

Harshal Mittal

IIT Roorkee

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EDUCATION

- **Indian Institute of Technology Roorkee** Uttarakhand, India
B.Tech in Electronics & Communication Engineering, GPA:8.360/10.000 *July 2016 - May 2020*

PUBLICATION

- **Machine Learning for Automatic Cluster Tendency Assessment** November 2019 - May 2020
ML-aVAT: In Review, IEEE TPAMI 2020 *Supervisor: Prof. Dheeraj Kumar*
 - Used a two stage machine learning approach to infer cluster structure and hierarchy in real-life data from its VAT type RDI without human intervention.

EXPERIENCE

- **Software Engineer** July 2020 - Present
Atlassian India *Bengaluru, India*
 - Developing the migration platform comprising JMT and other microservices along with the site import approach to transition server products to Jira cloud in the Jira enterprise migrations team.
- **Research Internship** May 2019 - July 2019
Samsung R&D Institute Bangalore *Bengaluru, India*
 - Worked on the concept of efficient model scaling for convolutional neural networks with the Samsung Advanced Institute of Technology (SAIT) team.
 - Explored literature and built experiments for different scaling configurations in ResNet.
- **Machine Learning Engineer Intern** May 2018 - July 2018
Flutura Decision Sciences & Analytics *Bengaluru, India*
 - Built two frameworks for anomaly detection, used algorithms provided in a research paper based on machine learning and statistics.
 - Integrated the first version to the company's data pipeline, improved algorithm runtime for largescale data sources.

PROJECTS

- **Personalized Federated Neural Architecture Search** November 2020 - January 2021
University of California, San Diego (Remote) *Supervisor: Prof. Pengtao Xie*
 - Worked on the concept of federated Neural Architecture Search to allow clients with non-i.i.d data jointly search for highly-performing neural architectures, with Gaussian differential privacy.
 - Designed experiments for gradient-based optimization of architecture variables specific to each client and weight parameters shared using a parameter server architecture.
- **Boosted Hypergradient Optimizers** June 2019 - August 2019
<https://github.com/harshalmittal4/Hypergradient-variants> *Report: [Hypergradient-optimizers](#)*
 - Designed experiments to improve Hypergradient based optimizers proposed in 'Online Learning Rate Adaptation with Hypergradient Descent', by using momentum and adaptive gradients to boost the learning rate updates.
 - The resulting optimizers provide better generalization and faster convergence compared to their hypergradient-descent baselines.
- **ICLR Reproducibility Challenge 2019** December 2018 - January 2019
<https://github.com/yashkant/Padam-Tensorflow> *Arxiv: <https://arxiv.org/abs/1901.09517>*
 - Reproduced the experiments in the ICLR 2019 submission 'Closing The Generalization Gap of Adaptive Gradient Methods In Training Deep Neural Networks' in Tensorflow.
- **Peer-to-Peer Tube** August 2018 - October 2018
<https://github.com/harshalmittal4/Peer2PeerTube>
 - Implemented a decentralized Peer to Peer model of current YouTube with VLC media streaming and a tracker.

- Mainly contributed to adding the live-streaming functionality to the video sharing platform using python-vlc.

- **Depth Mapping for Enhanced Focus** March 2019 - April 2019
Supervisor: Prof. Saumik Bhattacharya
[\[link\]](#) *Course project for Digital Image Processing*

- Built a module to classify image pixels as foreground/background for better focus (Bokeh photography) using image processing techniques and concept of defocus map.

- **Modelling Anomalies in Temporal Data** July 2018 - August 2018
Artificial Intelligence and Electronics Society, IIT Roorkee

- Performed a comparative study of CAD (conformal anomaly detection) using distance and density NCM's for modeling temporal data and anomalies in it.
- Studied different types of anomalies which occur in practice in temporal data using real-world datasets.

- **RISC Processor** September 2017 - November 2017
Supervisor: Dr. Vaskar Raychoudhury
[\[link\]](#) *Course project for Computer Architecture*

- Built a 24-bit RISC processor implementation in Verilog.
- Used a self-developed Instruction Set Architecture for the processor with custom opcodes.

- **Mini Contributions**
IIT Roorkee

- CHAOSS-microtasks: Implemented metrics which can analyse the performance of software projects on Github. [\(link\)](#)
- d2l-PyTorch: Contributed and mentored for the PyTorch version of 'Dive into Deep Learning (D2L.ai)' book. [\(link\)](#)
- Add-Emoji: Developed a module which appends a relevant emoji based on sentiment of the input text. [\(link\)](#)

ACHIEVEMENTS

- Built Presence - an app to detect members in the currently enabled wi-fi zone using their MAC addresses in Microsoft Code.Fun.Do hackathon.
- Secured All India Rank 948 in Joint Entrance Examination (JEE) Advanced and 99.97 %tile in JEE Mains 2016.

SKILLS

● **Languages:** C++, Python, MATLAB, Java, Bash **Tools:** PyTorch, Tensorflow, Keras, Git, Linux, Docker

- **Relevant Courses (Online)/ Books:**

CS231n: CNNs for Visual Recognition (Stanford)	ISLR (by G. James et al.)
Statistics 110: Probability (Harvard)	Python Machine Learning (by Sebastian Raschka)
DeepLearning.ai (Coursera)	Deep Learning Book (by I. Goodfellow et al.) [in progress]

- **Coursework (Classroom):**

Object Oriented Programming, Data Structures, Mathematical Methods, Linear Algebra, Probability and Statistics, Digital Signal Processing, Computer Architecture, Computer Networks, Digital Image Processing, Introduction to Machine Learning, Operating Systems

POSITION OF RESPONSIBILITIES

- **Core Team Member** January 2018 - May 2020
[link] SDS Data Science Group, IIT Roorkee

- Delivered lectures and organised discussions on topics and research papers in Deep Learning.
- Conducted a workshop on 'security and privacy in machine learning' on campus.

- **Undergraduate Teaching Assistant** January 2020 - May 2020
Academic Reinforcement Program, IIT Roorkee

- Teaching Assistant for the course CSN-102 Data Structures to assist freshmen in their course concepts and tutorials.