Ishank Arora

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Education

Indian Institute of Technology (BHU) Varanasi, India   2019 (expected)
Integrated Bachelor and Master of Technology in Computer Science and Engineering (with Hons. in AI)
Cumulative GPA: 9.64/10.00

Delhi Public School Rohini, Delhi (Central Board of Secondary Education)   2014
All India Senior School Certificate Examination | Score: 98%

Delhi Public School, Agra (Central Board of Secondary Education)   2012
All India Secondary School Examination | CGPA: 10.0/10.0

Work Experience

Information Systems and Machine Learning Lab, University of Hildesheim   May 2018 - Present
Research Intern under Prof. Lars Schmidt-Thieme

- Working with the Information Systems and Machine Learning Lab (ISMLL) on predicting the behaviour of learning curves across different datasets and algorithms through Bayesian optimization to automate the process of hyperparameter optimization.

IIT (BHU) Varanasi   Aug 2016 - May 2018
Teaching Assistant, Introduction to Computer Programming and Information Technology Workshop

- Responsibilities included taking hands-on laboratory and tutorial sessions for the students, moderating discussions, setting assignment and lab exam problems and mentoring the students on their course projects.

Nutanix Inc. India   May 2017 - July 2017
Software Developer Intern

- Worked with the Stargate team on the development and automation of QoS Phase-II which implements user policies for VMs and Volume Groups through multiple interfaces including RPC, CLI and REST APIs.
- Integrated the Undefined Behavior Sanitizer (UBSan) for GCC for catching bugs related to integer overflows and misaligned pointers at runtime.

Scientific Analysis Group, Defense Research & Development Organization   May 2016 - July 2016
Undergraduate Research Intern under Dr. S. K. Pal

- Implemented hybrid and binary versions of nature inspired swarm optimization algorithms, Artificial Bee Colony, Firefly algorithm, for solving NP and NP Hard problems such as Integer Factorization and the Set Covering Problem.
- Explored the possibility of developing better versions of the algorithms by coupling with a combination of genetic and differential evolution techniques and introduction of new control parameters.

Publications

- Ishank Arora, Anant Dadu, Mridula Verma, K. K. Shukla, **"Random Projections of Fischer Linear Discriminant Classifier for Multi-Class Classification"**, in proceedings of the 4th International Symposium on Computational and Business Intelligence, September 2016, Olten, Switzerland.

Research Projects

Novel iteration for Stocachastic Proximal Gradient Descent with Adaptive Restart Sep 2017 - Nov 2017
Guide: Prof. K. K. Shukla   IIT (BHU) Varanasi

- Worked on developing a new iterative scheme for Stochastic Proximal Gradient incorporating Nesterov's acceleration, variance reduction and adaptive restart to significantly increase the rate of convergence achieved by current state of the art.
- The work is currently under evaluation.

Proof of Convergence for two stage Crossover for Multiobjective Optimization   Jan 2017 - April 2017
Guide: Prof. K. K. Shukla   IIT (BHU) Varanasi

- Implemented a two-stage crossover operator for more efficient exploration of the search space and analyzed for assumptions and situations where the operator can be guaranteed to converge to a global optimum.
- Analyzed the polynomial probability distributions involved and proposed a comprehensive proof, through the use of homogeneous finite Markov chains, that the operator maintains an elitist population obeying Holland's Schema Theorem and hence can be guaranteed to converge.

AGD based algorithm for datasets with overlapping group structure   Jan 2016 - April 2016
Guide: Prof. K. K. Shukla   IIT (BHU) Varanasi

- The extension of the group lasso feature selection involving overlapping groups presents multiple challenges in optimizing the choice of appropriate features.
- Implemented an algorithm for calculating the proximal operator associated with the group lasso penalty using Accelerated Gradient Descent(AGD).

Random projections as regularizers for Multi-Class classification   Aug 2015 - Nov 2015
Guide: Prof. K. K. Shukla   IIT (BHU) Varanasi

- For datasets with fewer samples than dimensions, discriminant classifiers provide poor results due to non-invertibility of the covariance matrices.
- Employed ensembles of random projections of Fischer Linear Discriminant classifiers to perform multi-class classification for the aforesaid setting and extended the generalization error bounds.

Scholastic Achievements/ Extra Curricular Activities

- All India Rank of 1136 in IIT JEE Advanced 2014 attempted by about 150,000 students.
- All India Rank of 127 in IIT JEE Mains 2014 attempted by about 1,200,000 students.
- Received a full grant to attend PyCon CZ 2018 at Prague, Czech Republic.
- Awarded the IIT (BHU) Honorable Mention award for excellence in the field of programming, 2016-17.
- Ranked 1st from over 400 teams in Goldman Sachs Quantify 2017.
- Ranked 14th from 105 teams at the ACM ICPC Asia Gwalior regionals 2017, and 19th from 255 teams at the Amritapuri regionals 2017. Also qualitifed for the ACM ICPC Asia Regionals in 2015 and 2016.
- Ranked 26th from 1410 participants in NSE ISB CodeSprint, organized on Hackerrank.
- Recipient of the KVPY (Kishore Vaigyanik Protsahan Yojana) Scholarship 2014, funded by Department of Science and Technology, Government of India.
- Received CBSE Merit certificate from the Human Resource Development Minister of India for being in the top 0.1% in All India Senior Secondary School Examination 2014.
- Algorithmic problem setter for Perplexed and Mathmania at Codefest '17, ICM (hosted on Codeforces) and CTF at Technex '17, Prayaas and Mathletics at Technex '16, and COPS Open Programming Contest 2016.
- Amongst the top 300 from the country to qualify for Indian National Chemistry Olympiad 2013.
- Amongst the top 1% in the country in National Standard Examination in Physics 2013.
- Amongst the top 30 from all over India to qualify for the onsite round of Topcoder Humblefool Cup 2017.
- Ranked 8th worldwide in Perplexed, the constrained programming contest of Codefest 2016, IIT BHU.

Key Projects

Generalized Reduced Gradient Algorithm   March 2018

- Implemented the generalized reduced gradient (GRG) algorithm based on implicit variable elimination to solve unconstrained optimization problems using Symbolic Python.

Secure voting protocol with multiple Central Tabulating Facilities   October 2017

- Implemented a secure voting protocol based on homomorphic encryption with numerous Central Tabulating Facilities (CTFs), where the vote preference of each voter is hidden from the CTFs.

Health-Keep   February 2017

- A Windows Universal application which notifies the user of the diseases spreading in their locality and precautionary measures to be taken, by forming clusters of the reported cases and testing whether the user's location lies in any of the clusters through various heuristics, using data scraped from Twitter.

Relational Algebra Engine in C++   October 2016

- Implemented the procedural query language, which operates on relations using some specified operators, such as select, project, cartesian product, join and aggregate operations to answer user-defined queries.

Live Gesture Recognition   April 2016

- An application to detect the arm gestures of the subject using the gyroscope sensors in android phones and deep neural networks in TensorFlow, implemented through socket programming.

Nine Men's Morris for Windows Store   November 2015

- Developed the single player as well as the two-player implementation of Nine Men's Morris board game for Windows 10 using extensive AI through Alpha-Beta Pruning.

Numerical Algorithms in Python   March 2015

- A web application to implement and illustrate through animations Linear system solvers - Gauss-Jordan eliminations and Gauss-Siedel method; Polynomial solvers - Secant Regula-Falsi and Newton-Raphson; and Lagrange's method of interpolation.

Relevant coursework

Computer Science Artificial Intelligence · Natural Language Processing · Intelligent Computing · Theory of Computation · Graph Theory · Operating Systems · Database Management Systems · Data Structures · Algorithms · Information Security · Computer Vision · Computer Networks

Mathematics Discrete Mathematics · Probability and Statistics · Linear Algebra · Optimization Techniques · Stochastic Processes

Positions of Responsibility

- Convener, Codefest 2017, the annual festival of Computer Engineering Society, IIT (BHU) Varanasi.
- Joint Secretary, Club of Programmers, IIT (BHU) Varanasi for the session 2016-17.
- Co-coordinator of A-Mazed, the autonomous grid-following robotics event of Technex 2016.
- Student Representative of DUGC, Department of Computer Science and Engineering, IIT (BHU), 2015-16.

Skills and Interests

Areas of Interest Machine Learning · Computational Intelligence · Algorithms · Web Development

Languages C++ · Python · GNU Octave · HTML/CSS · JavaScript · R · MySQL

Technologies TensorFlow · Keras · Scikit-learn · Django · BASH · Git · Android Studio · Adobe Photoshop · LaTeX