Ali Maleky

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Experienced and self-motivated **Machine Learning Engineer** and **Computer Vision Research Engineer** with experience and interest in diverse areas including generative models, computational photography, representation learning, and 3D reconstruction. I'm dedicated to crafting AI solutions to create awesome products utilizing my robust **software engineering** and problem-solving skills.

Experience

EcopiaTech *Toronto, Canada*

Machine Learning Engineer (Computer Vision) *09/2022 - 05/2024*

- **Managed** an end-to-end product on multi-view object detection independently. Demonstrated **leadership** by autonomously managing key project components including large-scale data processing, model prototype formulation, testing, and validation experiments, resulting in a model with **close-to-perfect recall**.
- Designed a **few-shot classification** model using **metric learning** to categorize the detected objects, enhancing automation and accuracy by **more than 30%**.
- Collaborated in cross-functional machine learning teams on scene representation and **3D object reconstruction** towards building generalizable 3D reconstruction and rendering pipelines to develop a complete **digital twin** for Earth.
- Researched and developed innovative deep learning and computer vision models including **Transformers**, **Latent Diffusion Models**, and **GANs** with **3D geometry** inductive biases to refine RGB reconstruction by a significant **2.3dB PSNR margin** while maintaining geometric consistency, facilitating scalability to continent-scale high-resolution datasets.
- Streamlined **model deployment** using **docker**, **PyTorch script**, and **coreml** tools for deployment on mobile devices and large-scale servers. Optimized training and inference workflows using software development principles, debugging, and algorithm skills resulting in a **3X training speed** optimization.

MDA *Toronto, Canada*

Machine Learning Research Assistant (Internship) *01/2022 - 07/2022*

- Applied machine learning and neural network optimization techniques to develop a customized image compressor using Generative Adversarial Networks, fine-tuned for **neural image compression of space imagery** in the Next-Generation Space Camera project.
- The resulting model outperformed existing compression methods by a substantial margin in all metrics (Bits-per-pixel, PSNR, and LPIPS), achieving a **120X compression rate enhancement** over their previous model on the internal space image data.

Samsung AI Center *Toronto, Canada*

Machine Learning Research Intern *07/2021 - 01/2022*

- Authored two collaborative projects in the computational vision group on **self-supervised noise modeling** in smartphone camera sensors, resulting in **two CVPR conference papers**, a **US Patent**, and parts of the code being used in the Samsung camera ISP.
- Formulated a novel framework to simultaneously train a denoiser and a noise model with **normalizing flows** without clean images with no performance drop in noise synthesis and a significant **1.5dB PSNR improvement** in denoising over the supervised baseline.

Hasin Group *Tehran, Iran*

Data Scientist *02/2020 - 09/2020*

- Worked in the artificial intelligence and data science team at Hasin Group on digital advertising in mobile app store environments.
- Developed a keyword generation and recommendation system with Natural Language Processing (NLP) models and a **sponsored search engine mechanism** using a modified GSP, **increasing the product revenue by 23%** during its first month of production.

Skills

Programming Languages: Python, Java, C++, C, R

Machine Learning and Deep Learning Frameworks/Tools: PyTorch, Tensorflow, Jax, CUDA

Other Tools/Skills: OpenCV, Unix shell, Linux Kernel, Git, SQL, Numpy, Pandas, Matplotlib, CI/CD, Google Cloud (GCP), Amazon AWS, Docker, System Design, debugging tools, Data Structures and Algorithms, Linear Algebra, Statistics

Education

York University *Toronto, Canada*

Master of Science - Computer Science (Supervisors: Dr. Michael S. Brown and Dr. Marcus A. Brubaker) - Thesis: *Noise2NoiseFlow: Realistic Camera Noise Modeling without Clean Images* *01/2021 - 08/2022*

Sharif University of Technology *Tehran, Iran*

Bachelor of Science - Computer Engineering *09/2015 - 09/2020*

Publications

- *Ali Maleky*, Marcus Anthony Brubaker, and Michael Scott Brown. "**System and method for training of noise model using noisy signal pairs**", May 18 2023. **US Patent App**. 17/984,755. (Google Patents)
- *Ali Maleky*, Shayan Kousha, Michael S. Brown, and Marcus A. Brubaker. "**Noise2NoiseFlow: Realistic Camera Noise Modeling without Clean Images**". In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2022.
- Shayan Kousha, *Ali Maleky*, Michael S. Brown, and Marcus A. Brubaker. "**Modeling sRGB Camera Noise with Normalizing Flows**". In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**)*, 2022.