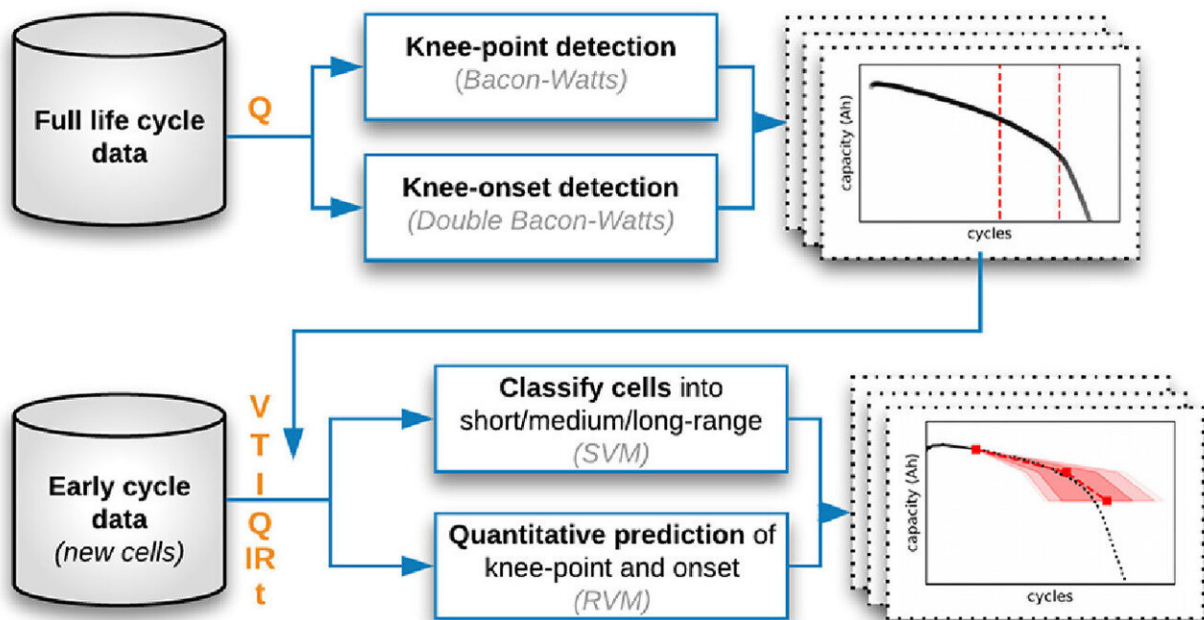


# Machine learning technique improves analysis and prediction of lithium-ion battery life

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Graphical abstract. Credit: *Energy and AI* (2020). DOI: 10.1016/j.egyai.2020.100006

A machine learning technique to improve analysis and prediction of lithium-ion battery life has been developed by researchers in Scotland. Gonçalo dos Reis and colleagues at the University of Edinburgh and Heriot-Watt University, Edinburgh, U.K., report the development and

application of their procedure in an article in the open access journal *Energy and AI*. The ability to predict the course of a battery's decline early in its life cycle could improve battery management, testing and design.

Lithium-ion batteries are the most common power sources for a variety of personal electronic devices including cell phones and laptops. Their [electrical capacity](#) degrades over time, but not in a linear manner. Instead, after a lengthy period of slow and almost linear decline, capacity tends to begin to fall in an ever-increasing, non-linear deterioration. When plotted as a graph of capacity against usage cycles, the most obvious bend in the curve of decline is called the knee-point.

The Edinburgh team have defined a procedure to predict the degradation curve and knee-point at an early stage, without having to monitor the fall in capacity over the full [life cycle](#). This could assist in the development of new batteries and in monitoring the health of a battery.

A key aspect of the new method is the identification of an earlier point in the capacity curve, which the researchers call the knee-onset point. This is a newly identified initial stage of decline towards the knee-point. The researchers' algorithm, developed using [machine learning](#), can use the knee-onset point to predict the knee-point and also the end of effective battery life. The algorithm allows each of these features to identify the timing of the others.

Better [battery management](#), assisted by this new method, could include prioritizing and optimizing the energy available to key applications and optimizing recharging cycles.

**More information:** Paula Fermín-Cueto et al, Identification and machine learning prediction of knee-point and knee-onset in capacity degradation curves of lithium-ion cells, *Energy and AI* (2020). [DOI:](#)

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