

Ali Cheraghian

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Biography

- Research scientist specializing in vision-language reasoning, foundation models, generative AI, and 3D vision (scene understanding, generation), with several publications in top-tier venues (CVPR, ICCV, ECCV). Developed scalable methodologies, including prompt learning, knowledge distillation, and incremental learning, to enhance adaptable AI systems. Collaborate with industry partners to translate cutting-edge research into real-world solutions. Supervise Master's and PhD students on projects in domain adaptation, generative models, and video understanding, emphasizing interdisciplinary research and responsible AI. Dedicated to fostering inclusive, student-centered mentorship that equips graduates for leadership roles in academia and industry.

Employment

2020 – Current

■ Research Scientist

Data61, CSIRO, Australia.

Job Description:

- Directed cross-functional AI, ML, and CV teams, managing hiring, mentoring, and resource allocation to deliver industry solutions.
- Led AI/ML projects solving real-world problems with cutting-edge technologies.
- Engineered and deployed scalable AI solutions using MLOps and integrating pipelines with cloud services like AWS.
- Designed end-to-end AI solutions using PyTorch, TensorFlow, and Scikit-learn.
- Led research-to-industry projects involving technology transfer and IP generation.
- Delivered GenAI solutions, developing applications with generative AI and LLMs.
- Collaborated with stakeholders to align AI solutions with business goals.
- Supervised PhD and Master's students.
- Published and presented at top-tier conferences, building networks with industry experts.
- Supported technical engagements by demonstrating AI leadership.

Selected Projects:

Generative AI: Led the development of a scene understanding model using diffusion models, achieving high accuracy and robustness against noisy data.

Video Understanding: Developed a real-time anomaly detection system for farm animals to monitor distress and injury, improving animal welfare.

Multimodal AI: Led the *Interpretations and Predictions* work package, developing vision-language models for internal and external initiatives.

Radar-Camera Fusion for Traffic Control: Led the development of a radar-camera fusion system for real-time lane detection, vehicle tracking, and hazard warnings on NVIDIA Jetson Nano.

Pest Monitoring: Developed a real-time fruit pest detection system using advanced object detection and tracking for industrial applications.

Face Recognition: Developed a face recognition system for industrial applications, deployed on edge devices for real-time processing.

Real-Time Atmospheric Correction for Satellite Imagery: Designed an AI-driven model for atmospheric correction of satellite imagery, deployed on edge devices for real-time processing.

Underwater Monitoring: Developed object detection algorithms for underwater monitoring, ensuring reliable tracking in challenging conditions.

Employment

2016 – 2020

■ **Graduate Researcher**

Data61, CSIRO, Australia.

Job Description:

- Conducted cutting-edge research in AI and machine learning.
- Developed and implemented machine learning algorithms for various applications, including 3D scene understanding, few-shot learning, and incremental learning.
- Assisted in the design and execution of experiments, data collection, and analysis.
- Contributed to the development of scalable AI solutions and their integration into real-world applications across multiple domains.
- Published research findings in peer-reviewed journals and conferences, contributing to the scientific community’s understanding of AI and machine learning techniques.
- Assisted in the preparation of technical reports, presentations, and project documentation for internal and external stakeholders.

Selected Projects:

Scene Understanding: Spearheaded innovative approaches in computer vision, focusing on object classification and addressing key challenges in object recognition.

Incremental Learning: Developed advanced methodologies for knowledge distillation, improving classification accuracy in incremental learning settings.

Transductive Learning: Introduced novel techniques like semantic-guided and transductive methods to enhance object recognition performance.

3D Point Cloud Analysis: Explored innovative deep learning architectures tailored for 3D point cloud analysis, advancing the field of computer vision.

Education

2016 – 2020

■ **Ph.D., Engineering and Computer Science** Australian National University (ANU)

Thesis title: *Exploring 3D Data and Beyond in a Low Data Regime.*

Supervisors: Dr. Lars Petersson, Dr. Dylan Campbell, and Dr. Mehrtash Harandi.

2009 – 2011

■ **M.Sc., Electrical Engineering** Amirkabir University of Technology (Tehran Polytechnic)

Thesis title: *3D Face Recognition robust to Pose Variation.*

Supervisor: Dr. Karim Faez.

2005 – 2008

■ **B.Sc., Electrical Engineering** Shiraz University of Technology (Shiraz Polytechnic)

Thesis title: *Microcontroller-Based Electronic Calendar System.*

Supervisor: Dr. Mohammad Sadegh Hadaegh.

Teaching/Supervisory Experience

Teaching

- **Honorary Lecturer** at The Crown Institute of Higher Education. Teaching Cloud Computing course.

Supervisor

- **Honorary Supervisor** at The Australian National University. Supervising one PhD student and one Master’s student, focusing on knowledge distillation and test-time learning.

Mentor

- Mentoring a research scientist at CSIRO on domain adaptation for underwater signal monitoring.

2020 – 2020

- **Computer Vision**, Australian National University (ANU)
ENGN 4528 & ENGN 6528 courses with Prof. Hongdong Li.

2016 – 2020

- **Digital Systems and Microprocessors**, Australian National University (ANU)
ENGN 3213 & ENGN 6213 with Dr. Nicolo Malagutti.

Skills

Languages	■ Strong reading, writing and speaking competencies for English.
Coding	■ Python, C/C++, \LaTeX , Matlab, Verilog
AI/ML	■ PyTorch, Caffe, TensorFlow, Keras, scikit-learn, XGBoost, OpenCV
ML Models	■ Yolo, Stable Diffusion, CLIP, BLIP, Flamingo, ViT-G, ViT-22B, GPT, BERT, T5, LLaMA, PaLM, SAM
Dev	■ Git, Docker, Kubernetes
Cloud	■ AWS, Google Cloud Platform, Microsoft Azure
LLMs	■ Prompt learning, prompt engineering, in-context learning, instruct learning
OS	■ Linux, Windows, Mac, Embedded/RPI

Research Publications

Journal Articles

- 1 S. Ahmadi, **A. Cheraghian**, T. F. Chowdhury, M. Saberi, and S. Rahman, "3d scene generation for zero-shot learning using chatgpt guided language prompts," *Computer Vision and Image Understanding*, vol. 249, p. 104 211, 2024, ISSN: 1077-3142.
- 2 **A. Cheraghian**, S. Rahman, T. F. Chowdhury, D. Campbell, and L. Petersson, "Zero-shot learning on 3d point cloud objects and beyond," *Int. J. Comput. Vision*, vol. 130, no. 10, pp. 2364–2384, Oct. 2022.
- 3 **A. Cheraghian et al.**, "Exploring 3d data and beyond in a low data regim," 2020.
- 4 F. Hajati, **A. Cheraghian**, S. Gheisari, Y. Gao, and A. S. Mian, "Surface geodesic pattern for 3d deformable texture matching," *Pattern Recognition*, vol. 62, pp. 21–32, 2017.

Conference Proceedings

- 1 R. Dastmalchi, A. An, **A. Cheraghian**, S. Ramasinghe, and S. Rahman, "Online 3d test-time adaptation via diffusion process," in *Proceedings of the Winter Conference on Applications of Computer Vision (WACV)*, 2025.
- 2 S. Ahmadi, **A. Cheraghian**, M. Saberi, *et al.*, "Foundation model-powered 3d few-shot class incremental learning via training-free adaptor," in *16th Asian Conference on Computer Vision (ACCV)*, 2024.
- 3 H. Y. Bae, M. Saberi, **A. Cheraghian**, *et al.*, "Enhancing glaucoma diagnosis through vision-language models and large language model descriptions," in *Proceedings of the Digital Image Computing: Techniques and Applications (DICTA)*, 2024.
- 4 A. Biswas, M. Hossain, **A. Cheraghian**, *et al.*, "3d point cloud network pruning: When some weights do not matter," in *Proceedings of the British Machine Vision Conference (BMVC)*, 2024.
- 5 **A. Cheraghian**, Z. Hayder, S. Ramasinghe, *et al.*, "Canonical shape projection is all you need for 3d few-shot class incremental learning," in *European Conference on Computer Vision (ECCV)*, 2024.
- 6 **A. Cheraghian**, S. Rahman, D. Campbell, and L. Petersson, "Mitigating the hubness problem for zero-shot learning of 3d objects," in *Proceedings of the British Machine Vision Conference (BMVC)*, 2024.
- 7 Y. Wang, **A. Cheraghian**, Z. Hayder, *et al.*, "Backpropagation-free network for 3d test-time adaptation," in *Proceedings of the IEEE conference on computer vision and pattern recognition (CVPR)*, 2024.
- 8 Y. Wang, J. Hong, **A. Cheraghian**, *et al.*, "Continual test-time domain adaptation via dynamic sample selection," in *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, Jan. 2024.
- 9 M. Zhang, **A. Cheraghian**, Y. Qin, D. J. Benn, T. A. Rollan, and N. Habili, "Efficient atmospheric correction for onboard processing using knowledge distillation and model compression," in *Proceedings of the Digital Image Computing: Techniques and Applications (DICTA)*, 2024.
- 10 F. H. Shubho, T. F. Chowdhury, **A. Cheraghian**, M. Saberi, N. Mohammed, and S. Rahman, "Chatgpt-guided semantics for zero-shot learning," in *International Conference on Digital Image Computing: Techniques and Applications (DICTA)*, 2023.
- 11 T. Chowdhury, **A. Cheraghian**, S. Ramasinghe, S. Ahmadi, M. Saberi, and S. Rahman, "Few-shot class-incremental learning for 3d point cloud objects," in *European Conference on Computer Vision (ECCV)*, 2022.



- 12 M. Nasiri, **A. Cheraghian**, T. F. Chowdhury, S. Ahmadi, M. Saberi, and S. Rahman, "Prompt-guided scene generation for 3d zero-shot learning," in *International Conference on Digital Image Computing: Techniques and Applications (DICTA)*, 2022, pp. 1–8.
- 13 **A. Cheraghian**, S. Rahman, P. Fang, S. K. Roy, L. Petersson, and M. Harandi, "Semantic-aware knowledge distillation for few-shot class-incremental learning," in *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Jun. 2021, pp. 2534–2543.
- 14 **A. Cheraghian**, S. Rahman, S. Ramasinghe, *et al.*, "Synthesized feature based few-shot class-incremental learning on a mixture of subspaces," in *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, 2021.
- 15 T. Chowdhury, M. Jalisha, **A. Cheraghian**, and S. Rahman, "Learning without forgetting for 3d point cloud objects," in *Advances in Computational Intelligence*, I. Rojas, G. Joya, and A. Català, Eds., 2021.
- 16 **A. Cheraghian**, S. Rahman, D. Campbell, and L. Petersson, "Transductive zero-shot learning for 3d point cloud classification," in *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2020.
- 17 **A. Cheraghian** and L. Petersson, "3dcapsule: Extending the capsule architecture to classify 3d point clouds," in *2019 IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2019.
- 18 **A. Cheraghian**, S. Rahman, and L. Petersson, "Zero-shot learning of 3d point cloud objects," in *2019 16th International Conference on Machine Vision Applications (MVA)*, 2019.

Preprints

- 1 A. A. Akl, A. Khamis, Z. Wang, **A. Cheraghian**, S. Khalifa, and K. Wang, *Task progressive curriculum learning: An efficient approach for robust visual question answering*, Submitted to IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2025.
- 2 H. Dastmalchi, A. An, and **A. Cheraghian**, *Etta: Efficient test-time adaptation for vision-language models through dynamic embedding updates*, Submitted to IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2025.
- 3 Z. Hayder, **A. Cheraghian**, L. Petersson, and M. Harandi, *Multi-objective optimisation for knowledge distillation*, Submitted to IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2025.

Miscellaneous Experience

Awards and Achievements

- 2022  **DICTA Best paper runner-up award**,
Prompt-guided scene generation for 3d zero-shot learning.
- 2016 – 2020  **Merit Award**, Data61 fellowship.

References

Dr. Mehrtash Harandi

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