Prateek **Varshney**

Indian Institute of Technology Kanpur · Computer Science and Engineering

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Education

Indian Institute of Technology Kanpur — *Kanpur, India*
Bachelor of Technology, major in Computer Science and Engineering
minors in Quantum Mechanics and Cognitive Science | CPI: 9.52/10.0 — *2017 - Present*

Hillwoods Academy — *Delhi, India*
All India Senior Secondary Certificate Exam (AISSCE) | Percentage: 95.8% — *2016*

Hillwoods Academy — *Delhi, India*
All India Secondary Certificate Exam (AISCE) | CPI: 10.0/10.0% — *2014*

Publications

CS-NET at SemEval-2020 Task 4: Siamese BERT for ComVE — *Barcelona, Spain*
Soumya Ranjan Dash, Sandeep Routray, **Prateek Varshney**, Ashutosh Modi — *December 2020*
Accepted in the International Workshop on Semantic Evaluation 2020

Honors & Awards

2020 **S.N. Bose Scholarship**, Among top 25 students in India — *USA*
2018 **Academic Excellence Award**, for exceptional academic performance in 2017-18 — *IIT Kanpur*
2017 **Joint Entrance Exam (JEE) Advanced**, Top 1.13% among 0.17 million candidates — *India*
2017 **Joint Entrance Exam (JEE) Mains**, Top 0.04% among 1.2 million candidates — *India*
2015 **KVPY Scholarship Recipient**, Indian Institute of Science and Government of India — *Bangalore*
2014 **All India Rank 54**, CBSE Group Mathematical Olympiad — *India*

Work Experience

California Institute of Technology — *Pasadena, California*
Research Scholar under Prof. Anima Anandkumar — *July 2020 - Ongoing*
- Working on the interface of Game Theory/Mechanism Design and Deep Learning.

Microsoft India (R&D), Bengalore — *Bangalore, India*
Software Engineering Intern — *May. 2020 - Jul. 2020*
- Implemented an ADF pipeline for the Demand Forecasting Problem, which loaded inventory snapshots and deltas from ADLS Gen 2 storage, performed suitable transformations and various analytics algorithms.
- Performed Statistical Analysis and modelling on inventory data in Databricks to output useful insights.
- Linked the ADLS Gen 2 storage to Azure Data Share and enabled cross subscription sharing of snapshots for transfer of data between the consumer storage and Open Logistics Platform platform in a scheduled fashion.
- Linked the output ADLS Gen 2 storage to Power BI (Business Intelligence) to load the prediction data. Created an interactive dashboard for visualisation of the predictions and insights obtained.

National University of Singapore — *Kent Ridge, Singapore*
Visiting Research Scholar under Prof. Djordje Jevdjic — *May 2019 – July 2019*
- Contributed to the design of an open-source DNA-based archival storage tool.
- Implemented a distributed and subquadratic algorithm to compute the underlying clusters in a DNA pool, which converged efficiently on real and synthetic datasets and was robust to outliers and high levels of noise.
- Simulated the process of storing error-sensitive compressed image files into DNA reconstructing the image from noisy amplified DNA strands. Improved the accuracy of existing DNA Clustering Algorithms by 10%.

IIIT Delhi — *Delhi, India*
Project under Prof. Debarka Sengupta — *Dec. 2019 – Jan. 2020*
- Implemented a single cell RNA-seq data based Generative Adversarial Network (GAN) architecture.
- The model learned non-linear gene-gene dependencies and used them to determine the missing cell states.

Projects

Siamese BERT for Common Sense Reasoning and Validation

Accepted Paper

CS698O Term Project under Prof Ashutosh Modi

Jan. 2020 - Mar. 2020

- Proposed a system for Task 4: "Commonsense Validation and Explanation" of SemEval 2020, involving differentiating between natural language statements that confirm to common sense and those that do not.
- Developed a Siamese model based on transformer neural network architecture, which was able to select the against common sense statement and identify the most crucial reason why a statement does not make sense.
- Paper accepted at International Workshop on Semantic Evaluation 2020.

Comparison of SGD Variants for Stochastic Optimization

Term Paper

EE609A Term Project under Prof Ketan Rajawat

Mar. 2020 - May. 2020

- Reproduced and extended the results of "On the Insufficiency of Existing Momentum Schemes for Stochastic Optimization" by Kidambi et al., published in ICLR 2018.
- Showed experimentally that there exist simple stochastic problem instances where momentum based methods are sub-optimal and enjoy practical gains over SGD in deep learning applications due to minibatching.
- Established that ASGD and Adam can converge faster than all other methods irrespective of Batch Sizes.

GemOS

CS330 Coursework Project

Aug 2019 - Nov 2019

- Designed and implemented several features of a Gem5 simulator based teaching OS called GemOS.
- Implemented multi-level paging, various system calls, exception handlers and process scheduling in C++.
- Worked on locking mechanisms, address space virtualisation and file IO.

Smart Tutor

Project under Prof. Vipul Arora

Dec 2018 - Feb 2019

- Worked on a review scheduling algorithm, using model-free reinforcement learning to learn a teaching policy.
- Studied and contrasted three student learning environments: Ebbinghaus' Curve, Half-life Regression, and Generalised Power Law; two teaching performance metrics and four baseline policies.

SAT Solver

CS202A Coursework Project

Sep 2018 - Oct 2018

- Implemented a SAT solver in python using Davis Putnam Logemann Loveland (DPLL) technique.
- Worked on various heuristics and achieved SAT solving time comparable to MINISAT.
- Encoded a diagonal sudoku problem using propositional logic and solved it using self-coded SAT solver.

Nutanix Summer of Code

Full Stack Development Project under Prof. Sandeep Shukla

May 2018 - July 2018

- Developed Web App to provide 3rd Party Services, as a Messaging and Complaint Management Platform between the company and the end-user, which maintained records of each user's queries & services consumed.
- Technologies used: PHP, SQL Server database, reCAPTCHA API, Geo-location API, Microsoft Azure Cloud.

Skills

Programming C/C++, Python, R, Haskell, GNU Octave, Node.js, HTML, CSS, MySQL, MongoDB

Deep Learning Tensorflow, Pytorch, Scikit-Learn, Pillow, Keras, Numpy, Pandas, Matplotlib, Scipy, CNTK, OpenCV

Utilities Linux shell utilities, Git, Bash, GDB, LaTeX

Relevant Coursework

Introduction to Programming
Introduction to Machine Learning
Discrete Mathematics
Computer Organization
Probabilistic Machine Learning^{A}
Probability for Computer Science
Special Topics in NLP
Operating Systems
Modern Cryptology
Theory of Computation
Real Analysis & Multivariate Calculus
Convex Optimization in SP-COM
Compiler Design
Data Structures and Algos
Philosophy of Cognitive Science

A: Audit

Mentorship Roles and Extra Curriculars

- Teaching Assistant for ESC101: Introduction to Computing under Prof. Biswabandan Panda.
- Academic Mentor for ESC101, Counselling Service; Assisted freshman year students through remedial lectures.
- Core Group Member, Vox Populi, Team member of the campus journalism society.
- Runner up Project, for design and fabrication of an Ornithopter, Introduction to Manufacturing Process (TA201).