

Sher Afghan Malik

Scientific Computing · Machine Learning · Research Software Engineering

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PROFESSIONAL SUMMARY

Computer scientist and doctoral researcher building C++ and Python software for scientific computing, algorithmic differentiation, and machine learning. Develops integrated numerical-analysis and ML pipelines and runs reproducible GPU/HPC experiments with Linux and Slurm. Experience spans research-software architecture, ML systems, and Oracle-based business applications.

CORE TECHNICAL EXPERTISE

Programming C++ · Python · Bash

Machine Learning PyTorch · TensorFlow/Keras · neural-network pruning · scientific machine learning

Scientific Computing & AD dco/c++ · tangent/forward mode · adjoint/reverse mode · interval arithmetic · Boost Interval

HPC & Systems Linux · Slurm · HPC clusters · GPU/multi-GPU · job arrays · batch workflows

Engineering / Model Tooling ONNX · tf2onnx · onnx-sim · Git · reproducibility workflows

Database / Legacy Engineering SQL · PL/SQL · Oracle RDBMS · Oracle tooling

RESEARCH & ENGINEERING EXPERIENCE

Doctoral Research — Interval Adjoint Significance Analysis

Oct 2018–Present

RWTH Aachen University, Software and Tools for Computational Engineering (STCE) | Thesis submitted; doctoral examination ongoing

- Developed Interval Adjoint Significance Analysis (IASA), combining interval arithmetic with tangent/forward and adjoint/reverse algorithmic differentiation for neural-network significance estimation and structured pruning.
- Implemented a C++ interval-analysis engine with dco/c++ and Boost Interval for interval-adjoint propagation, significance computation, and pruned-model generation.
- Built Python/PyTorch pipelines for training, evaluation, structured pruning, and gradient-aware retraining, including model/data conversion and pruned-network construction.
- Integrated the C++ analysis engine with Python ML pipelines through ONNX and structured JSON, NumPy, binary, and msgpack data exchange.
- Validated pruning and retraining workflows across MLP, VGG, and ResNet architectures using PyTorch and TensorFlow/Keras.
- Automated reproducible GPU/multi-GPU experiments on Linux HPC clusters using Slurm, shell scripts, job arrays, and batch execution.

Research Assistant (HiWi)

Sep 2022–Dec 2023

RWTH Aachen University, STCE, Aachen, Germany

- Developed and tested C++ neural-network workflows using dco/c++.
- Implemented ONNX export/import in Python and validated models using PyTorch and TensorFlow.
- Automated neural-network training on HPC clusters using shell scripts.
- Supported and supervised bachelor's and master's research projects.

ADDITIONAL PROFESSIONAL EXPERIENCE

Technical Assistant

Jun 2025–Aug 2025

QCG Computer GmbH, Eschweiler, Germany

- Configured server racks and performed BBU and Size-O testing before final delivery.

Software Engineer

Mar 2014–Aug 2015

CYAN Business Solution | Oracle database application development

- Developed business software using Oracle RDBMS, SQL, PL/SQL, Oracle Report Builder, and Oracle Form Builder.

Software Engineer

Oct 2013–Feb 2014

Sapphire Finishing Mills Ltd. | Oracle application tooling

- Developed forms and reports using Oracle Form Builder and Oracle Report Builder.

EARLIER ACADEMIC EXPERIENCE

Lecturer <i>Khwaja Fareed University of Engineering and Information Technology, Rahim Yar Khan, Pakistan</i> Advanced Object-Oriented Programming	May 2018–Oct 2018
Lecturer <i>University of South Asia, Lahore, Pakistan</i> Data Structures, Artificial Intelligence, Database	Feb 2017–Apr 2018
Lecturer <i>University of Management and Technology, Lahore, Pakistan</i> Theory of Automata, Information Security, Database	Aug 2015–Feb 2017

SELECTED PUBLICATIONS

- **Interval Adjoint Significance Analysis for Neural Networks** — ICCS 2020. [DOI](#)
- **Towards Sobolev Pruning** — PASC 2024. [DOI](#)
- **Optimization of a 660 MWe Supercritical Power Plant Performance — A Case of Industry 4.0 in the Data-Driven Operational Management Part 1. Thermal Efficiency** — *Energies*, 2020. [DOI](#)
- **Neural networks assisted computational aero-acoustic analysis of an isolated tire** — 2020. [DOI](#)
- **Structured Layerwise Pruning via Extended-Interval Activation- and Derivative-Based Significance Measures** — iSAI-NLP 2025. [DOI](#)

EDUCATION

Doctoral Research in Computer Science / Scientific Computing <i>RWTH Aachen University, Aachen, Germany</i> Thesis submitted; doctoral examination ongoing; degree not awarded	Oct 2018–Present
Master of Computer Science (MSc-CS) <i>University of Engineering and Technology, Lahore, Pakistan</i>	2013–2015
Bachelor of Computer Science (BSCS) <i>The Islamia University of Bahawalpur, Bahawalpur, Pakistan</i>	2009–2013

LANGUAGES

Urdu — Mother tongue · English — Advanced · German — A2