Eklavya Sharma

Curriculum Vitae

Education

Aug 2014 – June 2018 **B.E. (Hons) Computer Science**, *Birla Institute of Technology and Science (BITS)*, Pilani.
GPA – 9.14 / 10

Research Interests

Algorithms, Complexity, Cryptography.

Projects

Oct 2017 – Nov 2017 **Analysis of Primality-testing Algorithms** .
'Advanced Algorithms and Complexity' course project.
Topics: abstract algebra, number theory, computational complexity.
- Studied the AKS primality test and attempted to improve it.
- Studied and compared compositeness-proving algorithms like Miller-Rabin, Solovay-Strassen, Baillie PSW.

Sept 2017 – Dec 2017 **Mitigating DNS-related DoS attacks using SDN**.
Topics: computer networks, network security, SDN.
- Studied DNS-related DoS attacks and Software-Defined Networking (SDN).
- Devised a new mechanism for mitigating DNS Amplification attacks, which uses a set of geographically-distributed SDN routers.
- Wrote a research paper on the above mitigation strategy, which I will present at ICACCI in September 2018.

Nov 2017 – Jan 2018 **CT-means clustering algorithm** .
Topics: machine learning, algorithms, math.
- Invented a clustering algorithm, which I named CT-means. It is an approximation to C-means fuzzy clustering. It uses KD-trees to reduce running time.
- Mathematically proved its convergence and approximation guarantees.
- Implemented the algorithm and benchmarked its performance on different datasets. It was not significantly faster in practice and its applicability was limited.

Work Experience

Aug 2018 – Current **Platform Engineer**, *media.net*, Gurgaon, India.
Topics: machine learning, game theory.
media.net is an advertisement-technology company. One of media.net's operations involves participating in online real-time auctions to purchase ad-spots. I'm doing research on estimating valuation of ad-spots and choosing the optimal bid amount.

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Jan 2018 – June 2018 **Intern** , *American Express*, Gurgaon, India.
Topics: neural networks, machine learning, big data.
Trained a neural network from almost-raw data to estimate the probability of a credit-card applicant defaulting. The data was in a unique format, so a custom neural network architecture was devised. The neural network's performance was at par with the model then in production, which was tuned over many years and utilized several complex hand-engineered features.

May 2017 – July 2017 **Intern**, *Directi*, Mumbai, India.
Topics: machine learning.
Made Directi's news article classification algorithm recognize more categories.

May 2016 – Aug 2016 **Google Summer of Code (GSoC) Student** , *Zulip*.
Topics: software development.
Zulip is an open-source group chat application. 3 students were selected from over 100 applicants to work on Zulip as part of the GSoC program.

- Added type annotations to Zulip's python code (around 50,000 lines) so that it could be statically type-checked using a tool called mypy. This improved developer productivity and made Zulip the first major open source project to be 100% statically typed with PEP-484 annotations.
- Switched from an apt repository to using virtualenvs in production. This simplified dependency management and testing deployment workflow.
- Migrated Zulip's python code from Python 2 to Python 3. Apart from a lot of ad-hoc bug-fixing, this involved:
  - Writing scripts which used static code analyzers to find Python 3 bugs.
  - Migrating to python3-compliant dependencies. This required some sections of code to be entirely rewritten.
  - Standardizing the way Zulip uses different kinds of strings (text and byte strings).
- A more detailed description of my work:
  https://gist.github.com/sharmaeklavya2/57c2420865f17fc9b58a78033de61422.

Achievements

BITS-Pilani Merit Scholarship.
Scored GPA within top 2% in three semesters.

March 2018 **Graduate Aptitude Test in Engineering (GATE)**.
Secured all-India rank 86 (out of approximately 100,000 candidates) in the 'Computer Science and IT' test.

ACM-ICPC

ACM-ICPC is an international annual multi-tiered programming contest for college students. Around 3000 teams (of 3 students each) participate in the Indian online qualifying round each year. Top few teams qualify for on-site regional contests in India.

Dec 2017 Ranked 29 out of 250 teams in Amritapuri regional contest.
Dec 2016 Ranked 66 out of 450 teams in Amritapuri regional contest.
Dec 2016 Ranked 30 out of 70 teams in Kharagpur regional contest.
Dec 2015 Ranked 88 out of 250 teams in Amritapuri regional contest.

Selected Coursework

- Advanced Algorithms and Complexity

- Discrete Structures in Computer Science
- Design and Analysis of Algorithms
- Graphs and Networks
- Data Structures and Algorithms
- Machine Learning
- Cryptography
- Theory of Computation
- Logic in Computer Science
- Artificial Intelligence

Computer Skills

Programming Languages.
C/C++, Python, Java, Bash, JavaScript, Haskell, Prolog

Software Libraries.
NumPy, Pandas, Scikit-Learn, TensorFlow, Django

Other Languages.
SQL, LaTeX, HTML, CSS

Student Societies

BITS-ACM, *BITS Pilani ACM Student Chapter*.
- Problem setter for 3 programming contests organized by BITS-ACM.
- Created backends for web applications used in online quizzing events.
- Conducted intra-BITS-ACM workshops on Linux and CLI.