AAMIR MUSTAFA

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INTERESTS

Machine Learning, Deep Learning, Computer Graphics, Computer Vision

EDUCATION

Bachelor of Technology Electronics & Communication Engineering August 2014 - July 2018
National Institute of Technology, Srinagar, India
CGPA : 8.741/10
Courses Studied

Higher Secondary Education 2013
Tyndale Biscoe School, Srinagar
Score: 483/500 (96.6%)

Secondary Education 2011
Tyndale Biscoe School, Srinagar
Score: 500/500 (100%)
State GOLD MEDALIST for the year 2011.

RESEARCH PUBLICATIONS

A. Mustafa, S.H. Khan, M. Hayat, J. Shen, L. Shao "Image Super-Resolution as a Defense against Adversarial Attacks" Transactions on Image Processing (under submission). **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" ICCV 2019. **Paper**, **Code**.

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

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**.

EXPERIENCE/ INTERNSHIPS

Inception Institute of Artificial Intelligence, Abu Dhabi Sep 2018 - Present
Computer Vision Research Intern *Adversarial Attacks and Defenses*

- Designed a novel training scheme for image classification task making the model robust against adversarial attacks, by restricting the hidden space of deep networks. **ArXiv**.
- Designed a non-differentiable defense mechanisms by selectively adding high frequency components to an image which nullify the effect of adversarial perturbations. **ArXiv**.

Indian Institute of Technology, Ropar Dec 2017 - Mar 2018
Computer Vision Research Intern *under Dr. Abhinav Dhall*

- 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). **ArXiv**.

University of Canberra, Australia Dec 2016 - Feb 2017
Machine Learning Research Intern *under Prof. Roland Goecke & Dr. Munawar Hayat*

- 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. **Paper**.

Texas Instruments Dec 2015 - Jan 2016
Embedded Engineering Intern *NSIT, Delhi*

- 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).

PROJECTS

Evaluating the Robustness of Deep Neural Networks Sep 2019 - Present

- Trained a neural network to reduce the polytope overlap amonsgt various classes to guarantee model's robustness against adversarial attacks.

Localization of Student Engagement using Deep Multi-Instance Learning Dec 2017 - Feb 2018

- Collected a student video database for engagement level prediction.
- Training a Deep MIL network for engagement localization and prediction using *i).* Local Binary Pattern- Three Orthogonal Planes (LBP-TOP) features and *ii).* Temporal geometric features from facial landmark points.

Smart Surveillance- Fight/Violence Detection on Streets from CCTV Footages Aug 2017 - Jun 2018

- Feature extraction using Optical flow vectors and 2D-CNN's.
- Integration of CCTV Camera with a fight/ violence detection algorithm to raise alarms in real time.

Human Action Recognition Jun 2017 - Aug 2017

- Designed a computationally less intensive architecture with minimal space and time complexity to perform human action recognition. 2D CNN is used to extract frame-wise features and then 1D CNN is used to extract temporal dependencies among frames.
- Comparing the architecture with *i)* LSTM temporal dependency model and *ii)* Fine tuned pre-trained ImageNet Model for time complexity.

Heart Rate Estimation From Facial Videos for Depression Analysis Dec 2016 - Feb 2017

- Worked on data extraction from video based supervised dataset of Black-Dog Institute, a clinical research facility in Sydney offering specialization in depression and its subtypes.
- Estimation of Heart rate from facial videos and thereby training linear SVM to label unknown individuals on the basis of their mental health (depression analysis).
- Results published in IEEE International Conference on Affective Computing and Intelligent Interaction (ACII2017).

Optimization Algorithms Apr 2017 - Jun 2017

- Various projects using metaheuristic nature-inspired optimization algorithms like Particle Swarm Optimization (PSO), Bat algorithm, Ant Colony Optimization to improve the classification accuracy.

SKILLS

Machine Learning	Multi-Instance Learning, DNN, CNN, SVM, Random Forest, K-means, Decision Trees, Recurrent Networks:- LSTM & GRU, k-nearest neighbor, Naive Bayes
Languages and Libraries	Python, Matlab, R, Octave, PyTorch, Tensorflow, Keras, Java, C

POSITIONS OF RESPONSIBILITY

Data Science Lab Coordinator Mar 2017 - Jun 2018

IIED Centre, National Institute of Technology Srinagar

· Prepared a proposal for development of a Data Science Lab under Innovation Incubation Entrepreneurship Development (IIED) Centre at NIT Srinagar.

HONORS / ACHEIVEMENTS/ EXTRA CURRICULARS

GOLD MEDALIST in Secondary School Examination (10^{th}).
Ranked 1^{st} in the state out of 50585 students. 2011

Ranked 9^{th} in the state out of 51391 students in 12^{th} JK BOARD exams. 2013

Silver Certificate Awardee-DUKE OF EDINBURG INTERNATIONAL VOLUNTEERING AWARD
International Award for Young People (IAYP) . 2012

Dal Cross Swim- 6 mile non-stop swim completed in 4 hours 45 minutes. 2013

GRE Score: 322/340. Quant: 169/170, Verbal: 153/170, AWA: 4/6 2017

IELTS Overall 8.0 (L: 9.0, R: 9.0, W: 7.0, S: 7.5) 2019