



Bachelor/Master Thesis: On the Samplings of Gaussian Mixtures

Topic

Monte Carlo sampling uses randomness to estimate numerical results, often for integration or simulation. Deterministic sampling follows fixed rules, producing repeatable outputs. Las Vegas algorithms are randomized but always return correct results, though runtime varies. These methods differ in accuracy, reliability, and efficiency depending on the problem structure and goals. Gaussian Mixture Models (GMMs) describe complex data using multiple Gaussian distributions. Sampling methods help estimate GMM parameters via techniques like Expectation-Maximization or MCMC. Monte Carlo sampling explores probabilistic spaces effectively, while deterministic approaches ensure convergence. GMMs are valuable because they model heterogeneity, clustering, and uncertainty in a flexible probabilistic framework.

Path

Our main goal is to improve Expectation Maximization using Deep Unfolding for some use cases.

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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