

My Contribution

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As I mentioned before, my research is working with state-space models and Kalman filter. Before using Kalman filter, I spent quite a long time on particle filter, which is a sampling algorithm based on Monte Carlo methods. In the end, it turned out Kalman filter may have a better performance, but this doesn't mean particle filter doesn't work on our problem. If I have enough time I would like to try it more in future. Out of our main purpose introduced before, I choose Kalman filter for now.

Just like many statistical problems, how to have a good estimate of our parameter is very important. In state-space models, our parameter is the variance of different components. With the help of existing methods, we could have a approximate guess about the variances. Specifically, we can use grid search to find the values of parameters that generate the smallest error compared with the 'correct ' result.

Naturally, I tried MLE at first but the results are far from what we want, which is normal in some cases. Now I am trying to solve it from Bayesian standpoint. One feature of our problem is that it comes from the real life, which means we usually have some prior information on some components. Based on this point, Bayesian perhaps works here. That is to say, instead of finding MLE, we switch to find

MAP(maximum a posterior) estimate now. A lot of small difficulties happens in this process and I am still working on the MAP part.