

Munender Varshney

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Experience in Computer Vision, Deep Learning, Machine Learning, Active Learning and Data Mining. Currently working on understanding multi-modal data such as audio and video with a focus on utilizing a subset of labeled data.

Education

- 2017 – 2022  **Ph.D., CSE Department, IIT Kanpur**
Thesis title: *Efficient Deep Learning for Understanding Multi-modal data.*
- 2013 – 2016  **M.S. (By Research), IIT Mandi**
Independent Subspace Analysis for Activity Recognition and Fine-grained Classification .
- 2008 – 2012  **B.Tech (CSE), Guru Gobind Singh Indraprastha University, Delhi**

Experience

- Jan 2022 –  **Research Intern**, TCS Research Kolkata, India.
Generation of 3D avatars of a human, robust to a wide range of poses and resolutions and having realistic facial detail such as wrinkles to correspond the expressions (emotions) from a given single image.
- Jan 2017 – Dec 2021  **Teaching Assistant**, Indian Institute of Technology Kanpur, India.
Assisted with evaluation and gave tutorials to help students in various courses i.e., Bayesian machine learning, Special topic in NLP, Mathematics for CS, Fundamentals of Computing and Computer Graphics.
- Nov – Dec 2016  **Project Associate**, Indian Institute of Technology Kanpur, India.
Worked on Generative Adversarial Network and explored various deep learning libraries, mainly focused on Torch and Theano.
- Aug 2013 – July 2016  **Teaching Assistant**, Indian Institute of Technology Mandi, India.
Assisted with course material preparation, tutorials, evaluation and grading of Database practicum, Compilers and Head TA in Programming Lab.
- May – July 2014  **Research Intern**, Indian Institute of Science Bangalore, India.
Studied the feasibility of job scheduling and managing algorithm for a MapReduce Framework on REDEFINE architecture.
- April – July 2012  **Software Developer Intern**, DGM India.
Worked on web technologies like PHP, JavaScript, HTML, and CSS.

Research Publications

Journal Articles

- 1 Varshney, Munender and Pravendra Singh. "Optimizing nonlinear activation function for convolutional neural networks". *Signal, Image and Video Processing* 15.  DOI: <https://doi.org/10.1007/s11760-021-01863-z> (Jan. 2021): 1323–1330. Print.

Conference Proceedings

- 1 Varshney, Munender, et al. "Learning Speaker-specific Lip-to-Speech Generation". *Submitted in 26th International Conference on Pattern Recognition*. Aug. 2022. 1–8. Print.

- 2 Varshney, Munender, et al. "Minimizing Supervision in Multi-label Categorization". *IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*. June 2020. 93–102. Web. [🔗 <https://arxiv.org/abs/2005.12892>](https://arxiv.org/abs/2005.12892).
- 3 Singh, Pravendra, Munender Varshney, and Vinay Namboodiri. "Cooperative Initialization based Deep Neural Network Training". *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*. Mar. 2020. Web. [🔗 <https://arxiv.org/pdf/2001.01240.pdf>](https://arxiv.org/pdf/2001.01240.pdf).
- 4 Varshney, Munender and Renu Rameshan. "Accelerated learning of discriminative spatio-temporal features for action recognition". *International Conference on Signal Processing and Communications (SPCOM)*. June 2016. 1–5. Web. [🔗 <https://ieeexplore.ieee.org/document/7746695>](https://ieeexplore.ieee.org/document/7746695).

Research Projects

- 📌 **Multimodal understanding**, Dr. Puneet Gupta.
Exploring how other modalities such as audio, text and video to help in understanding and generation of speech and facial movements.
- 📌 **Speech generation from silent videos**, Dr. Vinay Namboodiri.
Explored facial clues and lip-movement for generation of speech using transformer model packed in VAE with metric learning to leverage synchronization between the two modalities.
- 📌 **Minimizing supervision for multi-label categorization**, Dr. Vinay Namboodiri.
A subset of weakly supervised data is selected using active learning foreground-background separation metric based on MIL and a 'metric agnostic' approach to ensemble various AL metric.
- 📌 **Mitigating annotation costs in legal domain**, Dr. Purushottam Kar.
Proposed a hierarchical clustering over a paired representation of query and documents in IR. The centroid is used as cluster to classify the test set using nearest neighbor algorithm.
- 📌 **Deep active learning for object localization**, Dr. Vinay Namboodiri.
Applied various active learning algorithms on Faster RCNN model based on various uncertainty-based metric i.e., maximum entropy to reduce annotation.
- 📌 **Independent subspace analysis for activity recognition and fine-grained classification**, Dr. Renu Rameshan.
 - ⦿ Implemented a faster projected gradient decent in MapReduce to train multilayered ISA in Spark which is used for action recognition.
 - ⦿ Used various hand designed features as first pipeline for the shallow network such as gradient volumes, edge information and SIFT feature points for fine grained classification. .po+
- 📌 **Activity recognition in a video using CFG**, Dr. Renu Rameshan.
Recognition task contains various abstraction i.e., pixel clustering form blob, body parts identification using blob tracking and gestures recognition using the motion of these body part. CFG is used to model activities using gestures.

Skills

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|--------------------------|---|
| Programming Languages | 📌 Proficient in: Python, Matlab, Lua, C++, C and \LaTeX |
| Deep Learning Frameworks | 📌 PyTorch, OpenCV, Torch, Theano, Keras |

Awards /Achievements /Affiliations

- 📌 **Visvesvaraya PhD fellowship**, DeitY, Ministry of Communications and Information Technology, Government of India, 2017-2022.
- 📌 **Among top 20 performers out of 250 participants**, in Summer schools of CV/ML at CVIT, IIIT Hyderabad, India in 2017 & 2018.
- 📌 **Best Teaching Assistant award**, for outstanding performance in IIT Mandi in 2016.

Awards /Achievements /Affiliations (continued)

- **GATE percentile 99.83, All India Rank - 389**, in Computer Science (2013).
- **JEST All India Rank - 72**, in Theoretical Computer Science, conducted by IMSc Chennai, India.
- **VLAI 2016**, 27-29 December 2016, Infosys Mysore campus, India.
- **SPCOM 2016**, 12-15 June 2016, Indian Institute of Science Bangalore, India.
- **ICVGIP 2014**, 14 - 18 December, Indian Institute of Science Bangalore, India.