

Ruchi Tripathi

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RESEARCH INTEREST

- AI/ML for Communication, 5G advanced & 6G communication, 3GPP standardization, Low-rank Matrix Recovery, Robust PCA, Convex Optimization, Stochastic Convex Optimization & Communications, Machine learning for MIMO RADAR, Statistical signal processing, Estimation and Detection

Education

- **Ph.D.** in Electrical Engineering Jul 2012-Oct-2019
INDIAN INSTITUTE OF TECHNOLOGY, KANPUR
Thesis Title: Dynamic Low Rank Matrix Completion
Supervisor: Dr. Ketan Rajawat
- **M.Tech** in Communication Engineering Jul 2009- Oct-2011
UNIVERSITY OF ALLAHABAD
Thesis Title: Built in software for enhancement of embedded devices and implementation of Ultrasonic distance meter
- **B.Tech** in Electronics and Communication Engineering Jul 2006- Jul-2009
UNIVERSITY OF ALLAHABAD

RESEARCH EXPERIENCE

- **Project Executive Officer** at IIT Kanpur Oct 2021 -Jan 2023
Title: Stochastic Optimization in 5G Networks PI: Dr. Rohit Budhiraja
- **Project Engineer** at IIT Kanpur Dec 2019 -Feb 2021
Title: Stochastic Optimization in 5G Networks PI: Dr. Ketan Rajawat
- **Sr. Student Project Associate** at IIT Kanpur Mar 2019 -Dec 2019
Title: Stochastic Optimization in 5G Networks Supervisor: Dr. Ketan Rajawat
- **Project Associate** at IIT Hyderabad Jul 2011- May 2012
Title: Cyber Physical Systems (CPS-Hub)
Supervisor: Dr.P Rajalaxmi, Department of Electrical Engineering, IIT Hyderabad

TEACHING EXPERIENCE

- **Tutor**, Dept. of EE, IIT KANPUR:
Courses: Introduction to Basic Electronics (Theory) Spring 16
Introduction to Basic Electronics (Lab) Fall 14
- **Graduate course TA**, Dept. of EE, IIT KANPUR:
Courses: Convex Optimization in Signal Processing Spring 15
Digital Communication Networks Fall 16
- **Undergraduate course TA**, Dept. of EE, IIT KANPUR:
Courses: Introduction to Basic Electronics Fall 13, Spring 18
Signals, System and Networks Fall 15
- **Guest Lecturer** at SIET Allahabad Jan 2011- May 2011
Course: Computer organization and architecture.

- **Guest Lecturer** at IERT Allahabad
Course: Introduction to basic electronics,
Circuit theory,
Signals and Systems.

Sep 2009- Dec 2010

- Mentoring:
Harsha Vardhan, M.S. Student
Boda Mohan Naik, M.Tech Student

July-2019 -July-2021, IIT Kanpur
July-2014- April-2015, IIT Kanpur

ACHIEVEMENTS & AWARDS

- Best poster presentation award at SRC, IIT Kanpur, 2019
- Best poster presentation award at Research conclave, IIT Guwahati, 2019
- Traveling allowance to attend SRC, IIT Guwahati, March 2019
- Best Ph.D. presentation award in COMSNETS-2015, held in Bengaluru 6-10 Jan, 2015.
- Traveling allowance to attend COMSNETS-2015, Jan 2015
- Outstanding TA award for summer session 2013-2014.
- MHRD scholarship to pursue Ph.D.
- Seventh rank in B.Tech at University level, 2009.
- Represented my college at the National Academy of Sciences, India, 2005.
- First Place in Physics and Chemistry in B.Sc. at college level
- First Place at District Level Student Science exhibition, 2001
- Consolation prize at State Level Student Science exhibition, 2001

Publications

PEER REVIEWED JOURNALS

1. **Ruchi Tripathi** and K. Rajawat, "Adaptive Network Latency Prediction From Noisy Measurements," in IEEE Transactions on Network and Service Management, vol. 18, no. 1, pp. 807-821, March 2021, doi: 10.1109/TNSM.2021.3051736.
2. Rishabh Dixit, Amrit Singh Bedi, **Ruchi Tripathi**, Ketan Rajawat, Online Learning with Inexact Proximal Online Gradient Descent Algorithms", in IEEE Transactions on Signal Processing, vol. 67, no. 5, pp. 1338-1352, March 1, 2019. doi: 10.1109/TSP.2018.2890368
3. **Ruchi Tripathi**, Boda Mohan, Ketan Rajawat, "Adaptive Low Rank Matrix Completion", IEEE Transactions in Signal Processing, page no. 3603-3616, Volume: 65, Issue: 14, July 15, 2017, DOI: 10.1109/TSP.2017.2695450

PEER REVIEWED CONFERENCES

1. H. Vardhan, **R. Tripathi** and K. Rajawat, "Adaptive Front-end for MIMO Radar with Dynamic Matrix Completion," 2020 International Conference on Signal Processing and Communications (SPCOM), 2020, pp. 1-5, doi: 10.1109/SPCOM50965.2020.9179549.
2. **Ruchi Tripathi** and K. Rajawat, "Dynamic Network Latency Prediction with Adaptive Matrix Completion," 2018 International Conference on Signal Processing and Communications (SPCOM), Bangalore, India, 2018, pp. 407-411. doi: 10.1109/SPCOM.2018.8724422
3. R. Dixit, A. S. Bedi, **R. Tripathi** and K. Rajawat, "Time Varying optimization via Inexact Proximal Online Gradient Descent," 2018 52nd Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, USA, 2018, pp. 759-763. doi: 10.1109/ACSSC.2018.8645323

4. **Ruchi Tripathi**, Ketan Rajawat, "*Tracking and predicting internet latencies using Kalman filter*", Comsnets-2015, Bangalore. **(Best PhD presentation)**

SERVICES AND PROFESSIONAL ACTIVITIES

MEMBERSHIP

- IEEE,
- IEEE Communications Society,
- IEEE Signal Processing Society,
- IEEE Vehicular Technology Society,
- IEEE Young Professional

REVIEWER

- IEEE Transactions on Signal Processing
- Elsevier Journal of Signal Processing
- IEEE Access
- National Conference on Communications
- International conference on Signal Processing and Communications (SPCOM)
- ICIP-2014

SELECTED PRESENTATIONS

- Speaker at "DoT-TEC-TSDSI joint workshop on 5G Advanced and beyond (6G)" CSI Feedback Enhancement for Rel-18
- Speaker at "NCC 2018" Online learning with dynamic convex optimization [<https://youtu.be/DxKqBOt340A>](My Talk starts at 2:13:24)
- Student Research Convention, "Dynamic low-rank matrix completion", Mar., 2019, IIT Kanpur (Best Poster)
- Research Conclave, "Dynamic low-rank matrix completion", Mar., 2019, IIT Guwahati (Best Poster)
- SPCOM-2018, "Dynamic network latency prediction", Jul, 2018, IISC Bangalore
- COMSNETS-2015, "Tracking and Predicting Network Latencies", Jan., 2015, Bangalore (Best Ph.D. presentation)
- Research Scholar Day "Network latency prediction for dynamic networks", Nov. 1, 2014 at IIT KANPUR

WORKSHOP & CONFERENCES ATTENDED

- Research Conclave IIT Guwahati, 2019
- Student research convention IIT Kanpur 2019
- SPCOM 2018 held at IISC Bangalore.
- NCC 2018 held at IIT Hyderabad.
- Workshop on Applied Probability - ATMW-2015 held at IIT Mumbai.
- COMSNETS-2015 held in Bengaluru
- NCC-2014 held at IIT Kanpur
- Short term course on "Estimation Theory for Communications and Signal Processing" (Jan 21-23, 2014), IIT Kanpur

- Workshop on Wireless Sensor Network ,IIT Delhi,2011
- CORD workshop, IIT Hyderabad,2011

COURSES CREDITED During Ph.D.

- Introduction to signal analysis
- Representation and analysis of random signal
- Information and coding theory
- Digital communication networks
- Wireless communication
- Convex optimization in SP/COM

KEY ACADEMIC PROJECTS During Ph.D. coursework

- Estimation Techniques for Doppler Spread in OFDM Systems

Course: Wireless Communication Networks

Abstract:Due to frequency offset the orthogonality between subcarriers is lost which induces Inter Carrier Interference (ICI) and performance of the system degrades greatly. In high Speed Mobile Communication, due to the time varying characteristic of the channel the Doppler spread and Doppler shift are induced. Ability of countering Doppler Effect has important theoretical significance. This paper focuses on various estimation techniques for estimating Doppler frequency.

- ℓ -1 Norm Minimization Methods

Course: Convex Optimization in SPCOM

Abstract:For sparse signal recovery constrained ℓ -1 norm minimization is the most oftenly used method. In many cases, the signal sparsity and the recovery performance can be further improved by replacing the ℓ -1 norm with a "weighted" ℓ -1 norm. In this paper different methods for ℓ -1 norm minimization such as Trend filtering, HP filtering, Quadratic Program, Least Square problems (LSP) have been studied along with illustrative examples.

TECHNICAL SKILLS

- Languages: C, Python, Keras, Tensorflow.
- Tools: MATLAB, LATEX, CVX.

KEY EXTRACURRICULAR ACTIVITIES

- Art of living volunteer since 2011
- Appointed as Student representative of Department post-Graduate Committee, EE, IIT Kanpur.
- Appointed as reading room secretary for Girls hostel-1 at IIT Kanpur
- Won first prize for mixed double carom, Navonmesh-2007, University Of Allahabad
- Performed anchoring in Reverberation-2009
- Won first prize science exhibition at district level, Allahabad,2002
- Won consolation prize science exhibition at state level, Allahabad,2003
- Won Second prize in kho-kho, 1995, District level,Sahibabad