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# Adaptive Multiple Importance Sampling: AMIS Algorithm

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The strength of AMIS resides in its completely adaptive and multi-purpose nature: no tuning parameter is needed and the same algorithm is proved to perform well on very diverse high-dimentional target distributions (from banana shaped to mixture with very well separated modes and tunnels).

The algorithm has both a temporal, $T$, and a population, $N$, dimention and consists of 3 steps: initialization, adaptation and clustering. The AMIS estimator is obtained by recycling the $N \times T$ particles generated in all 3 steps, with the corresponding importance weights. What drives AMIS and ensures unbiasedness, are importance sampling type of reasonings.

Variance reduction is achieved by Rao-Blackwellisation and by a novel way of combining different importance distributions by a deterministic mixture and an actualization process performed on the weights. As a byproduct of these processes, all particles are on the same "weighting scale" and can be easily and efficiently combined to get the final AMIS estimator.

In the first step of the algorithm a good scale parameter for the initial importance distribution is found using the effective sample size of the importance weights. Global adaptation of the mean and variance of the importance distribution to the corresponding target parameters (2nd step) is combined with local adaptation achieved via a Rao-Blackwellised clustering algorithm (3rd step).

In the talk the AMIS algorithm will be presented, together with examples of its application and performance evaluations/comparisons.

This is joint work with Christian Robert and Jean-Michel Marin.