Divyanshu Saxena

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Education

B.Tech, Computer Science and Engineering | Indian Institute of Technology Delhi | GPA – 8.11/10 *2016–2020*

ISC Board, Grade 12 | City Montessori School, Lucknow | Score – 96.50% *2016*

Internships and Research Projects

Ghost Indexing in Graph Databases **Undergraduate Thesis**

Indian Institute of Technology, Delhi | *Supervisor: Prof. Srikanta Bedathur* *April 2019 - Present*

- Investigated the utility of adding in-graph indexes over Graph Databases, for the Janusgraph and Neo4J frameworks.
- Implemented the novel idea of *Ghost Vertices* to implement in-graph BPlus-Tree and B-Tree indexes in Graph Databases.
- Obtained a significant improvement in performance of these *Ghost Indexes* over traditional Elasticsearch indexes.

Adding Zero Copy Buffer Payloads over gRPC **Member of Technical Staff Intern**

Cohesity | *Mentor: Mayank Shekhar Narula* *May 2019 - July 2019*

- Made changes in the gRPC framework (an open source RPC library maintained at Google) to allow payloads to be sent along with the message in the RPC Call, so that the entire workflow is memory efficient and memory safe.
- Implemented serialization and deserialization of Buffers into gRPC datatypes ensuring Zero Copy implementation.
- Awarded *Pre-Placement Offer* based on performance during the Internship period.

Network Design for a Modified Two Echelon Vehicle Routing Problem **Research Intern**

National University of Singapore | *Supervisor: Prof. Andrew Lim* *May 2018 - July 2018*

- Designed and implemented a Neighborhood Search heuristic to route available vehicles, choosing the optimal location of carparks for the Two Echelon Vehicle Routing Problem, an NP-hard combinatorial optimization problem.
- Used clustering and local search to get the solution. Designed novel operators for defining neighborhood.

Person Counter and Display Device **Summer Project**

Indian Institute of Technology, Delhi | *Supervisor: Prof. Subodh Kumar* *May 2017 - September 2017*

- Implemented real-time processing of images to count number of people in a room, using the Beaglebone microprocessor.
- Used multiple Haar cascade classifiers, applied on the same image, to counter the problem of occlusion.
- Conferred the *Design Innovation Summer Award* by the Ministry of Human Resource Development (Government of India).

Selected Projects

Identifying Shared Accounts in Streaming Services | *Prof. Srikanta Bedathur* | Course Project *Autumn 2019*

- Implemented Session-based Heterogeneous graph Embedding (Jiang et al **SIGIR'18**) to differentiate, identify and model different users using the same shared account, on online streaming platforms.
- Improved the performance of the model by the use of a novel formulation of loss function using KMeans++ Clustering.

Containerization over xv6 Operating System | *Prof. Smruti R Sarangi* | Course Project *Spring 2019*

- Implemented a User Space implementation of containers over xv6, a UNIX-like educational Operating System.
- Implemented novel data structures and system calls in the kernel for maintaining resource and file isolation, and fair scheduling.
- Implemented virtual page tables and associated system calls to allow container processes to declare and use variables.

Noisy Reward Prediction in the game of Breakout | *Prof. Parag Singla* | Course Project *Spring 2019*

- Developed a model to predict the future reward, given a noisy subset of five frames out of seven consecutive frames.
- Used PCA to transform the frames to a smaller dimension. Used SVMs over these frames to predict the rewards.
- Used CNNs separately on RGB Images to predict the rewards and analyzed the performance of the two models.

Secure Access Logging with Vulnerability Analysis | *Samsung IoT Lab* | Course Project *Autumn 2017*

- Developed a logging system for Iotivity to log every access to all the resources present on the network.
- Developed a rule based vulnerability analysis module to report potential threats based on the accesses.

Machine Learning based attacks in Cyber Security | *Prof. Rajeev Shorey* | Course Project *Autumn 2019*

- Designed a framework for defense against Machine Learnt attacks on IoT systems, using Adversarial Models and Noisy captcha.
- Poster paper submitted to COMSNETS 2020 conference.

Go Back N ARQ Protocol over Mininet | *Prof. BN Jain* | Course Project *Autumn 2018*

- Implemented a fully functional go-back-n protocol over socket connections, between two nodes in a Mininet Network.
- Simulated noisy message exchange between two nodes using parallel sender and receiver threads on each node.

PackagED: Software for Engineering Drawing | *Prof. Subhashis Banerjee* | Course Project *Spring 2018*

- Implemented a software package in C++ to construct 3D object from orthographic projections and vice-versa.
- Developed an interactive GUI for taking input, providing various features for customization.

CodeBot: AI Bot for Yinsh | *Prof. Mausam* | Course Project *Autumn 2018*

- Developed a Minimax bot, using self-designed heuristics, to play the game of Yinsh, an abstract strategy game.
- Given a seed in a competitive Yinsh Tournament, based on performance of the bot in preliminary rounds.

Frudo | Microsoft Code.Fun.Do Hackathon *Spring 2018*

- Developed and deployed *Food and Restaurant Recommendation* Chat Bot for Microsoft Code.Fun.Do hackathon.
- Used simple regression for providing features of Cuisine and Location Recommendation for a single or a group of users.

Scholastic Achievements

- Secured **All India Rank 64** in Joint Entrance Exam Advanced - 2016 among 1.5 million applicants.
- Secured **All India Rank 61** in Kishore Vaigyanik Protasahan Yojana (KVPY) - 2015 conducted by IISc Bangalore.
- Secured **All India Rank 1** in FIITJEE Talent Reward Examination (FTRE) - 2014 conducted by FIITJEE Ltd.
- Felicitated with **Design Innovation Summer Award** - 2017 by the Ministry of Human Resource Development (MHRD), given to selected projects from IIT Delhi, for the project *Person Counter and Display Device*.
- Qualified **National Talent Search Examination** (2012), conducted by NCERT.
- Qualified the **National Standard Examination** in Physics (NSEP) and Chemistry (NSEC) in 2016.

Technical Strengths

Languages and Frameworks: Python, C/C++, Java, SQL, OCaml, Prolog, Javascript, HTML/CSS, VHDL, Bash
Tools and Platforms: Git, Janusgraph, Neo4J, Elasticsearch, PyTorch, Android, Jupyter, Arduino, Django, Docker

Positions of Responsibility

Teaching Assistant | Artificial Intelligence, offered by **Prof. Mausam** *Autumn 2019*

Class Convener | Elected among 104 students of 2016 Entry Computer Science Batch *April 2019 - Present*

Student Mentor | IIT Delhi *June 2018 - May 2019*

- Selected as Student Mentor to mentor six Computer Science Freshmen students. Also appointed as **Head Mentor**.

Guest Lectures Coordinator | Tryst, IIT Delhi *November 2018 - March 2019*

- Worked in the Core Team of Tryst'19, the Annual Technical Fest of IIT Delhi and the largest Technical Fest of North India.
- Invited and hosted eminent Personalities, from diverse areas, to deliver guest lectures at Tryst.

Extra Curriculars

DevClub | Software Development Club of IIT Delhi *March 2017 - Present*

- Developed **Study Portal** (a crowd contributed portal to cater to all types of study material requirements of the students) and **Review System** (a fully anonymous peer review system).
- Delivered several lectures on application and software development with the aim to enhance Computer Science culture in campus.

AINA | An Initiative for National Advancement *September 2017 - Present*

- Regular participant in coordination of weekly teaching program, group discussions and rural trips, conducted by the club.

Indian Road Safety Campaign | Secretary, Technical Arm *January 2017 - May 2018*

- Developed a Road Safety Accidents Data Portal, which was launched by the *Ministry of Road Transport and Highways*, India.
- Collaborated with several Corporations and NGOs to organize technical events, including a Road Safety Hackathon.

Microsoft Student Partner *August 2017 - August 2019*

Best Fresher | Awarded for participation in dance, quizzing, debating and literary events. *2017*

Centre Topper, Mimamsa | Nationwide Science Quiz by IISER Pune *2017*