Curriculum Vitae

PERSONAL INFORMATION

Full name:	Sarthak Kapoor
Links:	GitHub, Google Scholar
Languages:	English (Professional proficiency), German (A1), Hindi (Native proficiency)
Date of birth:	Nov. 1, 1997
Nationality:	India

EDUCATION

RWTH Aachen University   2020.11 - 2023.04
MSc Simulation Sciences
Thesis: Correlative modeling of stress field with artificial neural networks

National Institute of Technology, Warangal   2016.08 - 2020.08
BTech Metallurgical and Materials Engineering

WORK EXPERIENCE

Data Scientist   2023.11 - Present
FAIRmat, Humboldt University, Berlin
Developing data science methodologies in the field of material synthesis.

Wissenschaftliche Hilfskraft   2021.05 - 2023.09
Chair for Material Mechanics, RWTH Aachen
Explored innovative ML architectures to learn non-linear computational models of physical systems. Trained models (U-Net, FNO, cGAN) for stress prediction in microstructures which were $1000\times$ faster than computation of numerical solution. Presented the findings at NeurIPS 2022 AI4Science workshop.

Machine Learning Developer Intern   2022.12 - 2023.05
Ericsson Eurolab, Herzogenrath
Worked in ML-powered anomaly detection and classification system for log files. Developed an interactive React-based GUI for visualizing millions of log anomaly scores, which was $100\times$ faster than the previous version. Performed data exploration and developed modeling strategies for data-driven resource allocation in telecom services.

Application Development Analyst   2020.09 - 2020.12
Accenture Technology Center, Bengaluru
Worked in software and ML-driven solution development. Participated in tech-oriented case studies and software development workshops.

MITACS Summer Intern   2019.05 - 2019.08
Département de génie mécanique, ETS Montreal
Implemented numerical models for material flow in low-pressure metallic-powder injection molding using Finite Element methods and contributed to experimental verification. Designed and verified data-driven models for constitutive relations. Contributed towards a journal publication.

TECHNICAL PROJECTS

Phase field modeling of chemomechanical binary system   2022.04 - 2022.08
Material Mechanics, RWTH Aachen
Implemented Cahn-Hilliard and Allen-Cahn models to simulate precipitate growth dynamics under the influence of chemical and mechanical energies. Used Python standard library.

Detecting gravity waves in atmospheric temperature data   2022.06
Chair for Applied and Computational Mathematics, RWTH Aachen
Implemented an FFT-based algorithm to detect gravity waves as wave packets in 2D temperature data. Lowered time complexity to $O(n \log n)$ in comparison to the previous method. Used Python with SciPy, JAX.

Tracking local optima in dynamic systems   2021.10 - 2022.02
Chair for Software and Tools for Computational Engineering, RWTH Aachen
Developed local-optima-tracking software for dynamic time-evolving functions. Tracked the local optima to reduce the need for global optima search from every time step to coarser time intervals. Achieved $10\times$ lower wall time. Used C++ with dco/c++ library.

Fast iterative solvers for linear systems   2021.04 - 2021.09
AICES, RWTH Aachen
Implemented multigrid solvers, Krylov-based linear system solvers (GMRES and CG) and eigen-solver algorithms (Lanczos and Power Iteration). Used Python standard library.

SKILLS

Machine Learning and data analysis —Python with PyTorch, TensorFlow, Scikit-Learn, Pandas, NumPy, SciPy, JAX

Software development —Python, C++, SQL, MATLAB, OpenMP, MPI, DCO

Web Development —JavaScript, React, Jekyll

Automated CI/CD workflows —git, Kubernetes

CONFERENCES

FAIRmat meets domain experts, Arnsberg, October 2023

NeurIPS 2022, New Orleans, November 2022 (virtually)

Machine Learning Summer School, Krakow, June 2022

COMMUNICATION

Kapoor, S., Mianroodi, J. R., Khorrami, M., Siboni, N. S., and Svendsen, B. (2022a). Comparison of two artificial neural networks trained for the surrogate modeling of stress in materially heterogeneous elastoplastic solids. https://arxiv.org/abs/2210.16994

Kapoor, S., Mianroodi, J. R., Svendsen, B., Khorrami, M., and Siboni, N. (2022c). Surrogate modeling of stress fields in periodic polycrystalline microstructures using U-Net and Fourier neural operators. In *NeurIPS 2022 AI for Science: Progress and Promises*

Kapoor, S., Mianroodi, J. R., and Svendsen, B. (2022b). Correlative modeling of microstructure and stress in solid mechanics using Machine Learning. In *MLSS 2022 Poster Session, Jagiellonian University, Poland*

Côté, R., Azzouni, M., Ghanmi, O., **Kapoor**, S., and Demers, V. (2021). Impact of rheological model on numerical simulation of low-pressure powder injection moulding. *Powder Metallurgy*, 64(1):8–16

AWARDS

Full scholarship to attend Machine Learning Summer School 2022, Krakow

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

MITACS 2019 scholarship to pursue research at ÉTS Montreal

NIT Warangal Merit Scholarship (Full Tuition Award)

OPJEMS award 2018 & 2019

VOLUNTEERING

Project Aakaar: Making geometry accessible to visually impaired
Started an assistive edu-tech project at the maker space of NIT Warangal to increase the participation of visually impaired students in STEM. Led the product design and established a strong network of designers, engineers, and researchers from MIT. Media coverage.

REFEREES

Prof. Dr. Bob Svendsen ⤴
Chair for Material Mechanics, RWTH
Max-Plank-Institut for Iron Research, Düsseldorf
b.svendsen@mpie.de

Dr. Jaber Rezaei Mianroodi ⤴
Ex-group leader at Max-Plank-Institut for Iron Research, Düsseldorf
Digital R&D, Covestro AG
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