Shubham **Agrawal**

Machine Learning Scientist · Web Developer

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Education

IITK(Indian Institute of Technology, Kanpur) — *Kanpur, U.P.*

B.Tech. in Computer Science and Engineering — *July 2013 - PRESENT*

CGPA till 7^{th} semester : **8.8**

St. Joseph's Sr. Sec. School — *Kota, Rajasthan*

CBSE, Higher Secondary (Class 12^{th}) — *2013*

Performance : **94 %**

St. Joseph's Sr. Sec. School — *Kota, Rajasthan*

CBSE, Secondary (Class 10^{th}) — *2010*

CGPA : **10 %**

Scholastic Achievements

2013	**All India Rank 191 ,** IIT-JEE Advanced (among 150,000 candidates)	*India*
2014	**Academic Excellence Award,** for exceptional academic performance	*IIT Kanpur, India*
2015	**Best Rookie Team,** BAJA Student India, an inter-collegiate all terrain vehicle design competition	*India*
2015	**All India Rank 1234,** JEE Mains (among 1,400,000 candidates)	*India*
2013	**Written Exam Qualified,** Kishore Vigyan Protsahan Yojna (KVPY)	*India*

Experience

Adobe — *Bangalore, India*

Research Intern, Big Data Experience Lab — *May - July 2016*

- Geo-fence is a virtual parameter that triggers notifications depending on entry, exit or dwell time of user. The project focused on analyzing customer's historical app usage behavior to automatically learn geo-fences for selective geo-targeting.
- Geo-fences are created by identifying areas with high values of user interest. To unsheathe interest from sparse location tagged browsing data, algorithm captures intrinsic interest of user, trends at semantically similar locations and similarity between products and users.
- Achieved precision was 5 times higher than existing geo-fence. Created user-friendly marketer's dashboard where marketer can manage geo-fence and get useful inferences about product sale. Patent is internally accepted by Adobe and writing research paper is in process.

Pariksha.co — *Pune, India*

Research and Developement Intern — *May - July 2015*

- Engineered an algorithm that adaptively recommend questions depending upon student's performance and question ratings.
- Modeled and programmed scalable adaptive question recommender system using GO language and MongoDB database as a micro service.
- Implemented Pariksha Practice Section for adaptive content and a Gamification engine with impact on 20K students.

Projects

Multiple Kernel Learning — *IIT Kanpur, India*

Undergraduate project under Dr. Harish Karnick — *Jan. - Apr. 2015*

- Explored relative kernel hilbert space, multiple kernel learning algorithm and hierarchical kernel learning. Project was focused around multiple kernel learning to analyze effects of linear combination of different kernels over classifier.
- Extracted surf and convolutional deep-net (pre-trained BVLC GoogleNet model) features for Caltech multiclass object classification dataset containing 102 categories. Implemented Simple MKL algorithm and studied effects of linear combination of distinct kernels on svm classifier.

Low rank model for neural networks — *IIT Kanpur, India*

Research Project under Dr. Purushottam Kar — *Aug. - Nov. 2016*

- Primarily motivated by Robust PCA problem with outlier pursuit which seeks to find the best low-dimensional subspace approximation to highdimensional points after eliminating corruptions. Working on applying similar model to weight matrix of fully connected layer.
- Learnt about Robust PCA with outlier pursuit and tensor train decomposition of weight matrix.

Automatic Abstract Generation for research papers

IIT Kanpur, India

Course Project under Dr. Harish Karnick — *Aug. - Nov. 2016*

- The important sentences are first extracted from the paper text and fed to an abstractive model which outputs the final summary for the paper
- Word frequency based scores, text rank and latent semantic analysis were experimented for extraction. We uses a RNN encoder-decoder network to generate the final abstract. Model was evaluated using ROGUE metric.

Densecap with NMS Convenet

IIT Kanpur, India

Course Project under Dr. Gaurav Sharma — *Aug. - Nov. 2016*

- Aim was to choose a problem, implement/reproduce approximate results from an existing paper and finally go beyond that work by identifying some weakness and improving on it. We choose the paper *DenseCap: Fully Convolutional Localization Networks for Dense Captioning*
- Inspired from the future works given by the authors i.e. to discard test-time NMS in favor of a trainable spatial suppression layer and the nms-convenet model presented by work-*A convnet for non-maximum suppression*, we enhanced the proposed model. We implemented and trained the nms-convenet using Keras.
- We were able to enhance the mAP of densecap from 5.698 to 5.76. Meanwhile, we learnt about Convolutional networks, Localization networks, Recognition network and Lanuguage model. The code was implemented using Torch, LuaJIT, Keras and python.

Object(Pedestrian/Two-Wheeler/Three-Wheeler) Detection in Survillience Videos

IIT Kanpur, India

Course Project under Dr. Harish Karnick — *Jan. - Aug. 2016*

- Identify and classify objects into pedestrians, two-wheelers, three-wheelers and four-wheeler in surveillance video.
- Performed background-foreground separation to identify moving objects. Tested surf and convolutional deep-net features (BVLC GoogleNet).
- Tried decision tree, random forest and svm (ovr and ovo) classifiers to predict labels.

Go-Python-x86 Compiler Design

IIT Kanpur, India

Course Project under Dr. Subhajit Roy — *Jan. - Apr. 2016*

- Implemented an end-to-end compiler for a subset of Go language and x86 architecture in python using PLY (python Lex-Yacc).
- Provided support for multi-dimensional arrays, nested and recursive procedures etc. Used back tracking algorithm and done short circuiting

NachOS

IIT Kanpur, India

Course Project under Dr. Mainak Choudhari — *Jan. - Apr. 2016*

- Extended the standard system call library of NachOS and implemented system calls pertaining to Fork, Exec, Join, Yield, Sleep and Exit.
- Implemented process scheduling algorithms: UNIX Scheduling, FIFO, Round Robin, Shortest Job First and Non-pre-emptive job scheduling.
- Programmed page replacement algorithms: Random Page Allocation, FIFO, LRU and LRU Clock to evaluate relative performances

Zoobar Secure

IIT Kanpur, India

Course Project under Dr. Sandeep Shukla — *Jan. - Apr. 2016*

- Extended zoobar web application to learn about various security concepts including buffer overrun attacks, xss, csrf and sql injection.
- Done privilege separation and server side sandboxing on OKWS web server. Created program analysis tools based on symbolic execution.

Open Source Projects

IIT Kanpur, India

Subtitle Downloader — *Dec. 2013*

- Wrote a python script that scrapes and extract the subtitle from subscene.com.

IITK FB Forum App — *May 2014*

- Created an online discussion website for students and connected it with Facebook to make it more user friendly
- Used PHP and PostgreSQL for back-end and hosted application on Heroku. Used Facebook SDK for JavaScript for facebook login and Canvas frame for user interface

Skills

Machine Learning	Scikit Learn, Keras, Theano, Lua
Web	Go, Javascript, Material Design, CSS, HTML, PHP, MYSQL, MongoDB, CakePHP
Programming	Python, C/C++
Tools	Ubuntu, Windows, Vim, LaTeX, Matlab, SolidWorks

Courses

Machine Learning	Machine Learning Tools, Natural Language Processing, Recent Advances in Computer Vision, Optimization Techniques
Systems	Operating Systems*, Compiler Design, Computer Networks, Computer Security, Computer Organization
Theory	Advanced Algorithms, Data Structures and Algorithms, Theory of Computation
Mathematics	Linear Algebra, Probability and Statistics

Extracurricular Activity

Counselling Sevice

IIT Kanpur, India

Academic Mentor, Introduction to Electrodynamics (PHY103) *July 2014 - Apr. 2015*

- Regularly took remedial classes on institute and hall level basis.
- Provided academic and emotional assistance to students in academic probation from junior batches

IITK Motorsports, BAJA Student India

IIT Kanpur, India

Chassis Head *Oct. 2013 - Jan. 2015*

- Build the chassis sub-system of the vehicle. Contacted dealers for tubes, welding and supervised the whole manufacturing process.
- Contacted firms like Bosch India, Mathworks etc. thereby raising sponsorship amounting to ₹ 8.20 Lakhs