

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, Udith Haputhanthri, Jathurshan Pradeepkumar, Mithunjha Anandakumar, Ashwin De Silva and Chamira Edussooriya, **Towards Accurate Cross-Domain In-Bed Human Pose Estimation** (*Accepted at ICASSP, 2022*)

Mohamed Afham, Salman Khan, Muhammad Haris Khan, Muzammal Naseer and Fahad Shahbaz Khan, **Rich Semantics Improve Few-Shot Learning** (*BMVC 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 Coordinantor - Career Fair organized by Electronic Club, University of Moratuwa	2022
Invited Reviewer	
<ul style="list-style-type: none">CVPR 2022 (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-Ul-Islam, University of Moratuwa	2021
Project Chair - YES YOU CAN, Majlis-Ul-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.