Saurav Shekhar

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Education

2016-	**MSc Computer Science**, ETH Zürich ESOP scholar, awarded to 3 admits among 150 in MSc Computer Science 2016	-
2012-2016	**B.Tech Computer Science**, Indian Institute of Technology, Kanpur Academic Excellence Award for year 2012-13	9.1/10

Professional experience

Zero shot emoji recognizer *June '18 - September '18*
Internship in Handwriting Recognition Research, Machine Perception, Google Mountain View

- Researched Machine Learning models for learning better embeddings for emoji recognition

Speeding up model evaluation for black box optimization *March '18 - June '18*
Internship at Amazon CoreAI, Berlin

- Trained ML models on thousands of hyperparameter configurations and created lookup tables with extrapolation for epochwise simulation of black box model.

Recurrent Neural Networks on GPU for Particle Physics applications *May '17 - August '17*
Google Summer of Code project under CERN-HEP Software Foundation, Geneva

- Restructured the Deep Learning module and added Recurrent Neural Network support in TMVA Module in the ROOT data analysis framework. Features include parsing network configurations, storing and loading weights, training data with GPU (using CuBLAS), BLAS and multi-threaded training support for CPUs.

Projects

Dialogue generation using Seq2seq models *April '17 - June '17*
Course project in Natural Language Understanding under Prof. Thomas Hofmann

- Starting with a basic sequence to sequence model for conversational agent, improved upon the baseline using attention models, stacked RNNs, mutual information (for diversifying output) and beam search.
- Introduced histograms of word frequency as a metric to evaluate model performance (especially diversity) along with perplexity and BLEU score.

Twitter Sentiment Classification *March '17 - July '17*
Course project (Kaggle challenge) in Computational Intelligence Lab under Prof. Thomas Hofmann

- Used GloVe and Word2Vec to extract word embeddings from tweets, along with a combination of unsupervised sentence level embeddings to form feature vectors.
- Used an ensemble of LSTM, GRU and Convolutional Networks to achieve a classification accuracy of 89% on a dataset of 2.5 million tweets. This was the **top** scoring model on the leaderboard.

Optimized implementation of Latent Dirichlet Allocation *March '17 - June '17*
Course project in How to Write Fast Numerical Code under Prof. Markus Püschel

- Enhanced the performance of a standard Latent Dirichlet Allocation (LDA) implementation on single core using memory usage improvements, use of SIMD instructions, cache analysis etc.
- Achieved a speedup of 11x over original C implementation written by authors of LDA.

Random Graphs *July '15 - Nov '15*
Undergraduate project under Prof. Surender Baswana, IIT Kanpur *link to report*

- Studied Erdos-Renyi phase transitions and expected linear time algorithms for finding biconnected components in Random graphs.
- Worked on average case analysis of an incremental algorithm for maintaining DFS tree in an undirected graph.

Robust PCA via Convex Optimization *Apr '16*
Term paper in Convex Optimization under Prof. Ketan Rajawat, IIT Kanpur

- Studied and compared the current best algorithms for low rank matrix recovery like the accelerated proximal gradient algorithm (APG), Augmented Lagrange Multiplier method (ALM), Dual method etc.
- Ran simulations with different size and error matrix and compared results of all algorithms on different metrices like time taken, reconstruction error, error-rate with iterations etc.

Scala to MIPS Assembly Compiler *Jan '15 - Apr '15*

Course Project in Compilers under prof. Subhajit Roy, IIT Kanpur

- Programmed a Scala to MIPS cross compiler with support for basic datatypes, conditional statements, looping statements, arrays, nested functions, recursion and object oriented features.
- Awarded as the 2^{nd} best project for the course out of 22 teams.

Extension of NACHOS *Aug '14 - Nov '14*

Course Project in Operating Systems under prof. Mainak Chaudhuri, IIT Kanpur

- Extended the standard system call library of NachOS and implemented Fork, Exec, Join, Yield, Sleep, Exit system calls. Implemented process scheduling algorithms like UNIX scheduling, FIFO, Round robin, SJF and non-preemptive scheduling.
- Programmed page replacement algorithms: Random allocation, FIFO, LRU and LRU-clock and evaluated relative performance.

Academic

- Research Assistant, Information Science and Engineering Group, ETH Zürich, fall 2017
- Teaching Assistant, Data Structures and algorithms, IIT Kanpur, fall 2015
- Teaching Assistant, Advanced algorithms, IIT Kanpur, fall 2015
- Secured All India Rank 958 in IIT-JEE among 500,000 candidates.
- Selected in Top 1% of each of the National Standard Examinations in Physics (NSEP), Chemistry (NSEC) and Astronomy (NSEA) and Regional Mathematics Olympiad.

Miscellanous

- Google Hash Code 2017 onsite Finalist, under top 50 worldwide among 3000 teams in the qualification round.
- Ranked 10^{th} among 60 teams and awarded a bronze medal at ACM ICPC SWERC 2016 Regionals.
- 6^{th} place among top 25 teams selected (among 8000 in online rounds) for the Codechef Snackdown onsite finale 2015.
- Secretary, Programming Club (*2013-2014*) - Assisted in organizing Programming competitions and took introductory programming lecture for the freshers.
- Advanced to Round 2 of Facebook Hackercup 2013 (position 287), and Round 2 of Google Code Jam 2014.
- Secured 1^{st} place in IHPC, high performance computing contest and 2^{nd} place in Battlecity, AI bot programming challenge in Techkriti 14.

Technical Skills

Coursework: Computer Vision, Probabilistic Machine Learning, Graphical models for image analysis, Causality *Ongoing*) Deep Learning, Natural Language Understanding, Machine Learning, Hardware Architectures in Machine Learning, How to Write Fast Numerical Code, Algorithms Lab
Programming Languages: C++ (Proficient), Python (Proficient), Lua, Java, Haskell, Bash Shell
Software: Torch, Tensorflow, Edward, CUDA (cuBLAS), MATLAB, Caffe, MySQL, GIT, MIPS Assembly, LaTeX