Umar Masud

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Summary

Innovative computer vision enthusiast with a keen interest in making machines perceive visual data as we humans do, while actively seeking roles that offer a dynamic mix of research and engineering.

Education

University of Toronto **September 2023 – Present**
Master of Science in Applied Computing (MScAC) - AI Concentration *Toronto*

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

Jamia Millia Islamia **August 2019 – May 2023**
Bachelor of Technology in Electronics and Communications (9.82/10). *New Delhi*

Experience

RESEARCH

Ulm University **(June 2022 – July 2022)**
DAAD-WISE Scholar

- Visited the lab at Institute of Neural Information Processing under Prof. Friedhelm Schwenker where I explored the topic of Compressed Image Super-resolution.
- Proposed a novel model and training strategy, utilising a pre-trained large scale vision model to assist in learning the representations from the compressed, low-resolution image. Evaluation with baselines showed competitive results.

Indian Institute of Science (IISc) **January 2022 – July 2022**
Research Intern

- Associated with VCL Lab, where I worked on Domain Generalisation for Person Re-identification task.
- Performed various idea implementations in code and ran experiments. Annotated CUHK03 and MSMT Datasets for person attribute information. Also responsible for visualisation of results in a descriptive manner.

École normale supérieure - PSL **December 2021 – March 2022**
Research collaborator

- Worked with members of *Computational Bioimaging and Bioinformatics* team headed by Auguste Genovesio for a project on Quality Control of out-of-focus/noised images in Phenotypic Screening using Self/Semi Supervised learning.
- Responsible for setting up pipelines to pre-train SOTA self-supervised methods on 2.1M bio-medical images and evaluate the results on downstream classification task. Performed studies with transfer learning and semi-supervised learning.

IIIT-Allahabad **May 2021 – July 2021**
Summer Research Intern

- Worked on the topic of "Automatic Detection of Image Splicing", under Prof. Anupam Agarwal, in *Interactive Technologies and Multimedia Research (ITMR) Lab.*
- Did literature review and comparative analysis, implemented five baseline papers from scratch and ran various experiments/simulations, cross-evaluated the SOTA papers with different datasets and out-of-distribution training/testing environments.

Jamia Millia Islamia **April 2021 – December 2022**
Undergraduate Researcher

- Exploring various problems in computer vision, under Prof. Sarfaraz Masood.
- Worked on Facial Mask Detection, did literature review and analysis, implemented many baseline techniques, designed a novel lightweight model with upto 496x reduction in parameter count in comparison to existing methods. Also, provided a large set of synthetic images developed by stitching masks on faces.
- Developed a time-distributed approach for simpler yet efficient DeepFake video detection model. The resultant spatio-temporal model performed at par with the existing models but with much lesser parameter count and faster inference time. Also, proposed a live feed deployment solution for the same.

ENGINEERING

Omdena Global **September 2021 – November 2021**

Junior ML Engineer

- Collaborated with a team of 50+ ML engineers to develop a production-ready deep vision system that uses geospatial data to provide accurate rooftop solar PV analysis, including factors such as total roof-area, roof obstacles, shadows/solar potential, rooftop material, etc. This project is in association with Rebase Energy.

Publications

1. **Masud, U.**, Cohen, E., Bendidi, I., Bollot, G., Genovesio, A. (2022). Comparison of semi-supervised learning methods for High Content Screening quality control. In *BioImage Computing workshop at **ECCV 2022***. https://doi.org/10.48550/arXiv.2208.04592
2. **Masud, U.**, Siddiqui, M., Sadiq, Mohd., Masood, S. (2022). SCS-Net: An efficient and practical approach towards Face Mask Detection. Accepted at *ICMLDE,* 2022. https://doi.org/10.1016/j.procs.2023.01.165
3. Jambigi, C., **Masud, U.**, Chakraborty, A. (2022). G-PReDICT: Generalizable Person Re-ID using Domain Invariant Contrastive Techniques. Accepted at *ICVGIP* 2022. https://doi.org/10.1145/3571600.3571655
4. **Masud, U.**, Shwenker, F. (2022). Compressed Image Super-Resolution using Pre-trained Model Assistance. Accepted at *COMSYS* 2022. https://doi.org/10.1007/978-981-99-2680-0_5
5. **Masud, U.**, Sadiq, Mohd., Masood, S., Ahmad, M., and Ahmed A. Abd El-Latif. 2023. LW-DeepFakeNet: A Lightweight Time Distributed CNN-LSTM network for real-time DeepFake Video Detection. Accepted in *Signal, Image and Video Processing*. https://doi.org/10.1007/s11760-023-02633-9
6. **Masud, U.**, Agarwal, A. (2021). Analysing Statistical methods for Automatic Detection of Image Forgery. arXiv. https://doi.org/10.48550/arXiv.2111.12661

Projects

- Image Inpainting using a U-Net model with a fused ConvMixer encoder. (Report)
- 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. (Report)
- *Background Remover* tool for portrait images of humans, made using a U-Net model trained for semantic segmentation of the image. The model achieved 0.981 IOU-score on test data. Also deployed on a web-app.
- *Air-Piano*, an air-based piano enabling the person to play through hand(fingertip) movements.
- Reproduced 5 papers from scratch on Image Forgery Detection that uses hand-crafted features (like LBP, DCT, DWT, etc.) for classification of pristine and tampered images.
- Fog detection in images using a texture based feature such as GLCM and SVM for classification (paper implementation). Got F1-score = 0.83 and test accuracy = 82.3%
- *Banking System*, contains a simple banking system that enables to transact between the customers. It uses HTML, CSS, bootstrap, PHP, and MySQL, with the local server provided by the XAMPP.

Miscellaneous

SKILLS

Languages: Python, Java, HTML/CSS, JavaScript, PHP
Libraries: NumPy, Pandas, Matplotlib, Sklearn, OpenCV, Keras, TensorFlow, PyTorch, Flask
Database: MySQL, PostgreSQL

POSITIONS OF RESPONSIBILITY

Organising Team - NewInML Workshop, ICML 2022.
ML/AI Dev - Google Developer Student Club, JMI
Youth Ambassador - HundrED Global Organisaton

AWARDS AND HONORS

Research Week with Google 2023: Amongst 250 people accepted for participation by Google Research India.
Online Asian Machine Learning School (OAMLS): Accepted with full scholarship as a part of ACML 2022.
Robotics & AI Summer School 2022: Accepted to this summer school hosted by IRI, CSIC-UPC
DAAD-WISE Scholarship 2022: Financial aid for Summer Research Internship in Germany.
Workshop on AI for Computational Social Systems(ACSS) 2021: 3rd place in Student Paper Competition.
5th Summer School of AI 2021 - IIIT Hyderabad: One amongst 500 participants worldwide.
INSPIRE Science Award For Top 1%: Scholarship for Higher Studies by Govt. of India.
Mr. Harbinder Singth Dugal Rolling Trophy: Awarded for Proficiency in Science ISC-XII.
Mr. G W Mayer's Merit Scholarship: Awarded for excellence in Mathematics and Science.
Shanker Sumeda Rolling Trophy: Awarded for Excellence in Academics.