This archive contains all datasets, codes, and output results corresponding to Section III, IV, and V of the associated paper. The complete dataset has been split into 7 packages, named as follows:

* Section\_III\_Raw\_data\_magnitude.rar
* Section\_III\_Raw\_data\_phase\_(1).rar
* Section\_III\_Raw\_data\_phase\_(2).rar
* Section\_III\_static\_physiological\_conditions\_model.rar
* Section\_IV\_physiological\_variability\_conditions\_model.rar
* Section\_IV\_Raw\_data\_apmlitude.rar
* Section\_IV\_Raw\_data\_phase.rar

Please extract all files in the same directory to reconstruct the full folder structure. The archive mainly consists of two folders:

1. Data under static physiological conditions;

2. Data under physiological variability conditions.

**1. Section\_III\_static\_physiological\_conditions**

This folder includes all data related to SOC and SOH estimation under static physiological conditions.

**Raw\_data:**

Contains raw magnitude and phase results obtained over 6 charge/discharge cycles at a 0.3C rate.

**1\_data\_preprocessing/**

Includes data\_preprocessing.m, which converts the raw data into interpolated SOC features with 0.5% resolution (e.g., 100%, 99.5%, ..., 0%) for model training and validation.

**2\_SOC\_ESTIMATION\_Model/**

Contains five SOC estimation models described in Section III-C. Each method includes two scripts (e.g., \*\_Multi.m and \*\_Single.m) for multi- and single-frequency feature set validation.

**3\_SOH\_ESTIMATION\_Model/**

Contains the LSLinear SOH estimation model shown in Section III-D, which includes two scripts (e.g., LSlinear \_Multi.m and LSlinear \_Single.m) for multi- and single-frequency feature set validation.

**2. Section\_IV\_physiological\_variability\_conditions**

This folder includes datasets and algorithms related to SOC estimation under physiological variability conditions.

**Raw\_data:**

Contains raw magnitude and phase results obtained over 6 charge/discharge cycles at a 0.5C rate.

**1\_SSA\_code/**

Includes codes implementing the SSA model for frequency shift compensation.

**2\_Gene\_Encoded\_Classifier\_code/**

Implements the gene-encoded classifier comprising three steps:

* step1\_Reference\_encoding.m: Encode reference features.
* step2\_Test\_feature\_encoding.m: Encode test features.
* step3\_vertification\_results.m: Performs SOC estimation verification.

The corresponding outputs, including encoded feature sets and SOC estimation performance are saved in the Experimental\_Results/ subfolder.