

MOHAMED AFHAM

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"A self-motivated individual equipped with strong fundamental knowledge and passionate in solving real-world problems with open source cutting edge research contributions in Computer Vision and Machine Learning."

RESEARCH INTERESTS

- Computer Vision
- Machine Learning
- 3D Vision
- Self-Supervised Learning

EDUCATION

University of Moratuwa, Sri Lanka Aug 2017 - Present (Expected Graduation: May 2022)
CGPA: 3.78 (First Class Honours)
B.Sc (Hons) - Electronics and Telecommunication Engineering Dean's List: Semester 1,2,4

St. Joseph's College, Trincomalee, Sri Lanka Grad: Aug 2016
GCE Advanced Level Z - Score: 2.78
High Distinctions for Combined Mathematics, Chemistry, Physics and General English
District Rank : 2, National Rank : 11 (out of ~ 35, 000 candidates)

MOOCs

Python for Data Science and Machine Learning Bootcamp (on Udemy) Certificate earned - June 2019
Deep Learning: 5-course specialization (on Coursera) Certificate earned - May 2020
Mathematics for Machine Learning Specialization (on Coursera) Certificate earned - Dec 2019

EXPERIENCE

Machine Vision Research Group, University of Moratuwa, Sri Lanka
Undergraduate Thesis Research Student Apr 2021 - Present
Advisor: Dr. Ranga Rodrigo

- Research on leveraging self-supervised contrastive learning for 3D point cloud understanding.
- Exploring the possibility of Few-Shot Learning, Meta-Learning settings in 3D point clouds.

VeracityAI, Colombo, Sri Lanka
Associate Machine Learning Engineer - Part time Jun 2021 - Present

- Research and development of state-of-the-art algorithms for vehicle damage detection system
- Experimenting with real-world dataset of vehicle damages with the developed algorithms
- Development of algorithms for PDR pattern recognition in car to facilitate better damage detection.

MBZUAI, Abu Dhabi, UAE
Research Assistant - Internship Oct 2020 - Apr 2021
Advisor: Dr. Salman Khan

- Worked as a research assistant for the computer vision department in the university research division.
- Experimentation on available Vision + Language models to facilitate few-shot image classification.
- Research on Few Shot Learning with focus on leveraging natural language descriptions to improve few-shot image classification.

PUBLICATIONS / PREPRINTS

Mohamed Afham, Salman Khan, Muhammad Haris Khan, Muzammal Naseer and Fahad Shahbaz Khan, Rich Semantics Improve Few-Shot Learning (BMVC 2021)

Mohamed Afham, Udith Haputhanthri, Jathurshan Pradeepkumar, Mithunjha Anandakumar, Ashwin De Silva and Chamira Edussooriya, Towards Accurate Cross-Domain In-Bed Human Pose Estimation (submitted for review, 2021)

Mohamed Afham, Isuru Dissanayake, Dinithi Dissanayake, Amaya Dharmasiri, Kanchana Thilakarathna and Ranga Rodrigo, CrossPoint: Self-Supervised Cross-Modal Contrastive Learning for 3D Point Cloud Understanding (submitted for review, 2021)

Amaya Dharmasiri, Dinithi Dissanayake, Isuru Dissanayake, Mohamed Afham, Ranga Rodrigo and Kanchana Thilakarathna, Part Semantic Aware Latent Space Navigation for Controlled Regeneration of 3D Point Clouds (submitted for review, 2021)

RESEARCH PROJECTS

3D Point Cloud Understanding

May 2021 - Present

Final Year Thesis Project

- Investigation on leveraging self-supervised, contrastive learning for better point cloud understanding.
- Survey on existing unsupervised methods for efficient pretraining of 3D point clouds.
- Developing a novel self-supervised architecture involving 3D-2D correspondence for a better 3D point cloud representation learning.
- Exploring non-linear transformation of 3D point cloud objects using an 3D autoencoder.

In bed Human Pose Estimation

June 2021 - Oct 2021

- Research and experimentation with state-of-the-art methods for domain adaptation in in-bed pose estimation
- Analysis on various domain adaptation techniques for pose estimation
- Implementing a cycle-GAN based data augmentation technique with knowledge distillation to perform in-bed pose estimation in unseen domain.
- Outcome: <https://arxiv.org/abs/2110.03578>

Few-Shot Learning

Oct 2020 - June 2021

- Research and experimentation on state-of-the-art few-shot image classification methods
- Analysis on integrating natural language descriptions to improve few-shot image-classification
- Exploring the contribution of contrastive vision + language learning setting for few-shot image classification.
- Outcome: <https://arxiv.org/abs/2104.12709>

SELECTED UNDERGRADUATE PROJECTS

Few-Shot Image Classification using Memory Augmented Neural Networks

2020

- 10 way 1-shot classification was implemented using Meta Learning Approach.
- Memory Augmented Neural Network cell was implemented from the scratch using tensorflow and keras.
- Accuracy of 99% was obtained by using 128 units LSTM layer as the controller network.

Github Link, Blog Article

Deep Neural Network for ECoG Handpose Detection

2020

- Implemented a single layer LSTM to decode pre-processed ECoG signals.
- Performed Multi-Class classification and obtained 84% accuracy in the given dataset.

Customer Churn Prediction

2020

- Based on the purchase pattern of a customer for the past 36 months, he/she has to be predicted whether is a churn customer or not for the following 2 months.
- A new Data Set was formed from the given raw data of 36 months (Jan 2017 - Dec 2019) to feed to LightGBM model.
- An Accuracy of 83 % was obtained and emerged as the Runners Up of the competition.

COVID-19 patients detection in crowd using cough samples

2020

- Aim of the project is to deploy a model which differentiate COVID-19 likely people in crowd using the cough sounds.
- A simple CNN based architecture is employed over the spectrogram of the training samples.
- The model was able to achieve around 90 % accuracy in detecting the patients.

Github Link

Twitter Sentiment Analysis

2019

- Developed a supervised learning model classify the user tweets as positive and negative.
- Used NLP libraries such as NLTK and TextBlob for text preprocessing and scikit-learn for ML modelling.
- Accuracy of 93% was obtained using naive bayes classifier model.

Github Link, Blog Article

American Sign Language Gestures Classification

2019

- Aim of the project is to classify American Sign Language Gestures in real-time using the data obtained from Myo Armband.
- An SVM based classifier is used to train the model.

Github Link

SELECTED AWARDS / HACKATHONS

2nd Runner Up - Video and Image Processing Cup, IEEE ICIP, Alaska, USA (Virtual)	2021
<ul style="list-style-type: none">Proposed a novel solution leveraging cycle-GAN data augmentation and knowledge distillation to perform in-bed human pose estimation in unseen domain.	
IEEE SMC Winners - BR41N.io hackathon, IEEE SMC Conference, Toronto	2020
<ul style="list-style-type: none">Proposed a deep learning based solution leveraging LSTM model to classify ECoG signals depicting 3 types of hand poses.	
Runner Up - DataStorm v1.0, Organized by Rotaract Club of University of Moratuwa	2020
<ul style="list-style-type: none">Implemented LigthGBM model to forecast customer churn based on their previous purchasing history.	
Ranked 191st in the world - IEEEExtreme 13.0	2019
<ul style="list-style-type: none">24-hour algorithmic programming competition took part by more than 4000 teams worldwide. We ranked 9th in the country.	
Champions - Intellihack v1.0, Organized by University of Colombo School of Computing	2019
<ul style="list-style-type: none">Developed an End-to-End machine learning solution for the problem of American sign language classification.	
Bronze Medalist - International Mathematics Competition for University Students, Blagoevgrad, Bulgaria	2018
<ul style="list-style-type: none">A mathematics problem solving competition taken part by over 350 undergraduates from 70+ Universities around the world.	
Participant - Asian Physics Olympiad, Yakutsk, Russia	2017
Honorable Mention - International Mathematics Olympiad (IMO), Chiang Mai, Thailand	2015
<ul style="list-style-type: none">A mathematics problem solving competition for high school students taken part by over 600 participants from 100+ countries.	
Merit Award - International Mathematics Competition, Daejeon, Korea	2014
Gold Medalist - Sri Lanka Physics Olympiad	2016
<ul style="list-style-type: none">A nation-wide physics problem solving competition	

RELEVANT COURSEWORKS

Computer Vision: EN2550 Fundamentals of Image Processing and Machine Vision (**A**), EN4553 Machine Vision (Ongoing)
Mathematics: MA2023 Calculus (**A+**), MA 2033 Linear Algebra (**A+**), MA4043 Neural Network and Fuzzy Logic (Ongoing)
Miscellaneous: EN1060 Signals and Systems (**A**), EN2570 Digital Signal Processing (**A**), CS2022 Data Structures and Algorithms (**A-**), EN2040 Random Signals and Processes (**A-**)

SKILLS

Languages: Python, MATLAB	Cloud Computing: AWS (EC2, S3), Microsoft Azure (VM)
Frameworks: PyTorch, Tensorflow, Keras	Utilities: PyCharm, VSCode, Git

VOLUNTEERING AND PROFESSIONAL SERVICES

Overall Coordinator - Career Fair organized by Electronic Club, University of Moratuwa	2022
Invited Reviewer	
<ul style="list-style-type: none">CVPR 2021 (h5-index: 356)IET Computer Vision (h5-index: 26)	
Global Volunteer - AIESEC in Hungary	2019
<ul style="list-style-type: none">A mathematics problem solving competition taken part by over 350 undergraduates from 70+ Universities around the world.	
President - Majlis-UI-Islam, University of Moratuwa	2021
Project Chair - YES YOU CAN, Majlis-UI-Islam, University of Moratuwa	2018
<ul style="list-style-type: none">Series of Mathematics Seminars based on GCE(O/L) curriculum in Sri Lanka	
Participant - Sakura Science Exchange Program in Science, Japan	2017
<ul style="list-style-type: none">A science tour to Japan experiencing the culture and education there, sponsored by the Institute of Science and Technology, Japan for the outstanding students at the GCE (A/L) examination 2016.	

REFERENCES

Available Upon Request.