Parth K. Thaker

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RESEARCH INTERESTS

Nonconvex Optimization, Online Learning (Bandits) and Probability.

EDUCATION

Ph.D. candidate, Electrical Engineering, Arizona State University, Arizona, USA.
Expected: August 2023

- GPA: **3.83/4** (As of 8 Semesters)
- Advisor: Gautam Dasarathy

M.Tech, **Indian Institute of Technology, Madras**, Chennai, India
May 2016

- GPA: **8.19/10**
- Specialization: Communication
- Advisor: Radha Krishna Ganti

B.Tech, **Indian Institute of Technology, Madras**, Chennai, India
May 2015

- GPA: **8.19/10**
- Department: Electrical Engineering
- Minor: Systems
- Advisor: Radha Krishna Ganti

RESEARCH ARTICLES/ PUBLICATIONS

1. **Pure Exploration in Multi-armed Bandits with Graph Side Information**
   Thaker P., Rao N., Malu M., Dasarathy G.
   arXiv preprint arXiv:2108.01152

   We study pure exploration in multi-armed bandits with inaccurate graph side-information. We propose a novel algorithm GRUB (GRaph based UcB) for this problem and provide a theoretical characterization of its sample complexity performance that elicits the benefit of the graph-side information (first of its kind!).

2. **On the Sample Complexity and Optimization Landscape for Quadratic Feasibility Problems**
   Thaker P., Dasarathy G., Nedich A.
   IEEE International Symposium on Information Theory (ISIT), Jun. 20

   In this paper, we consider the problem of recovering a complex vector from quadratic measurements. We establish conditions under which this problem becomes identifiable, and further prove isometry and landscape properties of the feasibility problem.

3. **Differentiable Programming for Hyperspectral Unmixing using a Physics-based Dispersion Model**
   Janiczek J., Thaker P., Dasarathy G., Edwards C., Christensen P., Jayasuriya S.
   European Conference on Computer Vision (NeurIPS), Nov. 20

   In this paper, we consider the problem of recovering a complex vector from quadratic measurements. We establish conditions under which this problem becomes identifiable, and further prove isometry and landscape properties of the feasibility problem.

4. **Queuing Optimal WiFi Sensing**
   Thaker P., Gopalan A., Vaze R.
   RAWNET, WiOpt, 2017

   When there is a queue of people trying to access a bandwidth shared Access Point, what should be the optimal strategy? To answer that we are using Game Theoretic concepts to come up with a learning algorithm to do the same.

5. **Factored gradient descent**
   Advisor: Radha Krishna Ganti
   Master's Thesis
   Indian Institute of Technology, Madras

   We analyze various properties of Frank-Wolfe type constrained Optimization algorithms on Reimannian Manifolds. We propose an alternate minimization approach for solving fixed rank matrix minimization optimization problems.

PROFESSIONAL
EXPERIENCE

1. Systems Engineer : Netradyne
   Aug 2016 - May 2017
   Bangalore, IN.

   Sensor Fusion
   Mentor: Prateek Gupte, Vidit Jain, Sreekanth Annapureddy
   - Using sensor data, worked to determine how accurate the orientation of the device is to the expected ideal orientation.
   - Worked on detecting aggressive driving patters (Hard acceleration, Hard braking, heavy swirling, etc.) using inertial sensor data.
   - Worked on end-to-end implementation of the modules including implementing data acquisition from on-bard intertial sensors, analysis of acquired data on cloud network and displaying the sounding alerts on mobile and web applications.

2. Intern : Securifi Systems Pvt. Ltd
   May 2014-July 2014
   Hyderabad, IN.

   (a) **Database Analysis**.
       Advisor: Mr. Ashutosh Dekne
       - Decided the type of database to be used based on the specific requirment of company. The Databases analysed included SQL, MongoDB, DynamoDB, Big Table and Cassandra.

   (b) **Mobile Broadband Dongle Kernel Support**.
       Advisor: Mr. Santoshkumar Kammar
       - Enabled router's USB 3G dongle support by setting up the required Kernel drivers, thus enabling the router to provide internet access through USB 3G network.

   (c) **Cloud Automation using PuppetLabs**.
       Advisor: Mr. Nirav Uchat
       - Developed cloud automation tools using Puppetlabs so as to make the work of setting up and maintaining new servers as less arduous as possible.

3. Intern : Cisco Systems Pvt. Ltd
   May 2013-July 2013
   Bangalore, IN.

   (a) **DHCP v4/v6 Testing Script (Lite)**.
       Advisor: Mr. Arun Kudur
       - Developed testing program to enable router code developers to get details of various internal parameter test-run data and high traffic generation which was not possible to get in conventional DHCP Router testing scripts.
       - Conventional testing scripts are heavy duty software and are very time consuming in the initial development stages of new router scripts. The new testing scripts developed had minimal time consumption and are easy to use in initial stages

   (b) **Management Portal**.
       Advisor: Mr. Arun Kudur

- Added administrator access to router's real time connections, enabling the admin functionality like removing or adding connections.

4. Conference Volunteer : WiOpt, 2015
   Mumbai, IN.

SOCIAL INITIATIVE

1. **Sahaay**
   Worked closely with **NGO Vidhyasagar**, based in Chennai, to develop software to assist patients affected with Cerebral Palsy to have an independent life.

TEACHING EXPERIENCE

1. Teaching Assistant : **EE5011: Computer Methods in Electrical Engineering**
   Conducted By: Harishankar Ramachandran

2. Teaching Assistant : **EE6151: Advanced Topics in Networks**
   Conducted By: Radha Krishna Ganti

COURSE PROJECTS

1. **Distance Estimation based on GPS data**
   Advisor: Prof. Shankar Narasimhan

   - Aim was to develop an algorithm to estimate total distance traveled based on a sequence of GSP coordinates and compare it with the actual data
   - 5 different models were developed using Kalman Filtering and Spline fitting for this purpose

2. **Tree Identification based on leaf samples**
   Advisor: Prof. Shankar Narasimhan

   - Given a set of pictures we were required to train a clustering algorithm of our own to identify which tree it belongs using image processing to get characteristics of leaf samples provided

3. **OFDM Channel Estimation using Modified Least Squares Estimate**
   Advisor: Prof. K. Giridhar

   - OFDM Channel Estimation was done and analysed for two variants of Modified Least Squares Estimate (MLSE) using Baseband, Kit to Kit and Wireless channels.

4. **Resource Allocation in a changing world: Optimization for resources with restless behaviour**
   Advisor: Prof. Balaraman Ravindran

   - In this work, we proposed a novel procedure for resource allocation in a restless environment. We showed that the problem can be formulated as Restless Multi-Arm Bandit problem.
   - Our solution is inspired from the UCB algorithms which are widely used in MAB cases

SKILLS

- **Languages** : C,C++, Python, R
- **Programming Tools** : Matlab, OpenCV, MySQL, Cassandra, Puppetlabs, Wireshark, GNU Radio,LATEX, LabView.
- **Operating Systems** : Linux OS (Ubuntu), Microsoft Windows

GRADUATE COURSES

- Statistical Machine learning
- Convex Optimization
- Real analysis
- Functional analysis
- Spectral graph theory
- Applied Time Series Analysis
- Multivariate Data Analysis
- Reinforcement Learning
- Information Theory
- Game Theory

SUMMER SCHOOLS
AND WORKSHOPS

1. **Recent Advances in Reinforcement Learning Workshop 2015**
   Conducted By: National Mathematics Initiative

2. **Summer School on Machine Learning**
   Conducted By: Miscrosoft Research, Bangalore

3. **Summer School on Applied Mathematics**
   Conducted By: Indo-French Centre for Applied Mathematics

4. **Summer school on Information Theory**
   Conducted By: Joint Telematics Group/IEEE Information Theory Society

ACHIEVEMENTS

- Secured an **All India Rank of 768** in JEE 2011 out of 470,000 applicants.
- Secured an **All India Rank of 1998** in AIEEE 2011 out of 1,118,000 applicants.
- Placed in top 2% in the **National Standard Examination** in **Physics** 2010-2011