

PROFILE

Asra Aslam is a Research Fellow at the University of Leeds UK in the Institute of Health Data Sciences. She is a Machine Learning Researcher with eight years of research experience (recipient of Global Talent Award by UK Research and Innovation UKRI). **Asra is a finalist of “Women of the Future Awards UK 2023”** in science domain. Her fields of interest are Deep Neural Networks, Medical Health, Computer Vision (Object Detection, Classification, Segmentation), and Internet of Multimedia Things (IoMT). She worked as “Machine Learning Researcher” in industry (@mindtrace, Manchester, UK) for 2 years. She completed her Ph.D. in March 2021 from University of Galway, Ireland. She also worked as a Lecturer in the Department of Computer Engineering, AMU, India for one year. She received her M.Tech./M.S. and B.Tech./B.S. degrees in computer science, where she has completed multiple projects/dissertations in image processing. Till now, she published in multiple journals and conferences (including CVPR, LNCS, IEEE Access, Elsevier IMAVIS, Springer MTAP, INDICON, Procedia Computer Science, ACM ICMR, ACM DEBS). She also teaches courses (associated with MIT coordinated by Great Learning) for Data Science and Machine Learning presently. She is Chair for Women in Computer Vision (WiCV) community, Steering Committee for Leeds Female Leaders Network (LFLN), and mentor Women in Data Science, WiML, and WAI.

RESEARCH INTERESTS

- Deep Neural Networks
- Object Detection
- 3D Point Cloud
- Weakly Supervised Learning
- Transfer Learning
- Computer Vision
- YOLO, SSD, RetinaNet, Faster R-CNN, CNN
- MobileNet, ResNet, VGG, DarkNet, InceptionNet
- Multimedia Event Processing
- Data Analytics
- Internet of Multimedia Things (IoMT)
- Anomaly Detection

EDUCATION

Ph.D. (Computer Science) Insight Centre for Data Analytics, National University of Ireland (NUI), Galway, Ireland **April 2016 – 2021**
Data Science and Machine Learning Course from Massachusetts Institute of Technology (MIT) **Sept 2022 – Jan 2023**
M.Tech./M.S. (Computer Sc. & Engg.), AMU, India. **CPI 9.67/10** **2013 – 2015**
B.Tech./B.S. (Computer Engg.), AMU, India. **CPI 9.11/10** **2009 – 2013**

PUBLICATION STATS

Journal Papers: 06 Citations: 830 **Google Scholar:** <https://bit.ly/2JPCUgj>
Conference Papers: 09 **ResearchGate:** <https://bit.ly/37HPlmm>

RESEARCH/ INDUSTRY EXPERIENCE

Job Title: Research Fellow (@University of Leeds, UK) **Ongoing**
Summary:
- Leading Designing of Models for DynAIRx Project: Artificial Intelligence for Health Data Sciences @Institute of Health Data Sciences in collaboration with University of Manchester, University of Leeds, Alan Turing Institute, University of Liverpool, and University of Glasgow.
- Leading Groupings for Multimorbidity Conditions
- Other responsibilities: Co-Supervise PhD students, Teaching/Labs for Machine Learning, Statistics, Data Science etc, Applying for Grants
Job Title: Machine Learning Researcher (@mindtrace.ai, Manchester, UK) **2021 - 2023**
Summary:
3D Point Cloud (ongoing): Investigating Semi-Supervised Approaches to improve performance of existing point cloud models like SPVCNN using Mean Teacher.
Defect Detection in X-Ray Images: Applying **Few-Shot Segmentation** using **RePRI** model and **Mask R-CNN**
Electricity Components based Problem Detection: Applying **Few-Shot Object Detection** techniques presently **FsDet** model, using **Detectron**
Anomaly Detection in Geodigital Images Project: Utilized Facebook research “Self-Supervised Vision Transformers with **DINO**” model, transformers, attention maps, **t-sne**, and **YOLOv5x** for post processing.

CVPR Challenge: Secured 11th rank in **CVPR retailers challenge 2021 as a team**, worked on data cleaning to remove noisy images from AliProducts dataset using **cleanlab**.

Insulator Defect Detection: Utilized “CutPaste” model for classification, template matching, and YOLOv5 for detection pipeline.

Unsupervised Learning: Using SCAN: Learning to Classify Images without Labels

Overall Libraries and Platforms: TensorFlow, Pytorch, Pytorch Lightning, MLFlow, MMDetection, CUDA, cuDNN, OpenCV, cleanlab, Detectron.

Hardware Used: Nvidia Titan Xp GPUs (Distributed Environments)

PhD Thesis Title: Detecting Seen/Unseen Concepts Online while Reducing Response Time with/without Bounding Boxes using Domain Adaptive Multimedia Event Processing

**Ph.D. Work
(2016-2021)**

Summary: **Deep neural network-based techniques** are effective for image classification, but the limitation of having to **train classifiers** for **unseen concepts** may increase the overall response-time for multimedia-based event processing models. This work focuses on foundational aspects of the problem of reducing response-time for **online adaptive classifiers**-based multimedia event processing which includes introducing **object detection** operators, standardization of the concept of response-time, identification, and proposed multiple IoMT based deep neural network models while using object detection specifically You Only Look Once (**YOLO**), Single Shot MultiBox Detector (**SSD**), and **RetinaNet**, and applying **transfer learning**. Lastly, I report the best possible performance of current object detection models for the online construction of classifiers. The major challenge in training deep neural network-based models is the need to collect many images with bounding box annotations, which is impossible for millions of unseen concepts. My final specific work is the design of first and fast detector for the training of unseen classes using only image-level labels with no bounding box annotations. **It takes 10 min only to train an object detector.**

Languages: Python, C, Shell Scripting (Linux Platform)

Libraries: TensorFlow, CUDA, cuDNN, Keras, OpenCV

Hardware Used: Nvidia Titan Xp GPU

Publication Outcomes: **4 Journals, 5 Conference papers (in CVPR and Journals)**

Title: Image Segmentation using Fuzzy Multi-Criteria Decision Making

Summary: Image segmentation refers to the separation of objects from the background. Practically it is impossible to design a segmentation algorithm that has 100% accuracy. In this dissertation, two methods of segmentation are proposed: the first one is the Improved Sobel **Edge Detection** algorithm and the second is the Falling Ball algorithm. Our Falling ball algorithm which is a region-based segmentation algorithm, an alternative to **watershed** transform (based on waterfall model) and applies **Fuzzy Logic** for the segmentation. Simulation results show that the proposed algorithms give superior performance over conventional Sobel edge detection methods and watershed segmentation algorithm.

**Masters
Dissertation
Thesis
(2013-2015)**

Languages: C, Java, Shell Scripting (Linux Platform)

Publication Outcomes: **1 Journal**

Title: Edge Detection using Ant Colony Optimization

Summary: In this work, a **multi-threading**-based implementation of **Ant Colony Optimization (ACO)** is proposed for identifying edges in images. It combines multi-threading with ACO for increasing the randomness among the artificial ants. Simulation results show that the proposed method has significantly lower execution time as compared to conventional ACO for **edge detection**.

**Masters Project
(2013-2014)**

Languages: C, Java, Shell Scripting (Linux Platform)

Libraries: POSIX

Publication Outcomes: 1 Conference paper

Title: Framework development and implementation of stereoscopic website
Summary: In this work, we worked on 3D images for the development of a **Stereoscopic Website**. We analyzed **MPO** and **anaglyph** 3D image formats. Moreover, we presented a new algorithm for obtaining depth information (for **Depth-Map**) pertaining to a depicted scene from a set of available pair of stereoscopic images.

Languages: C and HTML (Linux and Windows Platform)

Hardware Used: 3D television and stereoscopic glasses

Publication Outcomes: 1 arxiv paper and Book "Towards Stereoscopic Websites"

**Undergraduate
Major Project
(2012-2013)**

Managing /Mentoring Experience

- Leading Groupings for Multimorbidity Conditions project
- Leading Research for Designing of Machine Learning Models for DynAIRx project
- Steering Committee @Leeds Female Leaders Network (LFLN) on behalf of University of Leeds (UoL) and Leeds Teaching Hospitals NHS Trust (LTHT)
- Led Research of Semi Supervised Approaches for 3D point-cloud team
- Led Research of object detection and few shot learning at 2D computer vision team
- Organizer and Finance Chair for Women in Computer Vision workshop @CVPR
- Teaches Courses (associated with MIT coordinated by Great Learning) for Data Science and Machine Learning
- Mentor for DS4A/Women program @Correlation One for 3 months
- Mentor for ML4H symposium (for 2 months) at NeurIPS Conference
- Mentor for 1st to 2nd year PhD students in PhD
- Area Chair @WiML workshop for NeurIPS 2022
- Led a breakout session at WiML workshop @ ICML 2022
- Student Representative, Insight Centre for Data Analytics, Ireland

PUBLICATIONS

1. **Asra Aslam** and Edward Curry. "UnseenNet: Fast Training Detector for Unseen Concepts with No Bounding Boxes", *The 37th International Conference on Image and Vision Computing New Zealand (IVCNZ 2022)* **IVCNZ 2022**
2. **Asra Aslam**. "Detecting Objects in Less Response Time for Processing Multimedia Events in Smart Cities." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition CVPR 2022. **CVPR 2022 Rank: A***
3. **Asra Aslam** and Edward Curry. "Investigating Response Time and Accuracy in Online Classifier Learning for Multimedia Publish-Subscribe Systems", *Multimedia Tools and Applications, Springer, 2021* **Journal Impact Factor: 2.757**
4. **Asra Aslam** and Edward Curry. "A Survey on Object Detection for the Internet of Multimedia Things (IoMT) using Deep Learning and Event-based Middleware: Approaches, Challenges, and Future Directions", *Image and Vision Computing, Elsevier, 2020* **Journal Impact Factor: 3.012**
5. **Asra Aslam** and Edward Curry. "Towards a Generalized Approach for Deep Neural Network Based Event Processing for the Internet of Multimedia Things." *IEEE Access 6: 25573-25587, 2018* **Journal Impact Factor: 4.098**
6. **A. Aslam**, E. Khan and M.M.S. Beg, "Improved Edge Detection Algorithm for Brain Tumor Segmentation," *Elsevier Procedia Computer Science, 58,430 – 437. 2015* **Journal Impact Factor: 1.26**

7. Syed Sahil Abbas Zaidi, Mohammad Samar Ansari, **Asra Aslam**, Nadia Kanwal, Mamoona Asghar, Brian Lee. "A survey of modern deep learning based object detection models", Digital Signal Processing, 2022 **Journal**
Impact Factor: 4.24
8. **Asra Aslam** and Edward Curry. "UnseenNet: Fast Training Detector for Any Unseen Concept with No Bounding Boxes" LNCS (in review)
9. **Asra Aslam** and Edward Curry. "Reducing response time for multimedia event processing using domain adaptation." *Proceedings of the 2020 International Conference on Multimedia Retrieval*, ACM. 2020 **Conference**
Rank A2
10. **Asra Aslam**. "Object Detection for Unseen Domains while Reducing Response Time using Knowledge Transfer in Multimedia Event Processing." *Proceedings of the 2020 International Conference on Multimedia Retrieval*, ACM. 2020 **Conference**
Rank A2
11. **A. Aslam**, S. Hasan, and E. Curry. "Challenges with Image Event Processing: Poster." *Proceedings of the 11th ACM International Conference on Distributed and Event-based Systems*, ACM. 2017 **Conference**
Rank B
12. **A. Aslam**, M.S. Ansari and S. Varshney. "Non-Partitioning Merge-Sort: Performance Enhancement by Elimination of Division in Divide-and-Conquer Algorithm," *Proceedings of the Second International Conference on Information and Communication Technology for Competitive Strategies*, ACM. 2016 Proceedings
Impact
Factor 0.62
13. **A. Aslam**, E. Khan and M.M.S. Beg. "Multi-Threading based Implementation of Ant-Colony Optimization Algorithm for Image Edge Detection," *Annual IEEE India Conference (INDICON)*, IEEE. 2015 **Journal**
Impact Factor 0.52

TECHNICAL SKILLSET

- ❖ **Languages** Python, C, Java, Linux Shell Scripting, HTML, Assembly Language
- ❖ **Frameworks/Libraries** Keras, Pytorch, TensorFlow, CUDA, cuDNN, OpenCV, POSIX, Scikit-learn
- ❖ **Tools** LaTeX, Esper, Apache ActiveMQ, MATLAB
- ❖ **Platforms** Ubuntu Linux 12.04, 16.04, 20.04; Windows XP, 7, 8, 10
- ❖ **Hardware** Nvidia Titan Xp GPU, NVIDIA Jetson TX2

TEACHING EXPERIENCE

- Teaches Courses (associated with MIT coordinated by Great Learning) for Data Science and Machine Learning **April 2023-present**
- Mentor @Data Science for Women DS4A @Correlation One for 3 months **June to Aug 2022**
- Teaching Assistant (at College of Engineering & Informatics, School of Computer Science, NUI Galway, Ireland)
- CT5135 Research topics in AI **2019-2021**
 - CT5103 Case Studies in Data Analytics **2017-2020**
 - CT5112 Data Analytics Project **2017-2018**
- Lecturer (Computer Engineering Department, AMU, India)
- CO 406, Compiler Design Course (1 semester)
 - CO315, Computer Graphics Course (1 semester)
 - CO191, Computer Programming Lab (2 semesters) **2015-2016**
 - CO395, Colloquium (1 semester)
 - CO393, Software Lab (1 semester)

Teaching Assistant (at Computer Engineering Department, AMU, India)

- CO191, Computer Programming Lab (2 semesters) 2013-15
- CO291, Programming Lab (1 semester) 2013-2014
- CO292, Data Structure Lab (1 semester) 2014-2015

PROFESSIONAL TRAININGS UNDERTAKEN

- ❖ Data Science and Machine Learning Course **MIT (Massachusetts Institute of Technology)** Sept 2022 to Jan 2023
- ❖ Courses on *Deep Learning: Image Recognition, Artificial Intelligence Foundations: Neural Networks, Artificial Intelligence Foundations: Machine Learning, Applied Machine Learning: Foundations, and Applied Machine Learning : Algorithms.* 2021-2023
- ❖ Winter School, Big Data 2017 **University of Bari, Italy**
- ❖ Summer School on Deep Learning 2018 **DCU, Dublin, Ireland**
- ❖ C Programming Course **APTECH, Aligarh, India**
- ❖ Java Programming Course **APTECH, Aligarh, India**

Grants

- On National Institute for Health Research (NIHR) Grant, UK Research and Innovation (UKRI), worth £2.8 million. **March 2023**
- Recipient of NIHR Teams Science Grant (for Stage-1) in Sept 2023 NIHR, UK for conducting research on Multiple Long-Term conditions. **Sept 2023**
- Grant Application **Submitted** for L'Oréal UK and Ireland, the UK National Commission for UNESCO and the Irish National Commission for UNESCO, with the support of the Royal Society. **Oct 2023**
- Full-Funding Grant (Travel, registration, Accommodation, Other Expenses) from IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR) **June 2023**
- Registration and Travel Grant for 39th International Conference on Machine Learning (ICML) 2022 (Maryland, USA) **July 2022**
- In-person Waiver Award for IEEE/CVF CVPR 2022 (Louisiana, US), Apr 2022 **April 2022**
- In-person Waiver Award for ECCV 2022 (Tel Aviv) **Oct 2022**
- AISTATS 2022 Registration Grant for the 25th International Conference on Artificial Intelligence and Statistics (AISTATS) by Women in Machine Learning (WiML) **Feb 2022**
- Skilled Worker sponsorship for 2 years (2021-2023) Manchester, UK **March 2021**
- **NVIDIA GPU Grant** for Titan Xp GPU by the NVIDIA Corporation 2018 **Nov 2017**

AWARDS/ ACHIEVEMENTS

- **Women of the Future Awards UK 2023 Finalist** (under 35 years old) **London, UK**
- **Recipient of NIHR Teams Science Grant (for Stage-1) in Sept 2023** **NIHR, UK**
- Recipient of **Global (Exceptional) Talent Award/Endorsement** by UK Research and Innovation (UKRI), Feb 2023 **UK**
- , Recipient of prestigious **Science Foundation Ireland Fellowship** and European Regional Development Fund (ERDF), 2016 to 2021, on my PhD Proposal, University of Galway, Ireland **Ireland**
- Graduate Aptitude Test in Engineering (GATE) Score 713 **All India Rank 597 out of 115,425 candidates** (Scholarship from 2013 to 2015) **India**
- Recipient of the prestigious IDB Fellowship Jeddah (2009 – 2013) for pursuing Undergraduate/B.Tech (Computer Science and Engineering), India **Jeddah**
- Recipient of Sir Syed Scholarship (2009 - 2013) AMU, India **AMU, India**
- Secured Third Position in M.Tech. (Computer Engineering) 2015 **AMU, India**

LEADERSHIP ROLES & EXTRA CURRICULAR ACTIVITIES

- ❖ **Steering Committee** @Leeds Female Leaders Network (LFLN) on behalf of UoL and LTHT **June 2023 to present**
- ❖ **Organizer and Finance Chair** for WiCV workshop @IEEE/CVF CVPR **Dec 2022 to present**
- ❖ **Mentorship** at ML4H for **NeurIPS** Conference 2022 **July to Sept 2022**
- ❖ **Area Chair** for Women in Machine Learning event at NeurIPS Conference 2022

❖ Mentorship at DS4A Correlation One	June to Aug 2022
❖ Leading Breakout Session in Women in Machine Learning @ICML 2022	July 2022
❖ Presenting Poster @39 th International Conference on Machine Learning (ICML 2022)	
❖ Student Representative, Insight Centre for Data Analytics, NUIG	2017-2018
❖ The Insight Hackathon (2 nd Position), UCD, Dublin, Ireland	2016
❖ Coordinator , Workshop on LaTeX, in Electronics Engineering Dept., AMU	2015
❖ Coordinator of Technical Events in Zarf'13, ZHCET, AMU	2013
❖ Member of Core Organizing Team in Zarf'13, ZHECT, AMU	2013
❖ Organizer , Chess, Zarf'13, ZHCET, AMU	2013
❖ Common Room In-Charge , Bibi Fatima Hall, AMU	2014-15
❖ Member of Student's Grievance Cell of Bibi Fatima Hall, AMU	2014-15
❖ Member of Organizing Committee of EDS'2012 IDB, Jeddah	2012
❖ Winner of College Chess Championship (in Zarf'11 ZHCET, AMU)	2011
❖ Winner of College Chess Championship (in Zarf'10 ZHCET, AMU)	2010
❖ Winner of Creating Writing Competition, AMU	2013
❖ Winner of Coding Frenzy, Zarf'13, ZHCET, AMU	2013

Invited Talks

- Title: "DynAIRx Project Codelist and Temporal Graph Neural Networks for Clustering" @Alan Turing Institute, AIM-RSF, London
- Title: Key Fundamentals of AI/ML including challenges and Opportunities for Health Data Community with a use case of DynAIRx for Optimising Prescriptions) on **N8 CIR Digital Health Day** on 22nd June @Nexus University of Leeds
- Title: "DynAIRx: MultimorbidityClustering" at University of Liverpool, May 2023
- Title: DynAIRx: Dynamic AI for Optimising Prescriptions) at AIM RSF Conference (26-27th April 2023) by Alan Turing Institute at Birmingham
- Title: Object Detection in Internet of Multimedia Things (IoMT) at **IoT day Women** (among 24 Women) @9 April 2023
- Industry Talk Speaker at University of Toronto and the Vector Institute Nov 2022
- Title: Object Detection on Unseen Concepts at Women in Machine Learning (WiML) at ICML 2022

Hobbies

- ❖ Playing Chess (Won and Organized multiple competitions),
- ❖ Coding in C (Won Coding Competition at college level, participated in Google APAC multiple times (before Ph.D.), Won Hackathon during Ph.D., Also received "Best Programming" award at college fest),
- ❖ Writing Poetry (Won Competitions at College and School Levels)

References **available upon request**

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