German/Iranian

Ali Darijani

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Education

Germany **KIT** **2028**
- PhD in Computer Science

Germany **RWTH** **2023**
- MSc in Simulation Sciences

Iran **SUT** **2016**
- BSc in Mechanical Engineering

Relevant Skills

Math
- Applications: Machine Learning, Deep Learning, Image Processing, Explainable AI, Model-Based AI,
- Fundamentals: Real Analysis, Optimization, Linear Algebra, Probability, Statistics,

Tech
- Operating Systems UNIX, POSIX, **Linux**, macOS
- Programming Languages: C, **C++**, **Python**, **Bash**, Zsh
- Libraries/Frameworks: **PyTorch**, **TensorFlow**, **Keras**, **Optuna** scikit-learn, Matplotlib, Pandas, NumPy,
- Misc: **HPC**, **Cloud Technologies**

Soft
- Google-Fu, Indomitable Will, Subliminal Pattern Recognition

Experience

Master Thesis **RWTH Aachen** **Oct 2022 – Oct 2023**

Deep Unfolding is a new **model-based/explainable AI** approach in **Deep Learning** that is gaining traction within the Signal/Image Processing realm. As Phase Problem has lots of applications ranging form X-ray Crystallography, Transmission Electron M to Coherent Diffractive Imaging; we decided to combine Deep Unfolding with Wirtinger Flow, one of the novel solutions to the phase problem, to bring best of the both worlds together. The non-trivial steps involved:
- Mathematical understanding of the phase problem, Wirtinger Flow, and the Deep Unfolding approach.
- **Model building** from scratch using **lower-level tensor** operations within **PyTorch**.
- Initialization of the weights/parameters due to the unique nature of the Deep Unfolding approach.
- More in-depth understanding of the available **first-order optimizers** within **PyTorch**.
- **GPU acceleration** using the **CUDA** API.
- **Hyper-parameter optimization** using the Optuna framework.

Research Assistant **RWTH Aachen** **June 2018 – Jan 2019**
- Simulation of the Rarefied Gas Flow Problem in **C++** on the **RWTH Compute Cluster**.

Research Assistant **RWTH Aachen** **April 2022 – Jan 2023**
- Visualization of lattice based structures using the **OpenGL** API in **C++** on the **RWTH Compute Cluster**.

I developed an in-house Visualization module to render **real-time 3D visualization** of lattice based structures using many as much as 60k cylinders in **OpenGL** for our clients. This required the thorough understanding of **Euler angles** and how to use them in 4 by 4 transformation matrices on top of the usual **Computer Graphics** concepts.

Teaching **RWTH Aachen** **Oct 2022 – Oct 2023**

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