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EDUCATION

[University of California, Berkeley](#)
 Ph.D., [Department of Statistics](#)

Aug 2016 - May 2022 (expected)

Advisors: Jointly advised by [Professor Michael I. Jordan](#) and [Professor Martin J. Wainwright](#).

[Indian Statistical Institute, Kolkata, India](#)
 Master of Statistics
 Bachelor of Statistics

July 2014 - May 2016

July 2011 - May 2014

INTERNSHIPS

2019: Research intern, Amazon. Mentor: [Prof. Dean Foster](#).

2020-2021: [Microsoft and BAIR collaboration](#). Mentor: [Prof. Lester Mackey](#).

AREAS OF INTEREST

My research interests spans theory and application of statistics, machine learning and optimization. Specific areas include EM algorithm, Gaussian mixture models, model mis-specification, factor analysis, reinforcement learning, inference in sequential environments, non-convex optimization.

R-PACKAGES:

[FACTMLE](#): R-package for calculating the maximum likelihood estimate (MLE) for factor analysis. [~ 22k downloads](#) in CRAN.

RESEARCH EXPERIENCE

Peer reviewed journal publications: (*= equal contribution, α -order)

- J1. [Is Temporal Difference Learning Optimal? An Instance-Dependent Analysis](#). **Koulik Khamaru**, Ashwin Pananjady, Feng Ruan, Martin J. Wainwright, Michael I. Jordan, [arXiv](#), to appear in SIAM Journal on Mathematics of Data Science, 2021.
- J2. [Singularity, Misspecification, and the Convergence Rate of EM](#). Raaz Dwivedi*, Nhat Ho*, **Koulik Khamaru***, Michael I. Jordan, Martin J. Wainwright and Bin Yu, [Annals of Statistics](#), 48(6): 3161-3182 (December 2020).
- J3. [Computation of the Maximum Likelihood estimator in low rank Factor Analysis](#). **Koulik Khamaru** and Rahul Mazumder, [Mathematical Programming](#) volume 176, pages 279–310 (2019).
- J4. [Derivative-Free Methods for Policy Optimization: Guarantees for Linear Quadratic Systems](#) Dhruv Malik, Ashwin Pananjady, Kush Bhatia, **Koulik Khamaru**, Peter Bartlett and Martin J. Wainwright. [JMLR](#) 21 (202) 1-51 (2019).

- J5. [Convergence guarantees for a class of non-convex and non-smooth optimization problems.](#) **Koulik Khamaru** and Martin J. Wainwright, *JMLR* 20 1-52 (2019).
- J6. [A Peak Synchronization Measure for Multiple Signals](#) Rahul Biswas, **Koulik Khamaru**, Kaushik Majumder, *IEEE Transactions on Signal Processing*, vol. 62(17), pp. 4391 - 4399, 2014.

Peer reviewed conference publications:

- C1. [Theoretical guarantees for EM under misspecified Gaussian mixture models.](#) Raaz Dwivedi*, Nhat Ho*, **Koulik Khamaru***, Martin J. Wainwright and Michael I. Jordan, *NeurIPS* 31 (2018).
- C2. [Sharp Analysis of Expectation-Maximization for Weakly Identifiable Models](#) Raaz Dwivedi*, Nhat Ho*, **Koulik Khamaru***, Martin J. Wainwright and Michael I. Jordan, *AISTATS*, PMLR 108:1866-1876, 2020.

Preprints:

- P1. [Instance-optimality in optimal value estimation: Adaptivity via variance-reduced Q-learning](#) **Koulik Khamaru***, Eric Xia*, Martin J. Wainwright, Michael I. Jordan, *arXiv* 2021.
- P2. [Near-optimal inference in adaptive linear regression](#) **Koulik Khamaru**, Yash Deshpande, Lester Mackey, Martin J. Wainwright, *arXiv* 2021 (under review in *Annals of Statistics*).
- P3. [Instability, computational efficiency and statistical accuracy](#) Nhat Ho*, **Koulik Khamaru***, Raaz Dwivedi*, Martin J Wainwright, Michael I Jordan, Bin Yu *arXiv* 2020 (under revision in *Annals of Statistics*)

PROGRAMMING
LANGUAGES

Matlab, R, Python, Julia.

ACADEMIC
ACHIEVEMENTS
AND AWARDS

2018 NeurIPS Student travel award

2016 K.C.Mahinda Scholarship for post graduate studies

2013 *Ranked 3rd* in Madhava Mathematics Competition, an all India based mathematics exam for 1st and 2nd year bachelor students.

2012 INSPIRE Scholarship Department of Science and Technology, Government of India.

2012 JBNSTS Scholarship, Department of Science and Technology, Government of India.

2011 - 2016 KVPY fellowship Department of Science and Technology, Government of India

2010 Certificate of Merit at [Indian National Mathematical Olympiad \(INMO\)](#)

CONFERENCE
TALKS:

- 2020 AISTATS 2020.
- 2020 NeurIPS 2020: Workshop on [Consequential Decision Making in Dynamic Environments](#).
- 2020 ICML 2020: Workshop on [Theoretical Foundations of Reinforcement learning](#).
- 2018 ICML 2018.

INVITED TALKS:

- 2020 Statistics Seminar, *ISRU*, Indian statistical Institute, Kolkata.
- 2014 D. Basu Meorial Lecture, *SMU*, Indian statistical Institute, Kolkata.
- 2013 Statistics Seminar, Indian Statistical Institute, Bangalore.

CONTRIBUTED
TALKS

- 2020 Berkeley-Stanford Joint Statistics Colloquium (virtual).
- 2019 Berkeley-Stanford Joint Statistics Colloquium, Department of Statistics, Stanford.
- 2019 BSTARS, Department of Statistics, UC Berkeley.
- 2018 BSTARS, Department of Statistics, UC Berkeley.

REVIEWING:

- SIAM Journal on Mathematics of Data Science
- Conference on Learning Theory (COLT).
- International Conference on Machine Learning (ICML)
- International Conference on Algorithmic Learning Theory (ALT)
- AAAI Conference on Artificial Intelligence

TEACHING
EXPERIENCE:

- I was Graduate Student Instructor for the following courses.
- STAT-201A: Introduction to Probability at an Advance Level.
 - STAT-135: Concepts of Statistics.
 - STAT-151: Linear Modeling: Theory and Application.