Shikhar Jaiswal

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IIT Patna
Computer Science & Engineering
3rd Year Undergraduate
GPA : 8.24/10.0

Work Experience & Key Projects

Hyperlinks at appropriate places

Software Development Intern - HackerRank *Summer '18*

Manager: Harishankaran Karunanidhi, Co-founder and CTO

- Improved upon the existing architecture for *HackerRank*'s state-of-the-art mission-critical Code Checker
- Applied custom mandatory access control abstractions for secure code execution under production environment
- Shipped additional crash and memory leak fixes, thread-safe control abstractions and build improvements

Open Mainframe Project Intern - The Linux Foundation *Summer '18*

Mentor: Wolfgang Engel, SUSE Linux GmbH

- One of the top 12, among 71 applicants, selected by the *Technical Steering Committee (TSC)* of *The Linux Foundation* for the prestigious student summer internship on mainframe systems
- Built and deployed *6 software packages* compatible with s390x architecture for *SUSE Linux Enterprise Servers (SLES 12 and SLES 15)* on the *SUSE Package Hub* using *Open Build Service (OBS)* platform
- Additionally worked on removing dependency issues and updated the entire *Haskell stack* on the SLES 12 channel

Google Summer of Code - Mlpack *Summer '18*

Mentor: Marcus Edel

- One of the selected 6, among 107 applicants, under *mlpack*, a fast, scalable C++ machine learning library, originally developed at *FASTLab*, *Georgia Tech*, for designing essential deep learning modules
- Deployed implementations of Generative Adversarial Networks (GAN, Deep Convolutional GAN and Wasserstein GAN) and Restricted Boltzmann Machines (RBM and Spike and Slab RBM), achieving ~1.5x speed (single core aggregate) over *Sklearn*'s and *Tensorflow*'s implementations for similar accuracy of generated data
- Introduced Cross Entropy, Layer Normalization, Bilinear Interpolation, Atrous and Transposed Convolution Layers

Google Summer of Code - SymEngine *Summer '17*

Mentor: Isuru Fernando & Sumith Kulal

- One of the selected 8, among 42 applicants, under *SymPy*, a popular symbolic manipulation engine in Python
- Improved the overall infrastructure of *SymEngine*, an efficient, standalone C++ Computer Algebra System (CAS), and refactored its Python wrapper *SymEngine.py* for cross-compatibility
- Introduced SymEngine as an optional core for SymPy, and *PyDy*, a multi-body dynamics tool-kit for speeding up their backend computations to the order of ~70x

Other Work Experience

Sentiment Induced Machine Translation Techniques *Winter '17*

Mentor: AI-NLP-ML Team, IIT Patna

- Implemented numerous probabilistic sentiment-driven pipeline routines using *VADER* (C. Hutto et al. 2014), in conjunction with the standard Phrase-Based Statistical and Neural Machine Translation models using *Moses SMT Library* (P. Koehn et al. 2007) and *OpenNMT Toolkit* (G. Klein et al. 2017)
- Benchmarked model performance against well known baseline models in the statistical and neural domain

NJACK Winter of Code Mentor *Winter '17*

- Responsible for review and selection of Open Source projects for IIT Patna's inaugural Winter of Code program
- Primary reviewer, grader and moderator for the code patches contributed by the participants

Accepted Talks

- SUSE Package Hub and Open Build Service | **Open Source Summit Europe** *October '18*
- SymEngine: Leveraging The Power Of A Computer Algebra System To Another | **SciPy India** *November '17*
- CAS For Different Programming Languages Using SymPy And SymEngine | **PyCon India** *November '17*

Independent Projects

Image Transfiguration using CycleGAN — *Deep Learning*
- Implemented an algorithmic pipeline in C++, to morph an image domain into another image domain, in a fluid way using Cycle-Consistent Adversarial Networks (Jun-Yan Zhu et al. 2018)
- Network can be trained to generate natural landscapes from Claude Monet's works, SVHN from MNIST and more

Movie Recommendation Engine — *Recommender Systems*
- Developed a movie recommendation engine in Python utilizing a convex combination of multiple methods (proceeding from R. Salakhutdinov et al. 2007), achieving comparable accuracy against the Netflix CineMatch Benchmark
- Implemented User-User and Item-Item based Collaborative Filtering methods on MovieLens 10M Dataset

Pipelined MIPS Processor on FPGA — *Hardware Systems*
- Designed a Verilog package for 32-bit five-stage pipelined MIPS processor simulation on FPGA
- Implemented Forwarding Unit, Flush Control Unit and Stall Control Unit modules for control and data hazards

Gestures Alive — *Image Processing*
- Used OpenCV and NumPy to build a gesture recognition app using web-cam to detect and track hand gestures
- Gestures are processed and matched with pre-defined custom gestures to produce identification output

Organ Exchange — *Software Systems*
- Developed a full stack web application using Django to allocate donor organs to patients keeping patient age preference and patient-donor blood group viability factors
- Implemented a modified version of Gale-Shapley algorithm to reduce the exchange to a stable matching problem

Football Game Engine — *Software Design Patterns*
- Developed a Football Game Engine to simulate object interactions of a real football game
- Identified and solved design problems associated with Football, Players, and Team Strategy using Observer, Decorator and Strategy patterns respectively and implemented C++ RCP support for resource management

Honours & Achievements

- Achieved *98.71%* percentile in JEE Advanced (previously IIT-JEE) 2016 among 200 thousand candidates
- Achieved *99.54%* percentile in JEE Main (previously AIEEE) 2016 among 1.2 million candidates
- Achieved *99.13%* percentile in National Entrance Screening Test (NEST) 2016 among 40 thousand candidates
- Recipient of the Kishore Vaigyanik Protsahan Yojana Scholarship in 2016 (*top 1400* students out of 0.1 million)
- Recipient of CBSE Award for Community Service - Human Rights and Social Equality 2013

Positions of Responsibility

SymEngine & Mlpack Collaborator *2017 - Present*
- Member of the push-access and code review team

NJACK Coordinator, Computer Science Club *2017 - Present*
- Responsible for organizing various programming related activities and talks in the institute

Mentor, Institute Student Mentorship Program *2018 - Present*
- Academic guide to four freshmen year students over the period of two years

Technical Skills

Programming Languages	Fluent in C++, experienced in Python, Cython and C and familiar with Javascript, Java, Perl, Octave, SQL and Verilog
Libraries & Tools	Experienced in Django, Git, OSC, CMake, MATLAB, Orange and familiar with OpenCV, NumPy, SymPy, Mlpack, Tensorflow, PyTorch, GCP and AWS

Key Courses

Theoretical	Programming and Data Structures, Algorithms, Discrete Mathematics, Switching Theory, Formal Languages & Automata Theory*
Labs	Programming and Data Structures, Algorithms, Switching Theory, Innovative Design, Databases* & Computer Architecture*
Systems	Databases* & Computer Architecture*
Mathematics	Real and Complex Analysis, Linear Algebra, Differential Equations, Probability Theory and Random Processes, Optimization Techniques & Abstract Algebra*