SARTHAK KAPOOR

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EDUCATION

RWTH Aachen University *2020.10 - Present*
MSc Simulation Sciences Grade: 2.3 (German scale)
Focus: ML in engineering, Computational mathematics

National Institute of Technology, Warangal *2016.08 - 2020.08*
BTech Metallurgical and Materials Engineering CGPA: 9.13 (10)
Gold Medallist

COURSEWORK AND SKILLS

- Machine Learning, Computer Vision (object detection/classification/tracking), Automatic Differentiation, Data Analytics, Parallel Computing, Fast Iterative Solvers
- C/C++, Python, TensorFlow, PyTorch, NumPy, SciPy, JAX, Pandas, MATLAB, Java, HTML, Javascript, MySQL, LaTeX, CAD Modeling,
- English, Hindi (Bilingual proficiency)

EXPERIENCE

Learning Solid Mechanics with Machine Learning *2021.05 - Present*
Aachen Institute for Advanced Study in Computational Engineering Science (AICES)
As a research assistant under Prof. Bob Svendsen, I am implementing learning-based models (using TensorFlow and PyTorch) to predict stress distributions with material properties given as input. The training data comes from an open-source spectral solver —DAMASK. The work is being done in collaboration with MPIE Düsseldorf with me as the principal investigator.

Publication in preparation —"Comparing Fourier neural operators and U-Net for predicting stress fields in inhomogeneous microstructures".

Machine Learning Summer School (MLSS^N) *2022.06*
Jagiellonian University, Poland
I was selected with full scholarship to attend the prestigious week-long MLSS, which included insightful talks by field experts in computational neuroscience, causality, representation learning, predictive coding, and much more. Presented poster for my research —"Correlative modelling of microstructure and stress in solid mechanics using Machine Learning"

Detecting gravity waves in atmospheric temperature data *2022.06*
Applied and Computational Mathematics, RWTH Aachen
As a part of week-long study excursion, I worked with an interdisciplinary team of master students on developing an algorithm to detect gravity wave events which are essential for reliable weather predictions. These waves were modelled as Morlet wavelets using FFTs and non-convex optimization. The project was supervised by Dr. Joern Ungermann from Forschungszentrum Jülich and code was written in Python using NumPy, SciPy, JAX libraries.

Tracking local optima in dynamic systems *2021.10 - 2022.02*
Software and Tools for Computational Engineering, RWTH Aachen
Supervised by Prof. Uwe Naumann from Informatik-12, this semester-long project focused on building local-optima-tracking software for dynamic time-dependent functions. It was build on a global optima search routine developed by Dr. Jens Deussen and provides a switching criterion between global and local search. The software in written in C++ using dco/c++ library for automatic differentiation.

Fast iterative solvers *2021.04 - 2021.09*

RWTH Aachen

During the semester-long course on iterative solvers, we programmed Multigrid solvers along with Krylov based linear system solvers for sparse matrices: GMRES (Generalized Minimum Residual) and Conjugated Gradients. We also implemented Lanczos and Power Iteration methods to compute dominant eigenvalue for big symmetric positive matrices. These implementations were done independently using vanilla Python code without computational libraries.

Application Development Analyst *2020.09 - 2020.12*

Accenture Technology Center, Bengaluru

During my stint as Application Development Analyst at Accenture, I learnt a great deal about software delivery methods and programming languages like C++, Java and Python.

Simulation of Mold Filling in LPIM (MITACS Scholar) *2019.05 - 2019.08*

Ecole Technologie Superieure, Montreal

As a summer research intern, I worked on optimizing LPIM injection stage for metallic feedstock using FEM simulations and experimentation. I also worked on an initial layout of a new viscosity model that accurately captured viscosity behaviour for our application. Gained experience in Moldflow, AutoCAD, MATLAB, feedstock preparation.

Phase Field Modeling of Ternary System *2018.11 - 2019.04*

National Institute of Technology, Warangal

During this semester-long bachelor project, I built a simulation routine to study growth kinetics of precipitates in a hypothetical ternary alloy system. It was based on phase field modeling using semi-implicit spectral formulation and written in C using FFT libraries.

AWARDS AND HONORS

Recipient of full scholarship to attend Machine Learning Summer School 2022 in Krakow, Poland

Recipient of Late Pendyala Upendra Gold Medal 2020 for academic excellence in BTech degree

Honored by Indian Institute of Metals, Hyderabad chapter, for academic excellence in BTech degree

Recipient of MITACS 2019 scholarship to pursue research at ETS Montreal

Recipient of NIT Warangal Merit Scholarship 2016, 2017, 2018, 2019 (Full Tuition Award)

Recipient of OP Jindal Engineering and Management Scholarship 2018, 2019

Recipient of Central Scheme National Scholarship 2016, 2017, 2018

VOLUNTEERING

Project Aakaar: Making geometry accessible to visually impaired *2019.01 - Present*

Started as a bachelor's project at the makerspace of NIT Warangal, Project Aakaar has expanded into a global network of designers, thinkers, managers, and engineers, with the common goal of making technical education accessible in the special schools of developing countries.

Innovation Garage: Makerspace in NIT Warangal *2018.03 - 2020.05*

As a student volunteer, performed various technical, leadership and mentorship roles. Organized Ideathon, an event to help students explore their ideas under expert mentorship from IIT Bombay; saw a participation of 100+ students.