

Megh Shukla

<https://meghshukla.github.io/>

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I am pursuing my Ph.D. in Deep Heteroscedastic Regression ([website](#)), a framework powering popular machine learning paradigms. Previously, I worked as a research engineer on the MBUX Interior Assist ([Video](#)), Mercedes-Benz. I led research **and** engineering of an active learning pipeline, combining academic research with business impact.

Education

Since Jul '22

PhD, EPFL

École Polytechnique Fédérale de Lausanne (EPFL)

Ph.D., Electrical Engineering

Thesis: Deep Heteroscedastic Regression - Methods and Applications

Advised by Prof. Alexandre Alahi and Dr. Mathieu Salzmann

Jul '17 – '19

IIT Bombay

Indian Institute of Technology Bombay (IIT Bombay)

Master of Technology

GPA: 9.98 / 10

Thesis: LEt-SNE - Data Embedding and Visualization of Satellite Imagery

Advised by Prof. KM Buddhiraju and Prof. Biplab Banerjee

Jul '13 – '17

University of Mumbai

Bachelor of Engineering

GPA: 9.00 / 10

Achievements

IIT Bombay

Institute Silver Medal

Secured Department Rank 1; Institute Rank 3 amongst Master's students in 2018

AP grades for top $\leq 2\%$ performance: Machine Learning EE769, Satellite Image Processing GNR602

Mercedes-Benz

Silver Jubilee: Rising Star Award

25 of 6000+ employees across various categories awarded to commemorate 25 years of MBRDI

Published and engineered (Innovation Award: top 5% inventions - 2020) an *Active Learning* pipeline

Publications

PhD, EPFL

Paper Code

Towards Self-Supervised Covariance Estimation in Deep Heteroscedastic

Regression. International Conference on Learning Representations (ICLR) 2025.

Authors Megh Shukla, Aziz Shameem, Mathieu Salzmann and Alexandre Alahi

Summary We study the KL Divergence and the 2-Wasserstein distance for deep heteroscedastic regression

Paper Code

TIC-TAC: A Framework for Improved Covariance Estimation in Deep Heteroscedastic

Regression. International Conference on Machine Learning (ICML) 2024.

Authors Megh Shukla, Mathieu Salzmann and Alexandre Alahi

Summary We propose a new method and metric for covariance estimation in deep heteroscedastic regression

Paper

MotionMap: Representing Multimodality in Human Pose Forecasting.

Computer Vision and Pattern Recognition (CVPR) 2025.

Authors Reyhaneh Hosseinijad* and Megh Shukla*, S Saadatnejad, M Salzmann, A Alahi

Summary We define new (1) representation for multimodality (2) evaluation paradigm for pose forecasting

- Mercedes-Benz**
Paper [Code](#) **VL4Pose: Active Learning through Out-Of-Distribution Detection for Pose Estimation.** British Machine Vision Conference (BMVC) 2022.
 Authors Megh Shukla, Roshan Roy *, Pankaj Singh *, Shuaib Ahmed, Alexandre Alahi
 Summary *We propose a computationally efficient algorithm for human pose refinement and OOD detection*
- Paper** [Code](#) **Bayesian Uncertainty and Expected Gradient Length - Regression: Two Sides Of The Same Coin?** Winter Conference on Applications of Computer Vision (WACV) 2022.
 Author Megh Shukla
 Summary We derive expected gradient length in regression, and show equivalency with bayesian uncertainty
- Paper** [Code](#) **A Mathematical Analysis of Learning Loss for Active Learning in Regression.** Computer Vision and Pattern Recognition (CVPR) Workshops 2022.
 Authors Megh Shukla and Shuaib Ahmed
 Summary We analyse and modify Learning Loss, a popular active learning algorithm for regression tasks
- IIT Bombay**
Paper [Code](#) **LEt-SNE: A Hybrid Approach to Data Embedding and Visualization of Hyperspectral Imagery.** IEEE Intl. Conf. on Acoustics, Speech and Signal Processing (ICASSP) 2020.
 Authors Megh Shukla, Biplab Banerjee, KM Buddhiraju
 Summary We propose a new variant of t-SNE using contrastive learning for better visualization and clustering

Work Experience

Aug '19 – '22

Computer Vision Research Engineer

Mercedes-Benz

Mercedes-Benz Research and Development India, MBUX Intelligent Interior

- Responsible for end-to-end R&D in active learning for human pose estimation
- Active Learning retains model performance using a smaller subset of labelled data
- Analyzed, implemented and optimized existing research for active and incremental learning pipeline
- Developed algorithms to improve: a) Overall performance b) Pre-empting failures c) Explainability
- (a) *EGL++* [WACV] explores a connection between Bayesian Uncertainty and Expected Gradient Length
- (b) *LearningLoss++* [CVPRW] automates failure case identification for pre and post-deployment models
- (c) *VL4Pose* [BMVC] models the skeleton through a Bayesian Net for fast out-of-distribution detection
 - Subsequently, active learning reduced labelling costs and model deployment time by 30-50%
 - Miscellaneous: Mentored research interns and campus recruits; interviewer for campus hiring

May – Jul '18

Research Intern

HARMAN India, a Samsung Company

- Explored Capsule Networks and Whitebox/Blackbox techniques for adversarial machine learning
- Experimented with reconstruction and dithering to prevent white box attacks on the model
- Devised PCA augmentations to increase similarity between Substitute and Oracle (blackbox) from 92% to 95%

Miscellaneous

Reviewer

CVPR 2024 and 2025, WACV 2024, Transportation Research: Part C

PhD, EPFL

Teaching Assistant

IIT Bombay

EPFL: 1. Deep Learning for Autonomous Vehicles and 2. Introduction to Machine Learning
 IIT Bombay: 1. Satellite Image Processing and 2. Machine Learning

Feb '22

Speaker, WADLA IIIT SriCity.

[Slides](#)

Presented trends in keypoint estimation and active learning

Jul '18 – '19

Department Technical Secretary

IIT Bombay

CSRE, IIT Bombay: Handled skill enhancement of 50+ students