Henry **Senior**

Computer Vision PhD Student

www.henrysenior.com Delphboy Delphboy

Education

Queen Mary University London
London, UK

PhD in Computer Science
Sept. 2021 - Current

My research focuses on developing Graph Neural Networks (GNNs) for Vision-Language problems, with a particular emphasis on developing multimodal representations that aid scene understanding. Applying these findings to image captioning, I have investigated novel approaches of structuring visual scenes to maximise the performance of these models. This research has given me experience with a wide range of deep learning architectures from the Transformer and GNNs to state space models such as Mamba.

University of Liverpool
Liverpool, UK

MSc in Advanced Computer Science
Oct. 2020 - Sept. 2021

- Distinction
- Dissertation title: "Detecting Objects in 3D Using Graph Neural Networks". The project focused on the design of a novel 3D object detector fusing 2D and 3D scene data from the KITTI data set
- Studied a wide range of AI, Machine Learning, Deep Learning, and Reinforcement Learning modules throughout the course

University of Salford
Salford, UK

BSc (Hons) in Computer Science with Professional Experience
Sept. 2016 - July. 2020

- First Class Honours
- Dissertation title: "Automated contextual caption generation for social media platforms"
- Used my dissertation to specialise in computer vision and scene understanding

Industry Experience

CarFinance247
Manchester, UK

Software Engineer
Aug. 2018 - Sept. 2021

- Asked to continue part-time throughout my undergraduate final year and masters after a successful industrial placement
- Developed mission critical software following Agile principles
- Experience of modern C# development with .NET Core as well as legacy systems
- Helped to complete a image pipeline project saving the company over £40,000 per year

Teaching Experience

Queen Mary University of London
London, UK

Postgraduate Teaching Assistant
Sept 2022 - Dec 2022

- Taught and marked on the MSc Statistics for Artificial Intelligence and Data Science module
- Tailored teaching to students with varied academic backgrounds ranging from computer science to philosophy
- Marked take home assessments in a timely manner whilst providing individual feedback

Queen Mary University of London
London, UK

Assistant Examiner
Jan 2022 - Present

- Marked multiple modules on the QMUL/BUPT joint programme
- Successfully marked extensive number of papers within a tight time frame
- Co-ordinated with other examiners to ensure a smooth operation

University of Salford
Salford, UK

Undergraduate Teaching Assistant
Sep. 2019 - April 2020

- Assisted in laboratory teaching of Programming, Web Development, Human Computer Interaction, and Database modules
- Provide teaching to a mixed group of first year students

Selected Projects and Publications

BioX-CPath: Biologically-driven Explainable Diagnostics for Multistain IHC Computational Pathology — *Queen Mary University of London*

Co-Author — *June 2025*

- Helped develop the graph-based representation of the Whole Slide Images and the accompanying graph neural network
- The paper introduces a stain aware attention pooling mechanism which generates expressive, stain-aware patient embedding
- Published in CVPR 2025

SuperCap: Multi-resolution Superpixel-based Image Captioning — *Queen Mary University of London*

Lead Author — *March 2025*

- The first superpixel-based image captioning algorithm
- Makes use of pretrained VLMs alongside a novel multiresolution approach to achieve state-of-the-art performance on the competitive COCO image captioning dataset
- Currently under review at ICCV25 and available as a preprint on arXiv

Graph Neural Networks in Vision-Language Image Understanding: A Survey — *Queen Mary University of London*

Lead Author — *March 2024*

- An extensive survey of graph-based approaches to vision-language image understanding tasks such as image captioning and visual question answering
- Presents a much needed taxonomy of the different graph types that are used across the domain, enabling researchers to see which graph type works best for their task
- Accepted into the Visual Computer journal

Funding

Queen Mary University London — *£1000+pa*

DERI Lunch and Learn — *Sept 2022*

Secured funding to provide food and refreshments for attendees of the bi-weekly seminar series I helped organise within research the institute

Queen Mary University London — *£338.08*

QMUL Festival of Communities 2022 — *June 2022*

Secured funding to run a workshop at the University's annual community outreach event demonstrating basic computer vision filters.

Committees

IARP S+SSPR — *Salford, UK*

Programme Committee Member — *2024 / 2026*

- A joint event organized by Technical Committee 1 (Statistical Pattern Recognition Technique) and Technical Committee 2 (Structural and Syntactical Pattern Recognition)
- Assisted with the timely reviewing of submissions

University of Salford Computing Society — *Salford, UK*

President — *Nov 2016 - May 2018*

- Organised regular meetings covering a wide range of topics
- Provided a framework for mentoring first year students
- Arranged for departmental lecturers to give guest lectures about their research
- Worked with the British Computing Society, enabling us to become a recognised Student Chapter

Honours & Awards

2018 **University of Salford**, Award for Outstanding Academic Achievement — *Salford, UK*

2017 **University of Salford**, Award for Outstanding Academic Achievement — *Salford, UK*