Deep Learning-based Eco-driving System for Battery Electric Vehicles Dataset

Dataset available at: https://doi.org/10.6086/D1FW9G

(This dataset supports report **Deep Learning-based Eco-driving System for Battery Electric Vehicles,** https://escholarship.org/uc/item/9fz140zt).

This U.S. Department of Transportation-funded dataset is preserved by the National Center for Sustainable Transportation at the Institute of Transportation Studies in the digital repository Dryad (https://datadryad.org), and is available at https://doi.org/10.6086/D1FW9G

The related final Deep Learning-based Eco-driving System for Battery Electric Vehicles, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/42373

Metadata from the ExLibris Rosetta record:

Title: Deep Learning-based Eco-driving System for Battery Electric Vehicles
Authors:

- Wu, Guoyuan, University of California, Riverside, https://orcid.org/0000-0001-6707-6366
- Ye, Fei, University of California, Riverside
- Hao, Peng, University of California, Riverside
- Esaid, Danial, University of California, Riverside
- Boriboonsomsin, Kanok, University of California, Riverside
- Barth, Matthew, University of California, Riverside

Emails: gywu@cert.ucr.edu, fye001@ucr.edu, haop@cert.ucr.edu, desai001@ucr.edu, kanok@cert.ucr.edu, barth@ece.ucr.edu
Publication Date: February 19, 2019
Publisher: UC Riverside
DOI: https://doi.org/10.6086/D1FW9G
Abstract: The uninterrupted growth in transportation activities, for both people and goods movement, have been exerting significant pressure on our socio-economics and environment. However, emerging technologies such as connected and automated vehicles (CAVs), transportation electrification, and edge computing have been stimulating more and more dedicated efforts by engineers, researchers and policymakers to tackle the transportation-related problems, including those energy and environment focused. The eco-driving strategies based on CAV technology particularly attract significant interest from all over the world due to its great potential in energy saving as well as tail-pipe emissions reduction. Among all CAV based eco-driving strategies, the Eco-Approach and Departure (EAD) at Signalized Intersections application has shown most significant promise. In this system, an equipped vehicle can take advantage of the signal phase and timing (SPaT) and geometric intersection description (GID) information from the upcoming signalized intersection and calculate the optimal speed to pass on a green light or to decelerate to a stop in the most eco-friendly manner. Speed recommendations may be provided to the driver using a driver-vehicle-interface (DVI) or to the vehicle systems

that support automated longitudinal control capabilities. In this project, the research team conducted a thorough literature review on EAD algorithms, and identified a few major research gaps in the corresponding area, including 1) the balance between system optimality and computational efficiency; 2) designated algorithms for electric vehicles (e.g., consideration of regenerative braking); and 3) taking into account of downstream traffic information (e.g., prediction of preceding vehicle's state). To address these gaps, the research team proposed a deep-learning based trajectory planning algorithm (DLTPA) for EAD application, which can be considered as an approximation of a global optimal algorithm (called graph-based trajectory planning algorithm or GTPA) that the research team previously developed. The proposed DLTPA has two processes: offline (training) and online (implementation), and is composed of two major modules: 1) solution feasibility checker which identifies if there is a feasible trajectory subject to all the system constraints, e.g., maximum acceleration or deceleration; and 2) a regressor to predict the speed of next time step. Preliminary simulation study in VISSIM showed that the proposed DLTPA can achieve a great balance of energy savings vs. computational efforts, compared to the baseline scenario where no EAD was implemented and the optimal solution (in terms of energy savings) provided by GTPA.

Recommended citation:
Wu, Guoyuan et al. (2019), Deep Learning-based Eco-driving System for Battery Electric Vehicles, UC Riverside, Dataset, https://doi.org/10.6086/D1FW9G

Dataset description:
This dataset contains 1 .zip file collection described below.

Doi_10.6086_D1FW9G_v1.zip:
This collection contains 80 .csv files. Each file begins with "Organized_MM_DataMonitor," and is then followed by what appears to be a date, number identifier, and worded identifier (eg. Organized_MM_DataMonitor_20130509-102207GPSXX064 La Sierra and Magnolia-processed_Sync_MM.csv). The .csv, Comma Separated Value, file is a simple format that is designed for a database table and supported by many applications. The .csv file is often used for moving tabular data between two different computer programs, due to its open format. The most common software used to open .csv files are Microsoft Excel and RecordEditor, (for more information on .csv files and software, please visit https://www.file-extensions.org/csv-file-extension).

National Transportation Library (NTL) Curation Note:
As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (https://ntl.bts.gov/public-access) Section 7.4.2 Data, the NTL staff has performed ***NO*** additional curation actions on this dataset. NTL staff last accessed this dataset at hhttps://doi.org/10.6086/D1FW9G on 2019-10-02. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.