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# Optimizing Battery State Estimation: Overcoming Computational Challenges with Hybrid Models

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To ensure the safety and reliability of batteries it is critical to accurately estimate the internal state of the battery which is crucial in Battery Management Systems (BMSs). It is crucial to have methods which, aside from yielding accurate predictions, can be applied for real time estimations. However, the advanced BMSs generating accurate results are computationally intensive and time-consuming, limiting their direct application in real-time estimation. To overcome the computational demand Deep Neural Networks (DNNs) have been applied. However, to have highly accurate models, DNNs with more complex architectures should be applied. The complexity of their architecture will hinder their efficiency for online state estimation algorithms. To tackle the goal of having highly accurate predictions while being computationally efficient, we propose a BiLSTM model as a state estimator, with its hyperparameters automatically optimized using a Bayesian Optimization (BO) framework. We show that leveraging Bayesian inference enables the use of a highly accurate state estimator with a less complex DNN architecture, ensuring computational efficiency.

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## References

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