AAMIR MUSTAFA

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University of Cambridge, UK aamir.mustafa@cl.cam.ac.uk

EDUCATION

PhD in Machine Learning for Computer Graphics & Vision Expected–September 2022 Department of Computer Science & Technology, University of Cambridge, UK

Bachelor of Technology Electronics & Communication Engineering National Institute of Technology, Srinagar, India CGPA : 8.741/10**Courses Studied**

RESEARCH PUBLICATIONS

A. Mustafa, A. Mikhailiuk, D. A. Iliescu, V. Babbar, R. K. Mantiuk "Training a Task Specific Image Reconstruction Loss" Winter Conference on Applications of Computer Vision, 2022. Paper, Code, Project Page.

A. Mustafa, R. K. Mantiuk "Transformation Consistency Regularization: A Semi-Supervised Paradigm for Image-to-Image Translation" European Conference on Computer Vision (ECCV) 2020. Paper, Code, Project Page.

A. Mustafa, S.H. Khan, M. Hayat, R. Goecke, J. Shen, L. Shao "Deeply Supervised Discriminative Learning for Adversarial Defense" IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI) 2020. Paper, Code.

A. Mustafa, S.H. Khan, M. Hayat, J. Shen, L. Shao "Image Super-Resolution as a Defense against Adversarial Attacks" IEEE Transactions on Image Processing (TIP), 2020. Paper, Code.

A. Mustafa, S.H. Khan, M. Hayat, R. Goecke, J. Shen, L. Shao "Adversarial Defense by Restricting the Hidden Space of Deep Neural Networks" International Conference on Computer Vision (ICCV), 2019. Paper, Code.

A. Kaur, A. Mustafa, L. Mehta, A. Dhall, "Deep Multi-Instance Learning: Prediction and Localization of Student Engagement in the Wild", Digital Image Computing: Techniques and Applications (DICTA), 2018. Paper, Code.

A. Mustafa, S. Bhatia, M. Hayat, R. Goecke, "Heart Rate Estimation From Facial Videos for Depression Analysis", International Conference on Affective Computing and Intelligent Interaction (ACII) 2017 Paper, Code.

EXPERIENCE

Rainbow Group, University of Cambridge Research Assistant/PhD Student supervised by Dr. Rafal K. Manituk

- · Working on learning latent representations for color graded movies using Invertible Neural Nets (INNs), using less than 20% of the frames.
- Developed a user interactive tool for color grading rest of the movie frames in the choice of a manual color grader.
- · Developed an efficient training scheme for image to image translation models using less data and perceptual loss function.
- Developed a semi-supervised learning method for image restoration tasks, which achieves comparable results to fully supervised counterparts using only 20% of the data.
- · Proposed a novel distortion specific perceptual loss function trained on as little as a single natural image. Performance of the loss function is superior to VGG and LPIPS for various image restoration tasks.

August 2014 - July 2018

Oct 2019 - Present

Industrial Collaboration – Part time

- · Creating a dataset ($\approx 150 \,\mathrm{GB}$) for video tone mapping. This includes correction of frame mismatch, temporal synchronization and masking mismatched frames (frame correlation < 0.9).
- Developed a light weight model with real time inference at the client's end for tone mapping movies/videos at 4k resolution. The model achieves substantial performance improvement over Google's HDRNet with 15 times faster inference and 100 times lighter model size.

Inception Institute of Artificial Intelligence, Abu Dhabi

Computer Vision Research Intern

- · Designed a novel training scheme for image classification tasks making the model robust against adversarial attacks, by restricting the hidden space of deep neural networks.
- · Designed a non-differentiable defense mechanism (difficult to circumvent) by selectively adding high frequency components to an image which nullify the effect of adversarial perturbations.

Indian Institute of Technology, Ropar

Computer Vision Research Intern

· Worked on prediction and localization of student engagement in response to a stimuli video (e-learning environment) from facial expressions using Deep Multi-Instance Learning (SVM and Neural Network).

University of Canberra, Australia

Machine Learning Research Intern

- · Estimation of Heart rate of different individuals and its variations over the span of video from their facial videos by extracting plethysmograph (PG) signals from green channel of the frames.
- · Considering heart rate as extracted feature, individuals are classified into two categories healthy controls and depressed patients using a linear SVM classifier.

Texas Instruments

Embedded Engineering Intern

- · Designed an Electronic Dice, 7 LEDs (5 mm) programmed using MSP 430 micro-controller (TI micro-controller).
- · Embedded system circuit design on Eagle and integration on the micro-controller using Code Composer Studio (CCS).

SKILLS

Languages and Frameworks	Python, PyTorch, Tensorflow, Keras, Matlab, R, Octave, Java, C
Deep Learning	Generative Models:- GANs, Normalizing flows & Diffusion models Encoder-decoder models, Recurrent Networks:- LSTM & GRU

SUPERVISIONS

- Supervised a Part II (Undergrad Student) at University of Cambridge for his project titled "Extracting MIDI Data From Video of a Piano Using Computer Vision".
- Supervised 4 M.Phil Students at University of Cambridge for their Advanced Graphics Project on "Image Style Transfer in the Gradient Domain using CNNs" and "Generalisable CNNs".
- Supervised an engineering undergrad student during his internship in the Rainbow Lab at University of Cambridge on "Perceptual Loss Functions".

ACHIEVEMENTS

Received funding for PhD from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme.

Huawei

Sep 2018 - Sep 2019 Adversarial Attacks and Defenses

supervised by Dr. Abhinav Dhall

Dec 2016 - Feb 2017

Dec 2017 - Mar 2018

supervised by Prof. Roland Goecke & Dr. Munawar Hayat

Dec 2015 - Jan 2016 NSIT, Delhi