# Shikhar Jaiswal

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## IIT Patna

Computer Science & Engineering
Major GPA : 9.07/10.0
Overall GPA : 8.66/10.0

## HONOURS & ACHIEVEMENTS
*Hyperlinks* at appropriate places

- Achieved *98.71%* percentile in JEE Advanced (previously IIT-JEE) 2016 among 200,000 candidates
- Achieved *99.54%* percentile in JEE Main (previously AIEEE) 2016 among 1,200,000 candidates
- Achieved *99.13%* percentile in National Entrance Screening Test (NEST) 2016 among 40,000 candidates
- Recipient of the Kishore Vaigyanik Protsahan Yojana Scholarship in 2016 (*top 1400* students out of 100,000)
- Recipient of CBSE Award for Community Service - Human Rights and Social Equality 2013

## RESEARCH EXPERIENCE

**Research Intern - Microsoft Research India**                    *Summer & Fall '20*

*Manager: Dr. Prateek Jain, Senior Principal Researcher*
- Working on bringing state-of-the-art Machine Learning to resource-constrained devices.

**Visiting Academic Researcher - University of Southern California**          *Summer '19*

*Mentor: Prof. Benjamin D. Nye, Director of Learning Sciences - Institute for Creative Technologies*
- Developed and deployed a variant of the active learning algorithm with weighted density policy for the SMART-E project for detecting user engagement with tutoring systems, funded by U.S. Office of Naval Research.
- Applied feature engineering to develop a set of generalizable engagement metrics for cross-system compatibility, and tackling cold start and automated annotation problems in play-tester environments.
- Achieved ~90% classification accuracy over a set of 5 distinct user groups with as little as 25 unlabelled samples.

**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.

## INDUSTRIAL & OPEN SOURCE EXPERIENCE

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

*Mentor: Wolfgang Engel, SUSE Linux GmbH*
- 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.

**Software Development Intern - HackerRank**              *Summer '18*

*Manager: Harishankaran Karunanidhi, Co-Founder and CTO*
- Shipped crash and memory leak fixes, thread-safe control abstractions and build improvements for *HackerRank*'s state-of-the-art mission-critical Code Checker.
- Applied custom mandatory access control abstractions for secure code execution under production environment.

**Google Summer of Code - Mlpack**              *Summer '18*

*Mentor: Marcus Edel*
- 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.
- Added Cross Entropy, Layer Normalization, Bilinear Interpolation, Atrous and Transposed Convolution Layers.

**Google Summer of Code - SymEngine**              *Summer '17*

*Mentor: Isuru Fernando & Sumith Kulal*
- 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.

# 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.

**Interactive Path-Invariant Traffic Forecasting** — *Deep Learning*

· Implemented novel deep learning architectures for accurate path-independent traffic inflow and outflow forecasting between two 5x5 sq. km. regions using the GreenTaxi dataset for the city of New York.

· Customized a previously existing web-based user interface for marking source and destination regions on an interactive map layout and querying the associated traffic.

**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.

# Mentoring

**Google Summer of Code - Mlpack**                                    *2019*

· Responsible for code review and guidance of two students under 'Essential Deep Learning Modules' project.

**Institute Student Mentorship Program**                          *2018 - 2020*

· Academic guide to four freshmen year students over the period of two years.

# Positions of Responsibility

**SymEngine & Mlpack Collaborator**                          *2017 - Present*

· Member of the push-access and code review team.

**NJACK Coordinator, Computer Science Club**                 *2017 - 2019*

· Responsible for organizing various programming related activities and talks in the institute.

# Key Courses

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|---|---|
| **Theoretical** | Programming and Data Structures*, Algorithms, Discrete Mathematics, Switching Theory, Formal Languages and Automata Theory, Computer Graphics, Artificial Intelligence, Introduction to Network Science*, Foundations of Machine Learning, Natural Language Processing*, Introduction to Deep Learning* & Advanced Machine Learning* |
| **Labs** | Programming and Data Structures, Algorithms*, Switching Theory*, Innovative Design, Databases, Computer Architecture*, Operating Systems, Computer Networks |
| **Systems** | Databases, Computer Architecture, Operating Systems* & Computer Networks |
| **Mathematics** | Real and Complex Analysis, Linear Algebra, Differential Equations, Probability Theory and Random Processes, Optimization Techniques & Abstract Algebra |
| | *Awarded **AA** grade (*either among top 4 students or top 5% of the class, whichever tougher*) |