Shweta Bhardwaj

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Research Interests

Computer Vision, Deep Learning, Explainability, Interpretability, Model Compression, Dynamic Computations

Education

Indian Institute of Technology Madras, India 2016 - 2019
M.S. (By Research/Thesis), Computer Science And Engineering C.G.P.A.: 9/10
Advisor: Mitesh M. Khapra
Thesis: Efficient Video Classification With Fewer Frames (Slides)

Guru Nanak Dev University, India 2012 - 2016
B.Tech., Computer Science And Engineering C.G.P.A.: 9.63/10

Publications

- **Efficient Video Classification Using Fewer Frames**
  Shweta Bhardwaj, Mukundhan Srinivasan, Mitesh M. Khapra Link, Poster
  In Proceedings of IEEE Conference on Computer Vision and Pattern Recognition, CVPR'2019.
- **Studying the Plasticity of Deep Convolutional Neural Networks Using Random Pruning.**
  Deepak Mittal, Shweta Bhardwaj, Mitesh M. Khapra and Balaraman Ravindran Link, Poster
  Published at the Journal of Machine Vision And Applications 2019.
- ***I have seen enough :* A Teacher Student Network for Video Classification Using Fewer Frames.**
  Shweta Bhardwaj, Mitesh M. Khapra Link, Poster
  In Proceedings of Computer Vision And Pattern Recognition Workshop on Brave New Ideas for Video Understanding, CVPR Workshop 2018.
- ***Recovering from Random Pruning:* On the Plasticity of Deep Convolutional Neural Networks.**
  Shweta Bhardwaj, Deepak Mittal, Mitesh M. Khapra, Balaraman Ravindran. Link, Poster
  In Proceedings of Eighteenth IEEE Winter Conference on Applications of Computer Vision, WACV 2018.

Professional Experience

Google Research **Aug 2021 - Present**
Research Associate, (Junior Researcher via Optimum InfoSystems)

- Develop a fully **dynamic** and **interpretable** computation model for sparse prediction tasks to improve generalisation.
- Underlying goal is to: i) amortize compute load, ii) build scale-aware and iii) inherently intuitive models.

Flipkart Internet Pvt. Limited **Aug 2019 - July 2021**
Data Scientist

- Built a horizontal framework of **explainability** across the different tracks of *User Trust & Safety*.
- Designed a hybrid Decision Tree based solution for detecting real-time **e-commerce fraud** on **returns** transactions.
- Detection of incomplete and suspicious **unstructured customer addresses** by incorporating **structured** information.
- Provided **cloud services** to third-party client (Myntra) for **real-time fraud** management

Robert Bosch Centre for Data Science and AI **May 2018 - May 2019**
Student Researcher

Presented ongoing/published work in Web Science Symposium, two RBC-DSAI poster sessions.

NVIDIA Bangalore **March 2018 - May 2018**
Research Intern

- Investigated the scope of compute-intensive AI models for real-time deployment
- Benchmarked different approaches of video classification models on high-end DGX GPUs

Research Projects

Exploring Teacher Student Paradigm for Efficient Video classification **Jan'18 - Oct'18**
Collaborator: Dr. Mitesh M. Khapra *arXiv*

- Proposed an efficient Teacher-Student Framework, wherein a student can learn the overall context of video using fewer frames, which contains the sufficient discriminatory information needed for video classification.
- Focused on reducing the computational cost at inference for multi-label video classification task.
- Initial findings accepted in CVPR'2018 workshop. Complete extension of this work is accepted in CVPR'2019.

Studying Plasticity of Deep CNNs using Random Pruning **July'17 - Jan'18**
Collaborators: Deepak Mittal, Dr. Mitesh M. Khapra, Dr. Balaraman Ravindran *arXiv*

- Explored different model-compression methods (filter-level pruning in CNNs) for various image processing tasks.
- By investigating *Random Pruning*, examined that the comparable performance of pruned network is not due to the specific criterion chosen but due to inherent plasticity of deep neural networks.
- Accepted in WACV'2018. Extended work is accepted in Journal of Machine Vision And Applications 2019.

Filter Pruning in Convolutional Neural Networks using Reinforcement Learning (RL) **June'17 - Sep'17**
Course Project *report*

- Our hypothesis is to use "try-and-learn" approach to train an RL pruning agent to remove insalient filters from computationally expensive CNN based models in a data-driven fashion.
- Systematically explored the use of REINFORCE, a popular RL algorithm to do filter-level pruning and validate results on image classification.

Teaching

Indian Institute of Technology Madras (IITM)

- *Deep Learning*: Spring 2018 and Spring 2019 Teaching Assistant
- *Introduction to Machine Learning*: Fall 2018 Teaching Assistant
- *Assembly Language Programming Lab*: Spring 2016 Teaching Assistant
- *Programming And Data Structures Course/Lab*: Fall 2016 Teaching Assistant

Course Work

- Introduction to Machine Learning, Deep Learning, Topics in Deep Learning, Linear Algebra and Random Processes, Reinforcement Learning.

Achievements & Responsibilities

Scholastic Achievements

- GATE: Graduate Aptitude Test in Engineering | 99.729 PERCENTILE
- Poster presentation at Amazon Research Days 2018

Service and Reviewer

- Reviewer for ICLR 2022 Conference.
- Workshop Volunteer at ICLR 2021 Conference.
- Internship Mentor for Flipkart Summer Internship 2020.
- Mentor for DL Summer Internship 2017 at IITM RISE-IIL lab.

Travel Grants

- CVPR 2019 Student Travel Scholarship.
- Microsoft Research India Student Travel Grant 2019.

Technical Skills and Tools

- **Languages**:- *Proficient:* Python, PySpark, MATLAB, Java. *Basic:* C, C++, MySQL.
- **Deep Learning Frameworks**:- *Proficient:* Tensorflow, Keras, PyTorch. *Basic:* Caffe.
- **Cloud Platforms**:- AWS, Microsoft Azure, Google Cloud Platform