

Matti Karppa

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WORK EXPERIENCE

Senior lecturer University of Gothenburg	2023–Present <i>Gothenburg, Sweden</i>
• Teacher (75%) and researcher; taught large-scale data science classes, master thesis coordinator, head of international bachelor's program, thesis supervision, program development, algorithm research	
Postdoctoral researcher IT University of Copenhagen	2020–2023 <i>Copenhagen, Denmark</i>
• Practical algorithm research in Kernel Density Estimation and Cardinality Estimation; also some lecturing	
Mathematics and physics teacher Nurmijärven Yhteiskoulu	2020 <i>Nurmijärvi, Finland</i>
• Middle-school teacher (class 7–9, ages 13–16) in mathematics and physics, also class supervisor responsibilities	
Software developer Vincit Oyj	2019 <i>Helsinki, Finland</i>
• Consultant, some data science work and various software development in Python and C#	
Postgraduate researcher Aalto University	2014–2019 <i>Espoo, Finland</i>
• Doctoral student in algorithms; matrix multiplication, symmetry breaking, similarity search, with C++, CUDA, MPI	
Undergraduate researcher Aalto University	2010–2014 <i>Espoo, Finland</i>
• Research assistant in content-based image retrieval, computer vision in the context of sign language videos	
System specialist Finnish Food Safety Authority Evira	2007–2009 <i>Helsinki, Finland</i>
• IT support and Windows server administration	

EDUCATION

Doctor of Science (Technology), Computer Science Aalto University	2020 <i>Espoo, Finland</i>
• Doctoral degree in algorithms	
Master of Science, Mathematics Education, 2020 University of Helsinki	2020 <i>Helsinki, Finland</i>
• Teacher qualification in mathematics, computer science, and physics	
Master of Science (Technology), Computer Science Aalto University	2014 <i>Espoo, Finland</i>
Bachelor of Science (Technology), Computer Science Aalto University	2014 <i>Espoo, Finland</i>

FREE SOFTWARE PROJECTS

HyperLogLogLog A cardinality estimation library, compressed version of HyperLogLog	github.com/mkarppa/hyperlogloglog C++, Python
DEANN A library for Kernel Density Estimation (KDE) using similarity search	github.com/mkarppa/deann C++, Python, pybind11
matmul Multi-GPU boolean and binary (over $\mathbb{Z}_2$) Strassen-like matrix multiplication library	github.com/mkarppa/matmul CUDA, C++, OpenMP
reduce A symmetry breaking tool, using colored graph isomorphisms	github.com/mkarppa/reduce C++, MPI

SKILLS AND TECHNOLOGIES

Programming:	C++, Python, C, Fortran, Scala, Matlab, C#, Java, Shell scripts, Assembly, Rust
Libraries:	NumPy, pandas, matplotlib, OpenCV, CUDA, MPI, Spark, pybind11, Eigen, GMP, OpenMP
Tools & OS:	SLURM, CMake, Docker, git, GDB, Emacs, LaTeX, Typst, Excel, Linux, MacOS, Windows
Skills:	Algorithm engineering, high-performance computing (HPC), software development, parallel programming, cluster computing, scalable computing, data science, machine learning, computer vision, teaching