-9*, (pp. 2923-2930) Menlo Park, CA: AAI Press. (Published)

Automated generation of interaction graphs for value-factored decentralized POMDPs, by YEOH, William; KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2013.0). *IJCAI '13: Proceedings of the 23rd International Joint Conference on Artificial Intelligence, Beijing, China, August 3-9*, (pp. 411-417) Menlo Park, CA: AAI Press. (Published)

Collective diffusion over networks: Models and inference, by KUMAR, Akshat; SHELDON, Daniel; SRIVASTAVA, Biplav. (2013.0). *Proceedings of the 29th Conference on Uncertainty in Artificial Intelligence UAI 2013, Bellevue, DC, July 11-15*, (pp. 351-360) Corvallis, OR: AUAI Press. (Published)

Approximate inference in collective graphical models, by SHELDON, Daniel; SUN, Tao; KUMAR, Akshat; DIETTERICH, Tom. (2013.0). *Proceedings of Machine Learning Research: 30th International Conference on Machine Learning 2013, June 16-21, Atlanta, GA*, (pp. 1004-1012) Cambridge, MA: JMLR. (Published)

Lagrangian relaxation techniques for scalable spatial conservation planning, by KUMAR, Akshat; WU, Xiaojian; ZILBERSTEIN, Shlomo. (2012.0). *Proceedings of the 26th AAI Conference on Artificial Intelligence 2012, July 22-26, Toronto, Canada*, (pp. 309-315) Menlo Park, CA: AAI Press. (Published)

Message passing algorithms for MAP estimation using DC programming, by KUMAR, Akshat; ZILBERSTEIN, Shlomo; TOUSSAINT, Marc. (2012.0). *Proceedings of Machine Learning Research: International Conference on Artificial Intelligence and Statistics AISTATS 2012, April 21-23, La Palma, Canary Islands*, (pp. 656-664) Cambridge, MA: JMLR. <http://jmlr.org/proceedings/papers/v22/kumar12/kumar12.pdf> (Published)

Influence diagrams with memory states: Representation and algorithms, by WU, Xiaojian; KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2011.0). *Algorithmic decision theory: 2nd International Conference, ADT 2011, Piscataway, NJ, October 26-28: Proceedings*, (pp. 306-319) New York: Springer Verlag. [https://doi.org/10.1007/978-3-642-24873-3\\_23](https://doi.org/10.1007/978-3-642-24873-3_23) (Published)

Scalable multiagent planning using probabilistic inference, by KUMAR, Akshat; ZILBERSTEIN, Shlomo; TOUSSAINT, M.. (2011.0). *IJCAI-11: Proceedings of the 22nd International Joint Conference on Artificial Intelligence: Barcelona, Spain, 16-22 July*, (pp. 2140-2146) Menlo Park, CA: AAI Press. (Published)

Message-passing algorithms for quadratic programming formulations of MAP estimation, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2011.0). *Proceedings of the International Conference on Uncertainty in Artificial Intelligence 27th UAI 2011, Barcelona, Spain, July 14-17*, (pp. 428-435) Corvallis, OR: AUAI Press. (Published)

Message-passing algorithms for large structured decentralized POMDPs, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2011.0). *AAMAS '11: The 10th International Conference on Autonomous Agents and Multiagent Systems, Taipei, Taiwan, May 2-6*, (pp. 1087-1088) Richland, SC: IFAAMAS. (Published)

MAP estimation for graphical models by likelihood maximization, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2010.0). *Advances in Neural Information Processing Systems 23: 24th Annual Conference on Neural Information Processing Systems 2010, 6-9 December 2010, Vancouver*, (pp. 1180-1188) La Jolla, CA: Neural Information Processing Systems. (Published)

Anytime planning for Decentralized POMDPs using expectation maximization, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2010.0). *Proceedings of the Twenty-Sixth Conference on Uncertainty in Artificial Intelligence 2010, July 8-11, Catalina Island, CA*, (pp. 294-301) Corvallis, OR: AUAI Press. (Published)

Point-based backup for decentralized POMDPs: Complexity and new algorithms, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2010.0). *Proceedings of the 9th International Conference on Autonomous Agents and Multiagent Systems AAMAS 2010, May 10-14, Toronto*, (pp. 1315-1322) Richland, SC: IFAAMAS. (Published)

Event-detecting multi-agent MDPs: Complexity and constant-factor approximation, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2009.0). *Proceedings of the Twenty-First International Joint Conference on Artificial Intelligence IJCAI09 : Pasadena, California, 11-17 July 2009*, (pp. 201-207) Menlo Park, CA: AAAI Press. (Published)

Dynamic programming approximations for partially observable stochastic games, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2009.0). *Proceedings of the Twenty-Second International FLAIRS Conference: 19-21 May 2009, Sanibel Island, Florida*, (pp. 547-552) Menlo Park, CA: AAAI Press. (Published)

Constraint-based dynamic programming for decentralized POMDPs with structured interactions, by KUMAR, Akshat; ZILBERSTEIN, Shlomo. (2009.0). *Proceedings of the 8th International Conference on Autonomous Agents and Multiagent Systems: May 10-15, 2009, Budapest, Hungary*, (pp. 561-568) Richland, SC: IFAAMAS. (Published)

Distributed Constraint Optimization with structured resource constraints, by KUMAR, Akshat; FALTINGS, Boi; PETCU, Adrian. (2009.0). *Proceedings of the 8th International Conference on Autonomous Agents and Multiagent Systems AAMAS 2009, Budapest, Hungary, 10-15 May*, (pp. 923-930) Richland, SC: AAMAS. (Published)

H-DPOP: Using hard constraints for search space pruning in DCOP, by KUMAR, Akshat; PETCU, Adrian; FALTINGS, Boi. (2008.0). *Proceedings of the 23rd AAAI Conference on Artificial Intelligence: 13-17 July 2008, Chicago, Illinois*, (pp. 325-330) Menlo Park, CA: AAAI Press. (Published)

An artificial immune system based approach for English grammar correction, by KUMAR, Akshat; NAIR, Shivashankar B.. (2007.0). *Artificial Immune Systems: 6th International Conference, ICARIS, Santos, Brazil, August 26-29, Proceedings*, (pp. 348-357) Berlin: Springer Verlag. [https://doi.org/10.1007/978-3-540-73922-7\\_30](https://doi.org/10.1007/978-3-540-73922-7_30) (Published)

Tournament versus Fitness Uniform Selection, by LEGG, Shane; HUTTER, Marcus; KUMAR, Akshat. (2004.0). *CEC2004: Proceedings of the Congress on Evolutionary Computation: June 19-23, Portland, OR*, (pp. 2144-2151) Piscataway, NJ: IEEE. <https://doi.org/10.1109/CEC.2004.1331162> (Published)

## Conference Papers

Prescribing routes to improve safety and efficiency of vessel traffic, by TENG, Teck Hou; LAU, Hoong Chui; KUMAR, Akshat. (2017.0). *5th International Port-Maritime Technology Conference, April 26-28, 2017, Singapore*. (Presented)

## **Research Grants**

### Singapore Management University

Trust to Train and Train to Trust: Agent Training Programs for Safety-Critical Environments, AI Singapore Research Programme, AI Singapore , PI (Project Level): Pradeep Reddy VARAKANTHAM , Co-PI (Project Level): Akshat KUMAR, Arunesh SINHA, David LO, 2021, S\$6,086,963.76

The “Other Me” : Human-Centered AI Assistance In Situ, AI Singapore Research Programme, AI Singapore , Co-PI (Project Level): Pradeep Reddy VARAKANTHAM, Akshat KUMAR, 2021, S\$9,551,520

Data Driven Collective Decision Making for Urban System Optimization, Academic Research Fund (AcRF) Tier 2, Ministry of Education (MOE) , PI (Project Level): Akshat KUMAR, 2018, S\$562,440

Moving Beyond Data Insights: Optimizing Dynamics in Safety and Security Networks, Academic Research Fund (AcRF) Tier 2, Ministry of Education (MOE) , PI (Project Level): Pradeep Reddy VARAKANTHAM , Co-PI (Project Level): Akshat KUMAR, 2016, S\$674,046

Urban Computing and Engineering Centre of Excellence, Corporate Laboratory@University, National Research Foundation (NRF) & Fujitsu (Multiple Funding Sources) , PI (Programme Level): LAU Hoong

Chuin , PI (Project Level): CHENG Shih-Fen, Pradeep Reddy VARAKANTHAM, Akshat KUMAR, 2014, S\$18,500,000

Collective Multiagent Reinforcement Learning, SMU Internal Grant, Ministry of Education (MOE) Tier 1 , PI (Project Level): Akshat KUMAR, 2017, S\$88,653

## TEACHING

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### Courses Taught

#### Singapore Management University

Undergraduate Programmes :

Introduction to Artificial Intelligence

Postgraduate Professional Programmes :

Artificial Intelligence and Uncertainty Reasoning

Introduction to Artificial Intelligence

Postgraduate Research Programmes :

Empirical Research Project 1

Empirical Research Project 2

Empirical Research Project 3

Empirical Research Project 4

Optimisation and Computing

## THESES AND DISSERTATIONS

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### Theses and Dissertations Assessed

#### Singapore Management University

Committee Member, "Proactive and Reactive Resource/Task Allocation for Agent Teams in Uncertain Environments", Dissertation by AGRAWAL PRITEE, PhD in Information Systems, Singapore Management University, 2018

Committee Member, "An Integrated Framework for Modeling and Predicting Spatiotemporal Phenomena in Urban Environments", Dissertation by LE TRUC VIET, PhD in Information Systems, Singapore Management University, 2018

Committee Member, "Online Learning with Nonlinear Models", Dissertation by DOYEN SAHOO, PhD in Information Systems, Singapore Management University, 2018

Committee Member, "Proactive Resource (Re)distribution for Improving Efficiency in Urban Environments", Dissertation by SUPRIYO GHOSH, PhD in Information Systems, Singapore Management University, 2018

## **EXTERNAL SERVICE – PROFESSIONAL**

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Conference Chair, International Conference on Automated Planning and Scheduling (ICAPS), 2022

Student Abstract Co-Chair, AAAI Conference on Artificial Intelligence, 2022

Co-Chair, Doctoral Consortium, International Conference on Automated Planning and Scheduling, 2019

Co-Chair, Planning and Learning track, International Conference on Automated Planning and Scheduling, 2018

Co-organizer, Workshop on Planning and Inference, AAAI Conference on Artificial Intelligence, 2018

Local organizing committee member, International Conference on Autonomous Agents and Multiagent Systems, 2016

Co-organizer, International Summer school on autonomous agents and multiagent systems, 2016

Reviewer Journal Article, Reviewer, Artificial Intelligence Journal (AIJ), 2014