HAMED HAGHIGHI

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ABOUT ME

Machine learning and **computer vision researcher** with 8+ years of experience in academia and industry. Specialising in exploring **deep generative models** for different tasks, ranging from **realistic image** and **3D point cloud simulation** to **drug molecule generation**. With hands-on experience deploying **state-of-the-art visual perception models** for real-world challenges, particularly in autonomous driving.

EDUCATION

University of Warwick

2020 - 2024 | Coventry, UK

- PhD in Engineering

Thesis: “Data-driven Simulation of Perception Sensors for Autonomous Vehicles”

- Proposed a novel **transformer-based** stereo **super-resolution** model for accelerating stereo **image rendering** for autonomous driving. Resulted in up to a 2.57x faster stereo image **rendering** in the **CARLA** simulation framework (published in IEEE Transaction on ITS, 2023).
- Introduced a novel **generative model** using **auto-regressive transformers** for **Lidar point clouds**. Achieved up to a 2.0x improvement in quality compared with SOTA models on the **KITTI-360** dataset (accepted in the CVPR workshop, 2024).
- Proposed a novel framework based on **contrastive learning** for **sim-to-real** mapping of **Lidar point clouds**. Led to 40% improvement in the realism of **CARLA** Lidar simulation.

University of Tehran

2016 - 2019 | Tehran, Iran

- M.Sc. in Artificial Intelligence (GPA: 18.85/20)

Thesis: “Ambient VAE: An Unsupervised Method for Image Restoration"

- Proposed an unpaired **image-to-image translation model** (based on **VAE-GAN** framework) tailored for **restoring images** (**CelebA** dataset) in an unsupervised setting.
- Ranked 2^{nd} in the major based on the GPA.

Isfahan University of Technology

2012 - 2016 | Isfahan, Iran

- B.Sc. in Software Engineering (GPA: 17.45/20)
- Ranked 2^{nd} in the major based on the GPA.

EXPERIENCE

ML Engineer (part-time)

March 2022 - Feb 2024 | Coventry, UK

- Hi-Drive
- Developed a semi-automatic **data annotation** tool (ML-ADA) for **2D/3D object detection** tasks in autonomous driving. ML-ADA achieved up to a 3x reduction in manual labelling effort indicators. Built with **Python**, **PyTorch** and **PyQT** (repository link).
- Designed experiments to approximate the manual annotation effort needed at various levels of automation.

Teaching Assistant

- University of Warwick

2021 - 2024 | Coventry, UK

Machine Intelligence and Data Science (MIDS) | Dr. Mehrdad Dianati

- Assisted in **designing** and **delivering tutorials** for the module, with a focus on implementing fundamental **deep learning models** using the **PyTorch** library.
- Assisted in designing post-module assessments and marking students.

- University of Tehran

2017 - 2019 | Tehran, Iran

Pattern Recognition, Computer Vision, Data Analytics | Dr. Babak Nadjar Aarabi, Dr. Reshad Hosseini, Dr. Mohammad Amin Sadeghi

- Assisted in designing and marking course final projects, as well as grading final exams.

Freelance

Feb 2020 - May 2020 | Remote

▸ Collaboration with Dr. Peyman Gifani @ University of Cambridge

- Successfully reproduced the results of the outstanding paper on **generating** hit-like **molecules** from gene-expression using deep generative models (*i.e.* **GAN**, **VAE**).
- Adapted techniques from Podda *et al.* and Yang *et al.* to use fragment **graphs**, a more expressive **molecule representation**, instead of SMILES. This change resulted in generating more unique and valid molecules.

Summer Intern

Summer 2016 | Isfahan, Iran

▸ Medical Image and Signal Processing Research Centre

- Developed innovative **software** using **image processing** techniques to automate the evaluation of crown preparation. Built with **C++**, **QT** and **OpenCV**, this tool is designed to assist students in comparing their crown work against standard parameters during preclinical tooth preparation.
- Assisted in writing a paper on the evaluation of the software's effectiveness by comparing it with the expert crown preparation. (paper link)

SELECTED PUBLICATIONS

Published

- **H. Haghighi**, A. Samadi, M. Dianati, V. Donzella and K. Debattista, (2024) " Taming Transformers for Realistic Lidar Point Cloud Generation ", in *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*.
- **H. Haghighi**, M. Dianati, V. Donzella and K. Debattista, (2023) " Accelerating Stereo Image Simulation for Automotive Applications Using Neural Stereo Super Resolution ," in *IEEE Transactions on Intelligent Transportation Systems*.
- Tahani, B.;Rashno, A.;**Haghighi, H.**; Kafieh, R. (2019) "Automatic Evaluation of Crown Preparation using Image Processing Technique: A substitute to Faculty Scoring in Dental Education" in *Journal of Medical Signals & Sensors*.

Under-Review

- **H. Haghighi**, M. Dianati, V. Donzella and K. Debattista, (2023) " Contrastive Learning-based Framework for Sim-to-Real Mapping of Lidar Point Clouds in Autonomous Driving Systems ", in arXiv: 2312.15817.
- **H. Haghighi**, X. Wang, H. Jing, M. Dianati, (2024) " Review of the Learning-based Camera and Lidar Simulation Methods for Autonomous Driving Systems ", in arXiv: 2402.10079.

AWARDS AND HONOURS

- ***Awarded full funding*** for the PhD program in Engineering, University of Warwick, 2020–2024.
- ***Ranked*** 2^{nd} out of students of Artificial Intelligence major, University of Tehran, 2018.
- ***Placed*** 29^{th} among 15000 students in Computer Science National University Entrance Exam for M.Sc. Degree, 2016.
- ***Ranked*** 2^{nd} out of students of Software Engineering major, Isfahan University of Technology, 2016.
- ***Accepted as an exceptional talent*** in NODET high school and intermediate school entrance exam in Iran, 2005–2012.

RESEARCH INTERESTS

- Deep Generative Models
- Neural Rendering
- Computer Vision
- Computer Graphics
- Machine Learning
- Deep Learning

TECHNICAL SKILLS

Python, Pytorch, C/C++, CARLA Simulation, Latex, Docker	●●●●○
Keras, Tensorflow, R, VueJS, Javascript, SQL, C#, Java	●●●○○
OpenGL, PHP, Unity, Android Development	●●○○○