Fraunhofer IOSB

Interaktive Echtzeitsysteme

Bachelor/Master Thesis:
High Performance EM for Gaussian Mixture

Topic
High performance Expectation Maximization (EM) for Gaussian Mixture is compelling because it unlocks scalable, accurate density estimation for modern datasets. Faster E and M steps enable real time clustering, anomaly detection, and soft classification in streaming and interactive applications. Optimized linear algebra, vectorization, and GPU acceleration reduce runtime and energy, broadening feasibility on edge and cloud. Careful numerical stability, batching, and memory layout improve convergence and robustness on large datasets. Parallelized responsibilities, batched covariance updates, and efficient mixture normalization increase throughput without sacrificing precision. Such implementations empower rapid model selection, online updates, and hyperparameter sweeps, driving better decisions in diverse range of applicatioons

Path
Our main goal is to develop and implement a high performance Gaussian mixture fitting on top of modern contemporary libraries.

Prerequisite
There are no hard constraints but the more programming and math you know the more you can have fun while doing the project.

What I offer

- A teammate/supervisor who is actually present.
- Possibility to be a co-author in a research level publication.
- A BSc/MSc thesis project that will be used in production level software for an enterprise level project.
- I can probably provide you with an office.
- Nice private IT infrastructure to implement whatever wild ideas you have in mind.

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