Chengyue He

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Education

Ph.D. in Operations Research 2021-present

Industrial Engineering and Operations Research, Columbia University, USA
Advisors: Yuri Faenza & Jay Sethuraman

M.S. in Operations Research 2019-2020

Industrial Engineering and Operations Research, Columbia University, USA

B.S. in Mathematics 2015-2019

School of Mathematical Sciences, Zhejiang University, China

Research Interests

Mechanism Design, Algorithmic Game Theory, Matching Market and Combinatorial Optimization.

Publications and Preprints

Undergraduate Thesis: SDN load generator
Guide: Prof Mythili Vutukuru, CSE Dept, IIT Bombay *Ongoing*

- Developing a client-server based load generator for testing SDN and NFV based EPC implementations
- Will be capable of generating traffic conforming to various transport layer protocols
- Employing **multi-threaded** programming to simulate multiple users for load generation

Countering device heterogeneity for Human Activity Recognition
Guide: Kuldeep Yadav, Xerox Research Centre India *Summer 2016*

- Devised a mechanism to counter device heterogeneity for human activity recognition by mobile sensors
- Analyzed various time and frequency domain features on accelerometer and gyroscope readings
- Used **canonical-correlation analysis** to project the datasets onto a common subspace
- Identified device pairs that achieved an **improvement of 33%** in the F1-score of cross-validation

Identifying Premium Revolving Customers at Acquisition
Guide: Nishit Aggarwal & Aashish Prakash, American Express, Gurgaon, India *Summer 2015*

- Analyzed tradeline level data to manufacture custom customer features for modeling
- Modeled the data using big data **machine learning techniques** such as Gradient Boosting
- Achieved an overall **60% accuracy** with **72% recall** of targets

Scholastic Achievements

- Secured **All India Rank 5** in JEE Advanced 2013 among **150,000** candidates
- Secured **99.99** percentile in JEE Main 2013 among 1.3 million students
- Awarded **Bihar Gaurav 2013** by Bihar Government for exceptional performance in JEE 2013
- Awarded **AP grade** in Computer Programming and Utilization course for exceptional performance, given to **11 students out of 532**

Key Academic Projects

Coloring Grayscale Images using CNNs
Guide: Prof Sunita Sarawagi, CSE Dept, IIT Bombay *Autumn 2016 (ongoing)*

- Employing convolutional neural networks to add color to grayscale images

Handwritten Devnagri Character Recognition
Guide: Prof Sunita Sarawagi, CSE Dept, IIT Bombay *Autumn 2016*

- Designed and developed a convolutional neural network to recognize handwritten devnagri characters
- Achieved **85% accuracy** using Adam optimizer and L2-regularization

Efficient Heuristics for Ballooning in KVM
Guide: Prof Purushottam Kulkarni, CSE Dept, IIT Bombay *Autumn 2016 (ongoing)*
- Designing smart memory usage based heuristics to determine parameters for ballooning service in KVM

Compiler for a C-like Language
Guide: Prof Amitabha Sanyal, CSE Dept, IIT Bombay *Spring 2016*
- Developed a compiler for a subset of C using *Flexc++* and *Bisonc++*
- Supports all major C features like function calls, recursion, multidimensional arrays and function call nesting
- Incorporated syntactic and semantic checks and lazy evaluation

Markov Text Generator
Guide: Prof G Sivakumar, CSE Dept, IIT Bombay *Autumn 2015*
- Developed a Python **Markov text generator** that employs n-gram model and smoothing techniques
- Learned document model from corpus and generated new meaningful sentences similar to corpus text

Project Management Tool
Guide: Prof N L Sarda, CSE Dept, IIT Bombay *Autumn 2015*
- Developed a web portal as an enterprise solution for project management in a hierarchical setting
- Included features like user teams, file upload with a **JDBC, PostgreSQL** back-end and JSP based UI

Program Checking
Guide: Prof Nutan Limaye, CSE Dept, IIT Bombay *Autumn 2015*
- Presented a seminar on efficient probabilistic program checker and characterization of conforming languages

Seat Allocation Portal
Guide: Prof Sharat Chandran, CSE Dept, IIT Bombay *Autumn 2014*
- Implemented modified **Gale-Shapely algorithm** in Java for allocating college admissions
- Developed a **Django** based web portal that accepted preferences and allotted programmes

ToyDB extension
Guide: Prof N L Sarda, CSE Dept, IIT Bombay *Autumn 2015*
- Implemented **external merge sort** and **hash join** operations on ToyDB

Statistical Inferences from Text
Guide: Prof Ganesh Ramakrishnan, CSE Dept, IIT Bombay *Autumn 2014*
- Developed a Python program to make statistically useful conclusions from English sentences
- Decided confidence values of predictions using standard distributions

Text2Sound
Guide: Prof Bhaskaran Raman, CSE Dept, IIT Bombay *Spring 2016*
- Developed an android app that encodes text to audio signals and vice-versa using frequency shift keying

Technical Strengths

- **Programming Languages:** C/C++, Python, Prolog, Bash, Java
- **Development:** Android, HTML, CSS, Django, PHP, Bootstrap, PostgreSQL, JavaScript
- **Others:** LaTeX, Matlab, MIPS-Assembly, SAS, Scilab, R, Wireshark

Positions of Responsibility

- **Teaching assistant** for courses like *Computer Programming* (**thrice**) and *Logic Design* (once)
- **Internship Coordinator** (*Placement Cell 2015-16, IIT Bombay*): Involved in the communication and scheduling of companies and universities and assisting them in recruiting students for internships
- **DAVP Volunteer**: Prepared questions and conducted weekly *Data Structures and Algorithms* tutorials for sophomores

Additional Courses Undertaken

Foundations of Machine Learning, Advanced Machine Learning, Virtualization & Cloud Computing, Network Security & Cryptography, Wireless Networks, Computational Complexity