Maximilian Vötsch

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Work Experience

University of Vienna   Feb 2021 - Ongoing
Prae-Doc Assistant in the Theory and Applications of Algorithms (TAA) group

- Researched how tools from classical algorithm research can be used to design efficient algorithms for unsupervised learning objectives
- Implemented, benchmarked and ran experiments with algorithms in C++
- Co-supervised a Bachelor's thesis on "Graph Clustering: A Comparison of Louvain and Leiden" and a Masters thesis on the topic "Repetition Free Longest Common Subsequence". Taught the courses "Advanced Algorithms" and "Algorithms and Data Structures for Computational Science". Taught the exercise class for "Mathematical Foundations of Computer Science 1" for six semesters.
- Organized workshops and conferences, co-organizing the Queer in AI workshop at ICML 2024 and local organizer of the SEA 2024 conference
- Collaborated internationally with researchers from academia and industry (Stanford, CMU, TU Munich, IIT Delhi, Google, ...)
- Acted as an expert reviewer for high profile conferences (NeurIPS, KDD, ICML, ALENEX, ICALP, SEA, ...)
- Received the faculty award for significant contributions in the category Publications in Highest Ranking Venues in 2023

Projects

XCut (published at KDD 2024)   May 2023 - Ongoing
First practical algorithm using expander decomposition to cluster a graph.

XCut solves the normalized cut problem by sparsifying a graph to a tree and it is the current state of the art solver for this problem. I co-designed the algorithm, implemented it in *C++*, and performed all experiments and data analysis using *Python*. This project received the audience appreciation award at KDD 2024, which is awarded to papers that garner significant public interest.

PRONE (published at NeurIPS 2023)   February 2023 - Ongoing
New algorithm for solving Euclidean k-means and creating coresets for downstream applications.

The algorithm has a running time of $O(nnz(A) + n \log n)$. It has been made available as a *Python* package, with its main implementation in *C++*, and *Cython* wrappers provided to make it available to data scientists. I co-designed the algorithm, implemented it for preliminary experiments, analyzed and plotted data using *pandas* and *pyplot*, and provided the resulting algorithm as a Python package.

Education

University of Vienna   February 2021 - March 2025
Dr. techn. Computer Science
Supervisors: Univ.-Prof. Dr. Monika Henzinger and Ass.-Prof. Dr. Kathrin Hanauer, B.Sc. M.SC.
Thesis Title: Efficient Algorithms for Problems in Clustering and Fairness

University of Vienna   March 2018 - August 2020
M.Sc. Mathematics, Thesis title: Cofinitary Groups

University of Vienna   October 2014 - March 2018
B.Sc. Mathematics, Thesis title: Lattice Path Matroids

Skills

Languages	C++, Python, Haskell, Rust, German (native), English (fluent)
Technology	Linux, git, unix shell, cmake, poetry, clang-tidy, vim, Docker
Libraries	Blaze, OpenMP, OpenMPI, pandas, numpy, scikit-learn, pytorch

Personal Interests

Bouldering, Analog and Digital Photography, Electronics, Guitar