

The Gaussian Mixture Optimal Transport Ensemble Kalman Filter and its application to predict the capacity fade of lithium-ion batteries

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In this talk, we propose a novel algorithm combining the Gaussian mixture (GM) with the optimal transport Ensemble Kalman filter (OT-EnKF), named the Gaussian mixture optimal transport EnKF (GM-OT-EnKF). An ensemble of state realizations is employed to exhibit the propagation of the states. A GM of the propagated uncertainty is then recovered by clustering the ensemble. The posterior density is updated by the OT-EnKF, which is known to be optimal within the quadratic function space that minimizes the Monge-Kantorovich dual problem in the optimal transport. We further discuss the adaptive choice of the number of the Gaussian component in the GM by minimizing certain model selection criterion, say AIC and BIC. The accuracy of our GM-OT-EnKF is demonstrated through the estimation and prediction of the capacity fade of lithium-ion batteries, which outperforms the EnKF and the OT-EnKF. (joint work with Yi Li)

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