Akshit Kumar

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Education

Columbia University, Graduate School of Business, New York, NY 2020-present
Ph.D. candidate in Decision, Risk and Operations division. GPA: 9.96/10.00
Advisors: Prof. Omar Besbes and Prof. Yash Kanoria

University of Michigan, Ann Arbor, MI 2018-2020
Master of Science in Electrical and Computer Engineering. GPA: 4.27/4.00.
Advisor: Prof. Vijay Subramanian
Masters' Thesis: *Finite Time Guarantees for Empirical Dynamic Programs*

Indian Institute of Technology Madras, Chennai, India 2014-2018
Bachelor of Technology in Electrical Engineering, minor in Robotics. GPA: 8.81/10.00
Advisor: Prof. Rahul Vaze, Tata Institute of Fundamental Research
Bachelors' Thesis: *Speed Scaling under QoS constraints with finite buffer*

Research Interests

Dynamic Resource Allocation, Online Algorithms, Reinforcement Learning

Publications

The Multi-secretary problem with many types with Omar Besbes and Yash Kanoria. *EC'22: Proceedings of the 2022 ACM Conference on Economics and Computation.*

Low-cost aerial imaging for small holder farmers with Ranveer Chandra et al. *COMPASS '19: Proceedings of the 2nd ACM SIGCAS Conference on Computing and Sustainable Societies*
★ Best Paper Award at COMPASS'19

Speed scaling under QoS constraints with finite buffer with Parikshit Hegde and Rahul Vaze. *WiOpt'18: 16th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks.*

Working Papers

Feature Based Dynamic Matching with Yilun Chen and Yash Kanoria. *Working Paper (2022)*

Finite Time Analysis of Empirical Dynamic Programs with Vijay Subramanian and Daniel Vial. *Under Preparation (2021)*

Breaking the Unit Throughput Barrier in Distributed System with Parikshit Hegde and Rahul Vaze. *Working Paper (2021)*

Patents

US20180213186 A1 *Low-cost, Long-term Aerial Imagery*
US20180213187 A1 *Aerial imaging of a region using above ground aerial camera platform*

Industry Internships

Nokia Bell Labs, Paris, France May 2018 - August 2018
Worked on developing and analysing decoding schemes for distributed wireless systems with applications in 5G and Internet of Things.

Microsoft Research, Bangalore, India June 2016 - August 2016
Worked on designing low cost solutions to enable precision agriculture for small farm holders. *Industry Category Winner at Microsoft OneWeek Hackathon*

Teaching Experience

Columbia University, **Teaching Assistant**
Business Analytics (EMBA core) Spring 2022
Foundations of Optimization (PhD core) Fall 2021

University of Michigan, **Grader**
Probability (PhD core) Winter 2019
Analysis of Societal Networks (PhD elective) Fall 2019

Awards

Narula Doctoral Fellowship, Columbia Business School, 2023
Best Paper Award, COMPASS'19, 2019
Industry Category Winner at Microsoft OneWeek Hackathon, 2016
Recipient of Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship by Government of India, 2014
Recipient of National Talent Search Examination (NTSE) scholarship by Government of India, 2011

Skills

Programming: Python, C/C++, JavaScript, PHP, HTML, CSS
Tools: Git, LaTeX, ROS

Selected Projects

Feature Based Dynamic Matching
Devised a novel algorithm dubbed "Fair Allocate and Match" (FAM) to dynamically match demand units to existing supply. Proved near-optimality of the FAM algorithm as a function of the market thickness and dimensionality of the problem.

The Multi-secretary problem with many types
Extended the network revenue management problem to encompass infinite types and distributions with gaps. Developed a novel algorithmic principle dubbed "Conversativism w.r.t Gaps" and proved near-optimality of the algorithm.

Finite Time Analysis of Empirical Dynamic Programs
Proved finite time bounds for biased and unbiased operators for stochastic approximation algorithms using Lyapunov method.

Breaking the Unit Throughput Barrier in Distributed System
Derived closed form expressions for throughput in coded slotted aloha scheme with power control. Developed an optimization framework to heuristically improve throughput for distributed system under the path loss setting.

Low-cost aerial imaging for small holder farmers
Developed a low-cost long-term aerial imagery system with lighter-than-air gas filled balloon system with novel battery efficient application and instant feedback system for online path planning to enable precision agriculture in developing countries like India.

Speed scaling under QoS constraints with finite buffer
Devised near-optimal policies for the problem of dynamic speed scaling for optimizing the service cost under QoS constraints.

Selected Talks

The multi-secretary problem with many types

MSOM Annual Conference, Munich	June 2022
RMP Annual Conference, Online	June 2022
EC'22, Boulder	July 2022
INFORMS Annual Meeting, Indianapolis	October 2022

Feature-Based Dynamic Matching

INFORMS Annual Meeting, Indianapolis	October 2022