Ishank Arora

Room 168, Morvi Hostel
IIT (BHU) Varanasi
India

Email: ishank.arora.cse14@iitbhu.ac.in
Webpage: www.ishankarora.tech
Phone: (+91) 7570027023

Education

May 2019 (Expected) — **Indian Institute of Technology (BHU) Varanasi**
Integrated Dual Degree (B.Tech + M.Tech) | CGPA: **9.74/10.0**
Major: Computer Science and Engineering

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

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

Work Experience

May - July 2017 — **Software Developer Internship at Nutanix Inc.**
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. Also integrated the **Undefined Behavior Sanitizer (UBSan)** for GCC for catching bugs related to integer overflows and misaligned pointers at runtime.

Aug 2016 - May 2017 — **Teaching Assistant, Introduction to Programming Course, IIT (BHU) Varanasi**
Responsibilities included taking laboratory and tutorial sessions for the students, and setting assignment and lab exam problems.

May - July 2016 — **Research Internship in Swarm Intelligence at Scientific Analysis Group, DRDO**
Worked under **Dr. S. K. Pal** to implement hybrid and binary versions of nature inspired swarm optimization algorithms, Artificial Bee Colony, Firefly algorithm, etc. 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

Jan - April 2017 — *AI Stream Project*
Proof of Convergence for a two stage Crossover for Multiobjective Optimization
Guide: *Prof. K. K. Shukla* — IIT (BHU) Varanasi
Implemented a **two-stage crossover (TSX)** 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.

Jan - April 2016 — *Exploratory Project*
AGD based algorithm for datasets with overlapping group structure
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)**.

Aug - Nov 2015 — *Research Project*
Random projections as regularizers for Multi-Class classification
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 an ensemble of random projections of **Fischer Linear Discriminant** classifiers to perform multi-class classification for datasets having the aforementioned 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.
- Awarded the **IIT (BHU) Honorable Mention award** for excellence in the field of programming, 2016-17.
- Ranked 18th across Asia in the **ACM ICPC Online Round** 2016 and qualified for the regional contests.
- Ranked 39th at Amritapuri site and 48th at Chennai site in the **ACM ICPC Onsite Regionals 2015**.
- 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 Prayaas and Mathletics at Technex'16, COPS Open Programming Contest 2016, and ICM and CTF at Technex'17.
- 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

February 2017	**Health-Keep** An android 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 supplied by doctors and hospitals to report cases.
October 2016	**Relational Algebra implementation in C++** 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.
April 2016	**Live Gesture Recognition** An application to detect the arm gestures of the subject using the gyroscope sensors in android phones and multi-layer Artificial Neural Networks, implemented through socket programming.
March 2016	**REST API for Health Prediction** Built an API in Python to predict the risk factor of diabetes in pregnant women, as well as the chance of mortality in patients admitted to ICU using an ensemble of Fischer Linear Discriminant Classifiers, Support Vector Machines and Random Forest Classifiers.
November 2015	**Nine Men's Morris for Windows Store** 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.
March 2015	**Numerical Algorithms in Python** 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.

Positions of Responsibility

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

Skills and Interests

Areas of interest:	Machine Learning, Computational Intelligence, Algorithms, Web Development.
Languages:	C++, Python, GNU Octave, HTML/CSS, JavaScript, R, MySQL.
Technologies:	Django, BASH, Git, Android Studio, Adobe Photoshop, LaTeX.