Mashaan Alshammari | مشعان عواد الشمري

Email | YouTube | GitHub | LinkedIn | Website

I am a machine learning researcher with experience in graph neural networks and vision transformers. My prior academic experience includes developing and teaching computer science courses at Sydney Polytechnic Institute and University of Hail.

Education

Doctor of Philosophy - PhD, Computer Science, *The University of Sydney*, ***2017 — 2021***
Thesis title: Graph Filtering and Automatic Parameter Selection for Efficient Spectral Clustering

Master of Science, Computer Science, *King Fahd University of Petroleum and Minerals (KFUPM)*, ***2013 — 2016***
Thesis title: Human In-Place Action Recognition using Combination of Kinect Data Streams

Skills

Research & Development	Lead author of 13+ research papers, with 150+ verified reviews on ORCID.
Technical	Experienced with ML frameworks (PyTorch, JAX), and formerly used Java and MATLAB.
Curriculum design	Designing CS courses following Australia's (AQF) and Saudi Arabia's (NCAAA).
Social media	My educational YouTube videos have accumulated over 2.1K watch hours.

Professional Experience

Machine Learning Researcher *Sep 2023 — Present*
Independent Researcher *Riyadh, Saudi Arabia*
- Creating YouTube tutorials on Python ML experiments using PyTorch, JAX, Flax, and scikit-learn.
- Working on machine learning research with researchers from the University of Sydney and KFUPM.
- Our research focuses on Graph Neural Networks (GNNs) and 3D reconstruction.

Curriculum Development Collaborator *Jul 2023 — Nov 2024*
Sydney Polytechnic Institute *Remote*
- Participated in curriculum development for a Master of Data Science and Bachelor of Computing.
- Designed the outline and planner documents for courses: Database Systems (U211), Cybersecurity and Information Assurance (U312), and Full-stack development (U322).

Assistant Professor *Jan 2021 — Sep 2023*
University of Hail *Hail, Saudi Arabia*
- Participated in curriculum design and lecturing for multiple graduate and undergraduate computer science courses.
- Adapted new teaching strategies to teach the following courses: data structures (ICS202), advanced database (ICS434), and machine learning for big data (CSAI510).

Curriculum Development Collaborator *Sep 2020 — Mar 2021*
Sydney Polytechnic Institute *Sydney, Australia*
- Participated in curriculum development for a Master of Data Science.
- Designed lecture slides, assignments, practical sessions, and exams for courses: Database Systems and Infrastructure (MDS604) and Mathematics for data science (MDS602).

System Engineer *Aug 2010 — May 2012*
SABIC *Jubail, Saudi Arabia*
- In charge of securing and maintaining the plant network components.
- Successfully upgraded obsolete network components while maintaining uninterrupted plant operations.

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Selected Projects

VisionTransformer-MNIST video | post
Implementation of a Vision Transformer (ViT) model, which was based on the paper "An Image is Worth 16x16 Words: Transformers for Image Recognition at Scale".

Graph Convolutional Networks (GCNs) video | post
Implementation of "Semi-Supervised Classification with Graph Convolutional Networks". Graph Convolutional Networks (GCNs) perform node classification on graphs.

SWIN Transformer video | post
The SWIN Transformer is usually used as a backbone for various downstream tasks in computer vision. I explained the SWIN Transformer's code and demonstrated attention visualization.

Neural Radiance Fields (NeRF) video | post
I performed 3D reconstruction experiments using recent NeRF advancements such as Mip-NeRF 360. Compute resources for these experiments were provided by Google Cloud TPUs and Lightning AI GPUs.

DINOv2 Architecture Analysis video | post
I ran an experiment exploring the architecture of DINOv2, which includes the ViT backbone, DINO head, and iBOT head. I also wrote a blog post with visualizations of tensor shapes inside DINO.

Selected Publications

- **Mashaan Alshammari**, John Stavrakakis, Adel F. Ahmed, Masahiro Takatsuka: "Graph Construction using Principal Axis Trees for Simple Graph Convolution.", arXiv:2302.12000, 2023.
- **Mashaan Alshammari**, John Stavrakakis, Adel F. Ahmed, Masahiro Takatsuka: "Random projection forest initialization for graph convolutional networks.", MethodsX, 2023.
- **Mashaan Alshammari**, John Stavrakakis, Adel F. Ahmed, Masahiro Takatsuka: "Random projection tree similarity metric for SpectralNet.", Array, 2023.
- **Mashaan Alshammari**, John Stavrakakis, Adel F. Ahmed, Masahiro Takatsuka: "The Effect of Points Dispersion on the k-nn Search in Random Projection Forests.", IEEE Access, 2022.
- **Mashaan Alshammari**, John Stavrakakis, Masahiro Takatsuka: "Refining a k-nearest neighbor graph for a computationally efficient spectral clustering.", Pattern Recognition, 2021.
- **Mashaan Alshammari**, Masahiro Takatsuka: "Approximate spectral clustering density-based similarity for noisy datasets.", Pattern Recognition Letters, 2019.
- **Mashaan Alshammari**, Masahiro Takatsuka: "Approximate spectral clustering with eigenvector selection and self-tuned k.", Pattern Recognition Letters, 2019.

Scientific Engagement

Journal Reviewer
Pattern Recognition Neural Networks Neurocomputing Information Sciences

Conference Organization
ICONIP2023, Changsha, China, November 20-23, 2023. CDMA2022, Riyadh, Saudi Arabia, March 1-3, 2022.