VAIBHAV SAHU

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EDUCATION

Master's in Scientific Computing, University of Pennsylvania — Expected 2024
Courses: Big Data Analytics, Computer Vision, Deep Learning, Numerical Methods
Scientific Machine Learning, Quantum Circuits and Systems

Bachelor of Science (Physics), Indian Institute of Science — 2016 - 2020
Courses: Pattern Recognition and Neural Networks, Data Analytics, Linear Algebra
Probability and Statistics, Real Analysis, Computational Physics

EXPERIENCE

Graduate Online Teaching Assistant — Jan 2023 - Present
MCIT-5450: Big Data Analytics, University of Pennsylvania — *Philadelphia, PA*

Research and Development Engineer — April 2021 - June 2022
Simyog Technology Pvt. Ltd. (Startup by Prof. Dipanjan Gope, IISc Bangalore) — *Bangalore, India*

- Achieved a 22% speedup by optimizing the Matrix-Vector Product function using OpenMP.
- Developed a concurrent-GMRES algorithm for linear iterative solvers, resulting in a 40% speed improvement.
- Implemented test cases utilizing MKL-BLAS with OpenMP for parallelization.
- Conducted Performance Profiling of computational solvers for bottleneck identification.
- Created automated testing routines using Python to ensure code reliability and quality.
- Established a pipeline for simulating Black-box measurement-based Integrated Circuit models using Neural Networks within TensorFlow.
- Successfully migrated and restructured a MATLAB pipeline into Python for waveform reconstruction of IC Models.
- Conducted training on various models using diverse IC data, with achieved R-squared values of more than 0.9 on noisy data, demonstrating the generation of accurate correlation graphs.

BACHELOR'S THESIS

Calculation of Quasiparticle Properties using the GW Approximation -Prof. Manish Jain, IISc
Extension to plane-wave DFT python code: Implementation of Self Energy calculation by the GW Approximation in Python aimed at making a readable code with sub-optimal performance

PROJECTS

Masked Face identification using One-Shot Learning on Deep Networks - Employed Inception-ResnetV1 as a Siamese Network for face identification, generating masked images through image editing. The system achieved a remarkable 90% accuracy on unmasked images and maintained a strong 82% accuracy on masked images, - PyTorch, OpenCV, NumPy

Generating Adversarial Attack Examples using GANs - Implemented AdvGANs to generate semi-white box adversarial attack examples for any model trained on the CIFAR-10 dataset, the Attack success rate for training and validation sets were 95% and 87% respectively on All-CNN - PyTorch

Efficacy of Neural Network Potentials in Molecular Dynamics - DeePMD is at the cutting edge of NNPs. This is an ongoing project where we are looking at the performance of NNPs and how well they explain phenomena - **Python, DeePMD, LAMMPS**

PUBLICATIONS

Co-Author: "Black-Box Behavioral DC-DC Converter IC Emission Model," 2022 IEEE International Symposium on Electromagnetic Compatibility & Signal/Power Integrity (EMCSI), 2022, pp. 570-574, doi:10.1109/EMCSI39492.2022.9889598.

SKILLS

Data Science & Machine Learning	TensorFlow, PyTorch, Jax, Scikit-learn, Pandas, SQL, Spark, spaCy
Computer Languages & Parallel Computing	Python, MATLAB, C++, OpenMP, Intel Vtune
Computational Math and Plotting	NumPy, SciPy, Intel MKL, Matplotlib, Seaborn
Version Control & Debugging	Git, Visual Studio

ACADEMIC ACHIEVEMENTS

- KVPY-SA 2014 Scholar (All India Rank - 258 amongst 40k participants)
- National Talent Search Examination (NTSE) 2012 Scholar