Shubham Agrawal

Member of Technical Staff, Adobe · Computer Science Graduate, IIT Kanpur

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Education

Indian Institute of Technology, Kanpur *July 2013 - May 2017*

B.Tech. Computer Science & Engineering

CGPA : 8.7

Research Interests

Recommender Systems, Machine Learning, eCommerce and Tourism, Adaptive and Conversational Systems

Publication

Smart Geo-fencing with Location Sensitive Product Affinity

Ankur Garg, Sunav Choudhary, Payal Bajaj, Sweta Agrawal, Abhishek Kedia, and Shubham Agrawal

ACM SIGSPATIAL 2017, California, USA

Patent

Smart Geo-fencing using Location Sensitive Product Affinity

With: Ankur Garg, Payal Bajaj, Sweta Agrawal, Abhishek Kedia, and Shubham Agrawal

Patent Application Number - 15/434,886. (Filed)

Experience

Adobe Systems India Pvt. Ltd. *July 2017 - ongoing*

Member of Technical Staff (Software Engineer)

- Developed POC of a **unified annotation tool** which automatically detects the annotation user is trying to make. Trained CNN for detecting tool (highlight/underline/strikethrough/polygons) given user drawings and pdf context. Idea got selected for the March Release
- Engineered an efficient algorithm for the synchronization of sticky comments between PDFNext (HTML based PDF format) and Classic PDF inside Adobe Acrobat. The challenge was to associate user click on HTML document to the most relevant textual/graphical content.
- Fixed more than ten critical security vulnerabilities (including buffer overflow vulnerabilities and javascript parameter tempering). Severity ranged from the crash of the application on launching malicious pdf to granting full read/write permissions of the user to the attacker.

Adobe Systems India Pvt. Ltd. *May - July 2016*

Research Intern *(**project page** , **pres**)*

- The aim was to assist marketers in creating **smart geo-fences**. The project was focused on segmenting users based on their geo-distributions of mobile app activity, identifying points-of-interest and then suggesting geo-fences customized to each user segment.
- 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 f1 score (24.89%) was significantly higher than geofence designed using Matrix Factorization (18.16%).
- Project was showcased in Adobe Tech Summit, 2017 (an annual internal research and engineering conference) (talk video)

Pariksha.co *May - July 2015*

Research and Development Intern

- Engineered an algorithm that adaptively recommends questions depending upon student's performance and question ratings
- Modeled and programmed scalable **adaptive recommender system** using the GO language and MongoDB database as a microservice
- Implemented Pariksha Practice Section for adaptive content and a Gamification engine with impact on more than 50K students

Projects

Densecap with NMS Convenet *Aug. - Nov. 2016*

Course Project under Dr. Gaurav Sharma *report , pres*

- Analyzed and extended the work "DenseCap: Fully Convolutional Localization Networks for Dense Captioning". Reproduced the results on smaller 2 GB GPU which required a lot of optimizations (Originally, 12 GB Titan X GPU was used)
- To discard test-time NMS in favor of a trainable spatial suppression layer, we used the "Tyrolean network - A convolutional network for NMS"
- Enhanced the **mAP** of densecap from **5.698 to 5.76**.

Multiple Kernel Learning

Jan. - Apr. 2015

Undergraduate project under Dr. Harish Karnick — ***report***

- Explored relative reproducing kernel Hilbert space, multiple kernel learning algorithm, and hierarchical kernel learning.
- Extracted surf and convolutional deep-net (pre-trained BVLC GoogleNet model) features for Caltech multiclass object classification dataset
- Implemented **Simple MKL** algorithm and studied effects of linear combination of distinct kernels on SVM classifier

Low-rank model for neural networks

Aug. - Nov. 2016

Course Project under Dr. Purushottam Kar — ***report***

- Implemented a module for decomposing the input weight matrix into a low rank and a sparse matrix. The Code was written in Matlab and python.
- Based on the paper - *"Robust PCA problem via outlier pursuit"* which finds the low-dimensional subspace approximation to high dimensional points after eliminating corruptions.
- The resultant neural network performed with comparable accuracy and takes less time.

Automatic Abstract Generation for Research Papers

Aug. - Nov. 2016

Course Project under Dr. Harish Karnick — ***report***

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

Poisson Matrix Factorization

Jan. - May 2017

Course Project under Dr. Piyush Rai — ***report***

- Implemented and compared Scalable Hierarchical Poisson Factorization and Nonparametric Bayesian Matrix Factorization
- Tried to expand the work by incorporating metadata and interactive sampling

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

Jan. - Aug. 2016

Course Project under Dr. Harish Karnick — ***code***, ***report***

- Identified and classified objects into pedestrians, two-wheelers, three-wheelers and four-wheeler in surveillance video
- Performed background-foreground separation to identify moving objects. Used SURF and convolutional deep-net features (BVLC GoogleNet)
- Used decision tree, random forest and SVM (OVR and OVO) classifiers to predict labels

Scholastic Achievements

2013 **All India Rank 191 ,** IIT-JEE Advanced (among 150,000 candidates)

2014 **Academic Excellence Award,** (awarded to top 7% students in the institute)

2015 **Best Rookie Team,** BAJA Student India, an inter-collegiate All-terrain vehicle design competition

2013 **All India Rank 1234,** JEE Mains (among 1,400,000 candidates)

Teaching

Academic Mentor, Introduction to Electrodynamics (PHY103)

July 2014 - Apr. 2015

Counselling Service, IIT Kanpur

- Conducted regular **tutorial classes** at the institute and hall level
- Guided 2 students out of the Academic Probation Program (AP) by constant academic and emotional support

Courses

Machine Learning Bayesian Machine Learning, Natural Language Processing, Recent Advances in Computer Vision, Optimization Techniques, Machine Learning Tools

Systems Computer Architecture, Operating Systems, Compiler Design, Computer Networks, Computer Security, Computer Organization, Principles of Database Systems

Theory Advanced Algorithms, Data Structures and Algorithms, Theory of Computation, Linear Algebra, Probability and Statistics

Extracurricular Activity

IITK Motorsports, BAJA Student India

Oct. 2013 - Jan. 2015

Chassis Head — ***video***

- Built the 3^{rd} lightest All-Terrain vehicle of the country in a team of 17 members to compete against 44 national teams
- Designed the chassis on Solidworks and did FE Analysis and weight optimization on ANSYS WorkBench.
- Contacted dealers for tubes, welding and supervised the whole manufacturing process
- Bagged 4th position in the acceleration event, **"Best Rookie Team"** trophy and awarded as Design Finalists in BAJA Student India'15