Parth K. Thaker

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Research Interests Convex Optimization, Statistical Learning, Probability Theory and Stochastic Processes, Networks, Algorithms, Applied Time Series, Deep Learning and Reinforcement Learning.

Education

Indian Institute of Technology, Madras, Chennai, India
Dual Degree, Electrical Engineering, *July 2016*

- CGPA: 8.34 out of 10 (India)
- Professional Majors: Electrical Engineering
- Specialization: Communication Engineering
- Professional Minors: Systems Engineering
- Advisor: Dr. Radha Krishna Ganti
- GRE: 320/340; Quant: 168/170; Verbal: 152/170; Analytical Writing: 4.0/6.0
- Mathematics Subject GRE: 780/990
- TOEFL: 114/120

Graduate Courses

- Multivariate Data Analysis
- Reinforcement Learning
- Convex Optimization
- Advanced Topics in Communicaiton
- Applied Time Series Analysis
- Process Optimization
- Information and Coding Theory
- Advanced Topics in Networks
- Measure Theory
- Computer Methods in Electrical Engg

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

Recent Research Works

1. **Factored Gradient Descent**
   Advisor: Dr. Radha Krishna Ganti
   - Generalized the method of Factored Gradient Descent, which was theoretically proved to work for PSD matrices, to work on Rectangular matrices. Also worked towards getting a convergence rate for the same.
2. **Perturbed Linear Bandits**
   Advisor: Dr. Aditya Gopalan
   - Worked on understanding the behavior of linear Bandit algorithms in a perturbed linear bandit setup.
   - Estimated the validity of standard algorithms like OFUL in perturbed scenario.
3. **Queing Optimal WiFi Sensing**
   Advisor: Dr. Aditya Gopalan
   - In previous works, the question of optimal sensing strategy when exposed to a new Wifi network was raised. Trying to extend the same question to a multi user bandwidth sharing setup.
   - Proposed a learning algorithm, analysed and proved the convergence to the optimal point.

Industrial Experience

Netradyne — July 2016 - Present

1. **Sensor Fusion**
   Mentor: Vidit Jain, Sreekanth Annapureddy
   - Using sensor data, the task was to determine how accurate the orientation of the device is to the expected ideal orientation.

- We derived a metric to comment on the driving behavior from looking at sensor data.

2. **Optimziation of Convolutional Neural Nets**
   Mentor: Ravi Banger
   - Working on improving the implementation of Convolutional Neural Nets in order to reduce heat generation in the device.

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

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

Conference Volunteership

1. **The 13^{th} International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks**
   Advisor: Dr. Radha Krishna Ganti
   - Helped organize paper presentations and panel discussions. Helped in the smooth functioning of the conference in terms of accomodation and other necessities for the guests.

Teaching Experience

1. **EE5011: Computer Methods in Electrical Engineering**
   Conducted By: Dr. Harishankar Ramachandran
   - The course being very intensive on both theoritical as well as programming, helped the students in solving their difficulties during the official lab hours as well as during the offhours.
   - Helped conduct the scribing sessions and extra lectures depending on the requirement of the students.

2. **EE5121: Convex Optimization**
   Conducted By: Dr. Radha Krishna Ganti
   - This course being one of the Mathematically intensive courses, helped students with their difficulties in assignments and suggested good reads for better understanding of the topics.

Industrial Projects

Securifi Systems Pvt. Ltd — May 2014 - July 2014

1. **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.

2. **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.

3. **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.

Cisco Systems Pvt.Ltd. — May 2013 - July 2013

1. **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

2. **Management Portal**.
   Advisor: Mr. Arun Kudur
   - Added administrator access to router's real time connections, enabling the admin functionality like removing or adding connections.

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.

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

References

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