Viraj Prabhu

virajp@vt.edu | virajprabhu.github.io

Research Interests

Computer Vision, Deep learning, Multimodal learning

Education

2011–2015	**Birla Institute of Technology and Science, Pilani** *Bachelor of Engineering (Honors) in Computer Science* **GPA**: 8.56/10.0 | **Major GPA**: 8.80/10.0

Research Experience

Aug '16–Present	**Research Scholar, Virginia Tech**, Blacksburg, Virginia *Advisors: Prof. Dhruv Batra and Prof. Devi Parikh* I work at the **Machine Learning and Perception Lab** on deep learning approaches to problems at the intersection of computer vision and natural language processing. **Exploiting Premises in VQA**: Formulating implicit knowledge contained in Visual Question Answering (VQA) questions as "premises", we are exploring their subsequent use for data augmentation, failure prediction and inference time refinement of CNN+LSTM based VQA models.
Jan '15–Jun '15	**R&D Intern, Tonbo Imaging**, Bangalore, India *Computer vision startup developing sensor systems for battlefields and reconaissance.* **Automated Calibration:** Developed algorithm for automated calibration of company cameras using a collimator and AprilTag target setup. Applied various image processing techniques to compute field of view, focal length and optical center, reducing calibration error by over 6%. [Report]. **Boresighting:** Developed a boresighting algorithm to precisely align a weapon's muzzle and sighting system with a target at 10m to 100m for TDS-BRS, Tonbo's video precision boresight tool.
May '14–Aug '14	**Research Intern, Adobe Systems**, Bangalore, India *Team: Adobe Presenter Video Express, an e-learning video creation tool.* **Real-time video segmentation:** Developed a graphcut-based segmentation algorithm for real-time background substitution in video that combined color, motion and shape cues and demonstrated robust segmentation across various backgrounds. The technology was transferred into *Magic Green Screen*, the marquee feature of Adobe Presenter Video Express (PVX) 11.[Report] [Demo] **US patent** for the algorithm is currently under filing.

Programming Experience

Apr '16–Aug '16	**Mentor, CloudCV, Google Summer of Code 2016** I mentored and presently maintain the Google Summer of Code project CloudCV-IDE, a web platform to build deep neural networks via a simple drag and drop interface. I was responsible for onboarding my mentee, conceptualizing features and implementation details, and reviewing and merging code. [GitHub]
Jul '15–Aug '16	**Member of Technical Staff, Adobe Systems**, Bangalore, India *Team: Adobe Captivate Prime, a newly launched Learning Management System for enterprise.* **Captivate Prime Android App:** Individually responsible for the Captivate Prime Android app through two release cycles, contributing with features and bugfixes for offline content play-back, syncing and UI. **Localization:** Implemented a scalable framework for localization and internationalization of the front-end codebase across 6 spoken languages.
May '13–Jul '13	**Summer Intern, Orange Business Services**, Mumbai, India Developed a web portal using the LAMP stack to automate customer data log creation for internal quality assessment purposes.

TEACHING

Fall 2016	**Teaching Assistant, Intro to Machine Learning, Fall 2016**, Virginia Tech *Instructor: Dr. Stefan Lee* Developed machine learning challenges on Kaggle for the course. [Link]

SKILLS

Languages:	Python, C++, JavaScript, Lua, MATLAB, Java, Bash
Technologies:	Torch, Caffe, Git, Unix, LaTeX, CUDA, Android

SELECTED PROJECTS [GITHUB]

Jan '14–Apr '14	**Teleconferencing Using Multiple Kinects** *Advisor: Dr. Jagdish Raheja, Senior Scientist, CEERI Pilani* Developed multithreaded C# application to interface multiple Kinect sensors to cover a field of vision as part of a modern teleconferencing system. Kinect Skeletal Tracking and OpenCV face detectors were used to identify and display current speaker on a central screen.
Sep '14–Dec '14	**Topic based news aggregator** *Advisor: Dr. Poonam Goyal, Associate Professor at BITS Pilani* Integrated a Python web crawler with a hierarchical agglomerative clustering algorithm to fetch, identify and chronologically present news articles pertaining to the same event.
Dec '13–Feb '14	**Sign Language to Speech Converter** Trained a Hidden Markov Model to recognize American Sign Language gestures on image features extracted using the Kinect's Skeletal Tracking libaries and OpenCV.
Feb '14–Apr '14	**Branch and Bound** Course project for Parallel Computing. Implemented algorithms for Travelling Salesman and Knapsack problems using a Branch-and-Bound framework and parallelized them using OpenMP and MPI.

TEST SCORES

GRE	168/170 — Quantitative Reasoning 162/170 — Verbal Reasoning 4.0/6.0 — Analytical Writing
TOEFL	118/120 — 30/30 in Reading, Listening, Speaking, 28/30 in Writing

AWARDS & RECOGNITION

Second Place (Adaptive Technologies Category, 35+ entries) in Project Presentation, APOGEE 2013, BITS Pilani's annual technical symposium. We developed a genre based music equalizer that used an SVM classifier trained on MFCC features.

Second Place (Design Appliances Category, 40+ entries) in Project Presentation for *Try-on*, an application that used the Microsoft Kinect to accurate measure a user's clothing size using the Kinect's Skeletal Tracking libraries.

Winner of the Google Hackathon at APOGEE 2014, BITS Pilani's annual technical symposium, for developing *Snapify*, an image-sharing Android app.

GSoC Mentor Summit 2016: I represented CloudCV at the mentor summit in Sunnyvale, CA

Top-200 rank in BITSAT 2011 among 140k applicants.

Top-20 rank in ICSE 2009 among 150k applicants (awarded Amul Vidya Shree).

Qualified regionals to reach Indian National Mathematics Olympiad 2010.

OTHER ACTIVITIES

Leadership

Editor, International Press during BITSMUN 2013, an all-India Model United Nations conference where I led a team of 25 student reporters, photographers and designers.

Head Boy, Lilavatibai Podar High School from '09-'10. I represented my school at intercollegiate competitions and events.

Member of the English Press Club and the Department of Sound at BITS Pilani

Extra-Curricular: Football (member of Adobe Football team), Long distance running, Piano Performance