Data-driven Online Prediction of Knee-point in Battery Capacity Degradation

손수연, 이재형†
한국과학기술원
(jayhlee@kaist.ac.kr†)

Accurate monitoring on a lithium-ion battery degradation is important to take preemptive actions to failure and plan battery replacement for optimal performance. Battery capacity fades gradually due to repetitive charging and discharging until it reaches the onset of rapid degradation, which is called 'knee-point'. Battery goes through irreversible deterioration up to its end-of-life after knee-point, so it is crucial to forecast it for safety and economic benefits. Machine learning based methods which predict the knee-point with early cycles cell data have shown good performance. Despite the notable progresses made, they are valid only under the constrained assumption that operating conditions are constant. In this study, a machine learning pipeline for online knee-point prediction is proposed which is flexible to changing battery usage. A CNN-based model extracts temporal features across past and current cycles to predict cycles left to knee-point in real time. The proposed framework can reflect dynamic properties changing from time to time, which makes its application more practical.