Shubham Agrawal

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Education

Columbia University — New York, NY
Master of Science in Computer Science — *Aug 2019 - Dec 2020*

University of Southern California — Los Angeles, CA
Master of Science in Computer Science (Transferred to Columbia University); CGPA: 3.65/4.0 — *Jan 2019 - Aug 2019*

Indian Institute of Technology Kanpur — Kanpur, India
Bachelor of Technology in Computer Science; CGPA: 8.7/10.0 — *Jul 2013 - Apr 2017*

Relevant Coursework: Recent Advances in Computer Vision, Bayesian Machine Learning, Artificial Intelligence, Machine Learning Tools, Optimizations Techniques, Natural Language Processing, Advanced Algorithms and Data Structures, Operating Systems

Experience

Adobe Inc — Noida, India
Member of Technical Staff (C++, JavaScript Software Developer) — *Jul 2017 - Jan 2019*

- Implemented CRUD operations for highlight/underline/sticky notes for the next generation PDF webview using Javascript.
- Formulated efficient algorithm for modeling an annotation's position across multiple PDF views (with variable structure and content).
- Shipped fixes for multiple critical security vulnerabilities (null pointer dereferencing, buffer overflow, JavaScript parameter tampering).

Robotics Embedded Research Laboratory, University of Southern California — Los Angeles, CA
Student Research Assistant (Robotics Research and Web Development) — *May 2019 - Aug 2019*

- Worked on differentiable physics simulator which allows parameter estimation for nonlinear dynamical systems using automatic differentiation. Implemented Adjoint Method for getting fast differentials of integrated ODEs using C++ template metaprogramming.
- Implemented simulation visualizer web app using nodejs+gulp+browserify and MVC architecture pattern (without framework). The web app has interactive 3D simulations (Babylon.js), player progress bar, plots, logs, and multi-window support (golden-layout).
- **Conference paper under review** at International Conference on Robotics and Automation (ICRA) 2020

Adobe Inc — Bangalore, India
Research Intern (Machine Learning) — *May 2016 - Aug 2016 (voluntarily working until Jun 2017)*

- Created a novel end-to-end system for automated design of affinity (user's interest) based smart geo-fences for selective targeting.
- To unsheathe interest from sparse location tagged browsing data, the three-step user affinity modeling approach sequentially utilizes pair-wise product-product, user-user, and semantic location-location similarities.
- Users are segmented based on affinity using K-means clustering and CH-index. Final geofences are created by clustering nearby points using DBSCAN and calculating the boundary using α-hull.
- US Patent US20180232767A1. **Conference paper** Smart Geo-fencing with Location Sensitive Product Affinity, ACM SIGSPATIAL 2017

Relevant Projects

- **Kaggle Diabetic Retinopathy Classification**: Task was to predict the severity of an input image given 3K labeled retina images. Used various preprocessing steps (CLAHE, smoothing, blood vessels segmentation) to remove noise and variable lighting conditions using OpenCV. Experimented with various architectures (ResNet, EfficientNet) and training parameters to improve score using PyTorch. EfficientNet-B2 and TTA gave a final optimized kappa score of 0.895.
- **Porn Block**: Chrome extension for realtime identification and blurring of sensual images from webpages. Trained VGG-net on scrapped data using KerasJS. Wrote a proxy server to bypass CORS while generating the client-side image matrix.
- **Dense Captioning**: Analyzed the work *DenseCap* by Karpathy et. al. by experimenting with the parameters and design choices of Fully Convolutional Localization Network on Visual Genome dataset. Improved mAP from 5.69 to 5.76 using trainable spatial suppression layer.

Skills

- **Languages**: C++, Python, JavaScript, SQL
- **Libraries**: PyTorch, Keras, Scikit-Learn, Stan-Math, Eigen, OpenCV, Numpy, Pandas

Achievements & Extracirricular

- **US Patent US20180232767A1** *Smart Geo-fencing with Location Sensitive Product Affinity*
- **All India Rank 191**, IIT-JEE Advanced 2013 (among 150K candidates)
- Received *Academic Excellence Award* for excellent academic performance during 2013-14 cirriculum at IIT Kanpur
- Received award of *Best Rookie Team*, and *Design Finalists*, BAJA Student India 2015 (an inter-collegiate all-terrain vehicle design competition)
- Served as CS Department Senator at Viterbi Graduate Student Association, University of Southern California for spring semester, 2019
- Co-created TOEFL Infinite, an android application for TOEFL and GRE exam preperation with 150K downloads on Google Play