Dilpreet Kaur

PhD Scholar

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Points of Interests

- Approximation Algorithms, Game Theory, IoT, Machine Learning, Software Design

Research Summary

Hierarchical Facility Location

with Prof. Naveen Garg

Work Under Progress — *Jan. 2018 - Present*

- Given a set of clients and a set of facility locations to open, each client demands a service from some facility. To provide the service to the client, a facility will incur a service installation cost given by a tree. We identify a set of minimum number of facilities to open, install services and assign clients to these open facilities so as to minimize the sum of service costs, installation costs and facility costs.
- Current work is focused towards identifying an LP-based solution to give a guarantee of 3-approximation ratio.
- In practice, facility location problems and its variants are prevalent in clustering problems and Operations Research.

Locating Service and Charging stations

with Prof. Naveen Garg

Published Work — *Jul. 2019 - Jun. 2022*

- Given the paths followed by clients in a road network, we wish to locate service stations such that the maximum detour that a client has to take is minimized. Designing algorithms to provide solution for trees and graphs.
- In the case of electric vehicles which have limited battery range, given client paths, the objective is to locate the minimum number of charging stations such that no client incurs any detour.

Face Detection for Arduino

with Prof. Manik Varma

Experimental — *Jun. 2016 - Jul. 2017*

- Resolved architectural limitations of device drivers to mount ArduCam SPI Camera on Arduino Uno and Arduino Mega.
- Implemented the Viola–Jones object detection framework to detect human faces in images captured by ArduCam.

Education

Indian Institute of Technology (IIT), Delhi

New Delhi, India

PhD Scholar in Computer Science — *Jul. 2015 - Present*

- Advisor: Prof. Naveen Garg | Research Topic: Approximation Algorithms for Facility Location Problems
- Selected Courses: Approximation Algorithms, Artificial Intelligence, Architecture of High Performance Computers, Machine Learning

Indian Institute of Science (IISc), Bangalore

Bangalore, India

Master of Engineering in Computer Science and Automation — *Jul. 2011 - Aug. 2013*

- Advisor: Prof. Yadati Narahari | Project: Novel Mechanisms and Algorithms for Power Deficit Management in Smart Grids
- Selected Courses: Automated Verification, Cryptography, Design and Analysis of Algorithms, Game Theory

JSS Academy of Technical Education, Noida

Noida, India

Bachelor of Technology in Computer Science and Engineering — *Aug. 2007 - Jul. 2011*

- Advisor: Prof. Seema Shukla | Final Year Project: Project Content Management System

Work Experience

Walmart Global Tech, India

Bangalore, India

Senior Data Scientist — *Sep. 2021 - Present*

- Providing keyword insights for items in Third-Party Marketplace using ML models developed using various NLP-based approaches and transformer models like BERT
- Designing scalable solutions to provide insights for millions of items using Apache PySpark

Center for Development of Telematics (C-DoT)

New Delhi, India

Research Engineer — *Oct. 2013 - Jul. 2015*

- Developed softphone to make VoIP calls through SIP Protocol and designed the UI in JavaFX.
- Implemented IaaS Cloud Computing Infrastructure to build and manage private cloud using OpenStack.

Publications

Conference Proceedings

Locating Service and Charging stations

R. Dabas, N. Garg, N. Gupta, D. Kaur

2022 Workshop on approximation and online algorithms (WAOA), 2022

Incentive compatible mechanisms for power cut allocation in smart grids

C. Yadati, D. Kaur, N. Balakrishnan, A. Sarkar, Y. Narahari

2013 IEEE International Conference on Automation Science and Engineering (CASE), 2013

Awards & Achievements

2022 **Bravo Award**, provided by Walmart Global Tech India for Engineering Excellence

2015 **Visvesvaraya scholarship**, provided by DeitY for PhD students in Electronics and IT

2014 **All India Rank 5**, GATE Computer Science, conducted by NCB-GATE, for MHRD (out of 155190)

2013 **All India Rank 6**, GATE Computer Science, conducted by NCB-GATE, for MHRD (out of 224160)

2011 **All India Rank 39**, GATE Computer Science, conducted by NCB-GATE, for MHRD (out of 136027)

Curriculum Projects

R-NUCA and Adaptive Odd-Even Routing *with Prof. S. Sarangi*

Group Project, IIT Delhi *Mar. 2016 - May 2016*

- Implemented Reactive NUCA (R-NUCA), a distributed cache design which reacts to the class of each cache access and places blocks at the appropriate location in the cache on Tejas which is an open-source, Java-based multicore architectural simulator.
- Using Tejas, designed Odd-Even routing scheme. Then extended this framework to implement Adaptive Odd-Even Routing which decides the next hop using congestion in the outgoing links.

Novel Mechanisms and Algorithms for Power Deficit Management in Smart Grids *with Prof. Y. Narahari*

Masters Project, IISc Bangalore *Jul. 2012 - May 2013*

- Evaluated several mechanisms: VCG mechanism, VCG mechanism with redistribution and dAGVA mechanisms to address the problem of distributing power among different regions in the face of shortage in Smart Grids.
- Under each mechanism setting, we investigate from two perspectives: (i) distributing power cuts and (ii) distributing premium power. We experimentally compare the performance of each of these mechanisms and derive insights from our comparisons.

Intelligent Transportation Using Nash Flows *with Prof. Y. Narahari*

Group Project, IISc Bangalore *Jan. 2012 - May 2013*

- Evaluated optimal flows in a road network where strategic individuals evaluate routes in the presence of the congestion resulting from the rational decisions made by themselves and everyone else.

Workshops & Conferences

Feb. 2020 **Recent Trends in Algorithms**, IIT Gandhinagar *Gandhinagar, India*

Dec. 2019 **Foundations of Software Technology and Theoretical Computer Science**, IIT Bombay *Mumbai, India*

Jun. 2019 **CIMPA Research School**, Graphs, Algorithms and Randomness, University of Tabriz *Tabriz, Iran*

Feb. 2019 **Recent Trends in Algorithms**, NISER, Bhubaneswar *Bhubaneswar, India*

Jun. 2016 **Microsoft Summer School**, in the area of Internet of Things (IoT), IISc Bangalore *Bangalore, India*

Aug. 2013 **IEEE CASE**, University of Wisconsin-Madison *Wisconsin, USA*

Organizational Activities

2017 **Captain**, Lawn Tennis Team, IIT Delhi

2016 **Volunteer**, VLDB Conference, New Delhi

2012 **Vice-Captain**, CSA Open Day, IISc Bangalore

2011 **Technical Head**, at Zealicon, the Annual Techno-Cultural Festival, JSS Noida

2007 **Volunteer**, Assistant teacher (Mathematics and Science), Uttam School For Girls, Ghaziabad

References

- **Prof. Naveen Garg** (Professor, IIT Delhi), naveen@cse.iitd.ac.in
- **Prof. Yadati Narahari** (Professor, IISc Bangalore), narahari@iisc.ac.in