Feature construction for on-board early prediction of electric vehicle battery cycle life

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Electric vehicles (EV) have become mainstream, and lithium-ion batteries are commonly used in EVs. Batteries degrade nonlinearly and the state of health varies depending on the operation condition. It is important to estimate battery cell life early in use for safe and optimal operation. Early prediction of cycle life can be used offline for cell quality testing. More importantly, on-board estimation is required because even for batteries from the same company, the cycle life can be different and we cannot specify the life in advance.

In this paper, we propose a set of new features that enables onboard cycle-life prediction with early cycle data. Several comparative tests confirm that the new features lead to higher prediction accuracy, lower computational cost, and lower memory than other existing studies. These also show good performances with various models such as neural networks and simple linear models, which means a great selection of features for battery cycle-life prediction.