

Bachelor/Master Thesis:

Optimal Gaussian Mixture Approximation of the Product of Gaussian Mixtures

Topic

Gaussian mixtures are widely used for object tracking (TopGun/Maverick), approximating density functions in various applications such as density estimation, belief propagation, and Bayesian filtering. These applications often utilize Gaussian mixtures as initial approximations that are updated recursively. A key challenge in these recursive processes stems from the exponential increase in the mixture's order, resulting in intractable inference. To overcome the difficulty, the Gaussian mixture reduction (GMR), which approximates a high order Gaussian mixture by one with a lower order, can be used. Although existing clustering-based methods are known for their satisfactory performance and computational efficiency, their convergence properties and optimal targets remain unknown. In our effort we follow the optimization based path hopping to have more accurate approximations.

Path

We combine methods from different branches of Math and Artificial Intelligence to develop more generalized version of optimization based methods for Gaussian Mixture Reduction.

Prerequisite

There are no hard constraints but the more Math and programming you know the more excitement you can get from the topic.

What I offer

- A teammate/supervisor who is actually present.
- A BSc/MSc thesis project close to cutting-edge research (SFB1574) with the opportunity to bring in own ideas and a potential prospect of publication in a journal or a likewise scientific contribution.
- I can probably provide you with an office.
- Nice private powerful hardware for running tests and experiments.

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