Megh Shukla

Research Beyond Publications

https://meghshukla.github.io/

Advisor: Prof. Alexandre Alahi (Homepage)
Visual Intelligence for Transportation Lab
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Education

Since Jul '22 **Ph.D.** *École Polytechnique Fédérale de Lausanne*, Electrical Engineering.
Jul '17 - '19 **M.Tech.** *Indian Institute of Technology Bombay*, Geoinformatics Engineering GPA: 9.98.
Jul '13 - '17 **B.E.** *University of Mumbai*, Electronics and Telecommunication Engineering GPA: 9.00.

Major Achievements

Nov '21 **Rising Star Award.** *Mercedes-Benz Research and Development India.*
- *25 of 6000+ engineers* awarded to commemorate 25 years (Silver Jubilee) of Mercedes-Benz R&D India
- *Published* [1, 2, 3], *Patented* (Innovation Award: top 5% inventions - 2020), *Engineered* active learning in production

Aug '19 **Institute Silver Medal.** *Indian Institute of Technology Bombay.*
- M.Tech. Class of 2019: Secured *Department Rank 1, Institute Rank 3* (in 2018)
- AP grades for exceptional performance (top 2%): Machine Learning EE769 and Satellite Image Processing GNR602

Research

[1] **VL4Pose: Active Learning Through Out-Of-Distribution Detection For Pose Estimation**.
BMVC link Proceedings of the British Machine Vision Conference 2022
Author(s): *Megh Shukla*, Roshan Roy *, Pankaj Singh *, Shuaib Ahmed, Alexandre Alahi

[2] **Bayesian Uncertainty and Expected Gradient Length - Regression: Two Sides Of The Same Coin?**.
WACV link Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision 2022
Author(s): *Megh Shukla*

[3] **A Mathematical Analysis of Learning Loss for Active Learning in Regression**.
CVPRW link Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops 2021
Author(s): *Megh Shukla*, Shuaib Ahmed

[4] **LEt-SNE: A Hybrid Approach to Data Embedding and Visualization of Hyperspectral Imagery**.
ICASSP link Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing 2020
Author(s): *Megh Shukla*, Biplab Banerjee, KM Buddhiraju

Work Experience

Aug '19 – May '22 **Computer Vision Research Engineer.** *Mercedes-Benz Research and Development India.*
- Module owner: Responsible for end-to-end R&D in active learning for pose estimation, MBUX Intelligent Interior
- Active Learning intelligently selects images for annotation, costs and model deployment time reduced by 30-50%
- Analayzed, implemented and optimized existing research for active and incremental learning pipeline
- Designed algorithms to improve: a) Overall performance b) Pre-empting failures c) Explainability in active learning
(a) *EGL++* [2] theoretically explores a connection between Bayesian Uncertainty and Expected Gradient Length
(b) *LearningLoss++* [3] provides a mathematical background for Learning Loss to pre-empt failure cases in production
(c) *VL4Pose* [1] models simple skeletal constraints with a Bayesian Net to perform out-of-distribution detection
- Miscellaneous: Interviewer for IIT on-campus hiring; provided mentorship for research interns and campus recruits

May '18 – Jul '18 **Research Intern.** *HARMAN India, a Samsung Company.*
- Explored Capsule Networks and Whitebox/Blackbox techniques for Adversarial Learning in autonomous driving
- Experimented with reconstruction and dithering using TensorFlow to prevent white box attacks on the model
- Parallelized the serial implementation of gradient computation in *cleverhans*: Jacobian augmentation function
- Devised PCA augmentations to increase similarity between Substitute and Oracle (blackbox) from 92% to 95%

GitHub

Since Mar'20 *Open-source library*, Optimized implementation of active learning algorithms for human pose estimation.
Apr '18 *Numba-CUDA*, Implemented GPU accelerated algorithms using thread-level control in Python.

Miscellaneous

Since Mar'21 **Board of Studies Member.** *Electronics and Telecommunication*, Dwarkadas J Sanghvi CoE.
Feb '22 **Speaker, WADLA IIIT SriCity.**, Presented trends in keypoint estimation and active learning.
Jul '18 – '19 **Teaching Assistant**, IIT Bombay: 1. Satellite Image Processing and 2. Machine Learning.
Jul '18 – '19 **Department Technical Secretary**, CSRE, IIT Bombay: Handled skill enhancement of 50+ students.