Umar Masud

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Education

University of Toronto **Sep 2023 – Dec 2024**
Master of Science in Applied Computing (MScAC) - AI Concentration (4.0/4.0) *Toronto, Canada*

Relevant Coursework: Computational Imaging, Neural Networks and Deep Learning, Software engineering for machine learning, Visual and mobile computing systems.

Jamia Millia Islamia **Aug 2019 – May 2023**
Bachelor of Technology in Electronics and Communications (9.82/10.0). *New Delhi, India*

Experience

Samsung AI Center Toronto **May 2024 – Dec 2024**
ML Research Intern *Toronto, Canada*

- Worked with the Camera technology team, focusing on computational imaging problems. Developed extremely lightweight Neural Implicit model (180kb) for addressing the authenticity of images when cameras use generative AI (submitted to CVPR 2025). Additionally, conducted psychovisual user-studies for other teams.

University of Toronto **Jan 2024 – April 2024**
Teaching Assistant *Toronto, Canada*

- Facilitated weekly sessions for undergraduate students in CSC108 - Introduction to Python Programming. Provided instruction and guidance in Python concepts, helping with course materials, coding exercises, and grading.

Ulm University **Jun 2022 – Jul 2022**
Visiting Summer Intern *Ulm, Germany*

- With only a 4.19M parameter model, could effectively address jpeg compression and super-resolution simultaneously, achieving up to 27.62 PSNR and 0.771 SSIM.
- To overcome additional compression artefacts, devised a lightweight CNN-based model leveraging a pre-trained teacher model to distill information during training. At inference, the base model runs efficiently with increased performance.

Major Publications

1. GenAI Implicit MLPs : Addressing Image Authenticity When Cameras Use Generative AI. *Review* ***CVPR*** 2025.
2. Self Supervised Learning : **Masud, U.**, Cohen, E., Bendidi, I., Bollot, G., & Genovesio, A. Comparison of semi-supervised learning methods for High Content Screening quality control. *Workshop at* ***ECCV*** 2022. LINK
3. Contrastive Learning Domain Generalization : Jambigi, C., **Masud, U.**, & Chakraborty, A. (2022). G-PReDICT: Generalizable Person Re-ID using Domain Invariant Contrastive Techniques. *ICVGIP* 2022. LINK

Projects

- RAG Multi-Modal ~ Built a Multi-Modal *Visual-RAG* for smart gallery search that combines image and metadata reasoning capabilities using multimodal embeddings and VLM for evaluation.
- Knowledge Distillation Diffusion ~ Clicking better Images with *Under Display Cameras (UDC)* in Smartphones. A 7.78M params model with KD gets 30.59 PSNR, and diffusion beats SOTA getting 42.37 PSNR. (Report)
- ML Engineering ~ Integrating ML functionalities - generating tags and descriptions for uploaded images, in an existing Instagram clone web-app in Flask. (Report)
- Attention Mechanism ~ Different Descriptors for Squeeze and Excitation Attention Block - experimented with standard deviation, trace, largest singular value, and DC coefficient of DCT instead of usual GlobalAvgPool2d. The SVD approach gives a 0.78% improvement but with an 80% increase in training time. (Report)

Skills

AI/ML: Classical ML, Deep Learning, Computer Vision, Multi-Modal learning, Generative AI, VLMs, LLMs, RAG
Languages: Python, Java, Bash/Shell
Libraries: NumPy, Pandas, Matplotlib, PyTorch, Sklearn, OpenCV, HF, Keras, TensorFlow, Flask
Database: MySQL, ChromaDB (vector)
MLOPs: Git, MLflow, W&B, Tensorboard