Varun Sundar

Curriculum Vitae

Education

2016–2020 **B Tech, Electrical Engineering (5th Semester)**, *Indian Institute of Technology Madras*, Chennai, *CGPA - 9.53/10*.
Description

Scholastic Achievements

- Secured **All India Rank of 2917** in Joint Entrance Examination (JEE) -Advanced 2016 (out of1 ,50,000+ candidates).
- Secured **All India Rank of 501** in Joint Entrance Examination (JEE) -Mains 2016 (out of 13,00,000+ candidates).
- Awarded **KVPY Scholarship** (top-1 % out of 10,000 applicants) and offered provisional admission to IISc with fellowship in 2016.
- Top-1 (out of 35,000 students) in the **National Chemistry Olympiad 2016** and qualified for the **Indian National Chemistry Olympiad 2016** .
- Top-1% (out of 35,000 students)in the **National Physics Olympiad 2016** and qualified for the **Indian National Physics Olympiad 2016**.
- Selected for national round of **Indian National Mathematics Olympiad 2015** out of 35,000 students.

Relevant Coursework

- Reinforcement learning*
- Non-convex Optimization**
- Deep learning*
- GPU Programming**
- Digital Signal Processing
- Probability theory
- Numerical Methods and Applied Programming

* - Indicates Courses in present semester. ** - Indicates Courses in audit.

Internships and Work Experience

Industrial Internships

Summer 2018 **Deep Learning Engineer**, ***Hyperverge Inc.*** , Bangalore.

- Worked on building an end-to-end pipeline for training small scale object detectors on over 13 architectures for the specific case of satellite imagery

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- Achieved a **mAP of 67.4** with a hybrid architecture involving atrous convolutions, and **nasnet** feature-extractors. Used a version controlled system to record deep learning experiments.
- Designed a bootstrapping system utilising fast-inference based on **tensorrt**. Pipeline was designed to work on parallel **ETL(Extract Transform Load)** for training, interleaved synchronous evaluation and on the run visualisations.
- Designed a visualisation metrics and system for large satellite data (Tb) on **mercaptor** based tools such as Google maps while using libraries such as **rtree, fastKML** in order to facilitate scalable human-annotation.

Research and Projects

Fall 2018 **Optimising Neural Machine Translation on FPGA's**, *Prof Pratyush Kumar*, IIT Madras.

- Working on on-device optimisation of **NMT** on **FPGA's** by performing correlated experiments on quantisation, pruning, surrogate functions and fused custom operators. Aim to reduce large overhead and compute cost of NMT models in their softmax and conversion layers.
- Presently working on **OpenNMT and Google NMT** based architectures as models under consideration.

Spring 2018 **CNN Monocular SLAM**, *Computer Vision and Intelligence Group*, IIT Madras, GitHub.

- Working on fusing benefits of **Large Scale Direct SLAM** with monocular depth estimation and fast image segmentation. Improved pipeline to incorporate any deep net based **detection, segmentation or heat map outputs**.
- Investigated usage of unsupervised monocular depth estimation with a wide number of techniques including : **stereo inspired left-right consistency, semi-supervised learning, 3-D depth reconstruction with ego-motion** (as a surrogate loss).

June 2018 - Aug 2018 **Shared Compute Setup**, *Computer Vision and Intelligence Group*, IIT Madras, GitHub.

- Set up a shared cluster for 30 users in IIT Madras to access over 4 nodes with independent container environments.
- Utilised best practices in **Dockerfiles** to obtain low memory demands, secure (SSH-key encrypted) and reliable access to training stacks throughout IIT Madras. Required understanding of operation of institute networking, safe access practices, server cooling requirements and dataloss mitigation strategies.

June 2018 - Aug 2018 **AI for India: Social Initiative**, *Prof Pratyush Kumar and Prof Mitesh Khapra*, IIT Madras, GitHub.

- Working closely with a team of 6 and professors Pratyush Kumar and Mitesh Khapra in the department of Computer Science, with an objective of building social impact solutions to largely out-of-focus problems.
- Aim to democratise benefits of **Artificial Intelligence and Computer Vision** to a broader, unknown rural audience

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Aug 2017 - May 2018 **Automatic Waste Segregator**, *Computer Vision and Intelligence Group*, CFI, IIT Madras.

- Designed the deep learning backend and fabricated electronics for creating a low-cost, fast response segregator at source. Used an ensemble of visual and electrical features to accurately classify over 4,000 distinct objects into a given set of classes.
- Compiled a resource optimised version of tensorflow to deploy on low-power **Single Board Computers** such as a Raspberry Pi and Odroid.
- Demonstrated at **CFI Open House**. Patent filled, approval pending.
- Won the campus round of the **9th HULT Prize** a $ 1 million challenge to solve the world's most pressing issues by using energy to transform the lives of 10 million+ people, dubbed as the "Nobel Prize for Students". **Shortlisted for the regional round at NTU, Singapore.**
- Awarded **Best Research Proposal Presentation** at **Shaastra 2018**. Shortlisted for **Design Impact Awards**, **Digital Ocean Campus Programme**, and **Pragyan, IISc.**

Oct 2017 - Jan 2018 **Fiducial Localisation**, *Computer Vision and Intelligence Group*, IIT Madras, GitLab.

- Worked on autonomous and unsupervised detection of fiducials implanted for brain surgery. Utilised **mayavi** and **VTK** to perform 3-D visualisation of skull images, followed by **PCL** methods for KD-Tree objects, 3-D template matching, and local clustering.
- Documented Deep Learning methods to fiducial isolation based on rendered data augmentation, with 3-D covnets ande slices for 2-D covnets.
- Taken up as a part of the **BARC** problem statement, **6th Inter IIT Tech Meet** .

Nov 2017 - Jan 2018 **Hand-Gesture Recogniton**, *Computer Vision and Intelligence Group*, IIT Madras, GitLab.

- Developed an ensembled neural network to accurately classify 20 hand gestures. Used architectures based on *Incpetion-V4* and *Resnet-50* as a part of the structure. Accuracy bench-marked on *Marcel* database. Later extended to incorporate IMU sensor based inputs.
- Adjudged winners for **T-Hub's Hack2innovate**, presented by **NVIDIA** and **Samsung**. Invited to **Global Entrepreneurship Summit, 2017- Hyderabad.**

Positions of Responsibility

Mar 2018 - Present **Head, Computer Vision and Intelligence Group**, IIT Madras, Github.

- Leading an undergrad community of 40 students who work enthusiastically towards building a impactfull organisation.
- Have conducted open sessions for an audience of 200+ strong multiple times in IIT Madras and a few outside. Frequently interact with startups (Hyperverge Inc, Detect Technologies, Verihelp,etc), companies (Amazon, Google), NGOs and professors in our activities and projects.

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