

Data Files: Bi-Objective Optimization for Battery Electric Bus Deployment Considering Cost and Environmental Equity

Dataset available at: https://doi.org/10.15760/TREC_datasets.10

(This dataset supports report **Bi-objective Optimization for Battery Electric Bus Deployment Considering Cost and Environmental Equity**)

This U.S. Department of Transportation-funded dataset is preserved by Transportation Research and Education Center (TREC) in their data repository PDX Scholar (<https://pdxscholar.library.pdx.edu/>), and is available at https://doi.org/10.15760/TREC_datasets.10

The related final report **Bi-objective Optimization for Battery Electric Bus Deployment Considering Cost and Environmental Equity**, is available from the National Transportation Library's Digital Repository at <https://rosap.ntl.bts.gov/view/dot/59880>

Metadata from the PDX Scholar Repository record:

Authors:

- Xiaoyue Cathy Liu, The University of Utah
- Yirong Zhou, The University of Utah
- Ran Wei, University of California, Riverside
- Aaron Golub, Portland State University

Document Type: Dataset

Publication Data: 2021

Subjects:

Local transit -- Environmental aspects, Electric buses -- Management, Transportation -- Planning, Sustainable transportation

Abstract:

This data supports the research project Bi-objective Optimization for Battery Electric Bus Deployment Considering Cost and Environmental Equity and a final report published on NITC's website. Dataset collected through multiple sources and organized into different formats including CSV format, JSON format, shapefile and code repository. Context: The research project develops a bi-objective model that aims to help transit agencies to optimally deploy BEB while considering both capital investment and environmental equity. The unique spatio-temporal characteristic of BEB system, charging limitations (on-route and in-depot charging), and operational constraints are also considered and incorporated into the model.

Description:

File List

1. Filename: BusRoutes_UTA - The folder contains the shapefile of bus routes of UTA in year 2016. Shapefile format consists of files with common filename prefix, stored in the same directory. Software used for processing the data: ArcMap BusRoutes_UTA.cpg Description: Specifying the code page (only for .dbf) for identifying the character encoding to be used. BusRoutes_UTA.dbf Description: Attribute format; columnar attributes for each shape, in dBase IV format. BusRoutes_UTA.prj Description: Projection description, using a well-known text representation of coordinate reference

systems. BusRoutes_UTA.sbn Description: A spatial index of the features.

BusRoutes_UTA.sbx Description: A spatial index of the features. BusRoutes_UTA.shp

Description: Shape format; the feature geometry itself. BusRoutes_UTA.shp.xml

Description: Geospatial metadata in XML format, such as ISO 19115 or other XML

schema BusRoutes_UTA.shx Description: Shape index format; a positional index of the

feature geometry to allow seeking forwards and backwards quickly.

2. Filename: BusStops_UTA - The folder contains the shapefile of bus stops of UTA in year 2016. Shapefile format consists of files with common filename prefix, stored in the same directory. Software used for processing the data: ArcMap BusStops_UTA.cpg Description: Specifying the code page (only for .dbf) for identifying the character encoding to be used. BusStops_UTA.dbf Description: Attribute format; columnar attributes for each shape, in dBase IV format. BusStops_UTA.prj Description: Projection description, using a well-known text representation of coordinate reference systems. BusStops_UTA.sbn Description: A spatial index of the features. BusStops_UTA.sbx Description: A spatial index of the features. BusStops_UTA.shp Description: Shape format; the feature geometry itself. BusStops_UTA.shp.xml Description: Geospatial metadata in XML format, such as ISO 19115 or other XML schema BusStops_UTA.shx Description: Shape index format; a positional index of the feature geometry to allow seeking forwards and backwards quickly.
3. Filename: UTA Runcut File Aug2016.xlsx Summary: The file contains network information of UTA buses in year 2016. Software or Language used for processing the data: Python
4. Filename: TAZ Summary: The folder contains the shapefile of Traffic Analysis Zone in the Salt Lake Metropolitan area. Software or Language used for processing the data: ArcMap TAZ.cpg Description: Specifying the code page (only for .dbf) for identifying the character encoding to be used. TAZ.dbf Description: Attribute format; columnar attributes for each shape, in dBase IV format. TAZ.prj Description: Projection description, using a well-known text representation of coordinate reference systems. TAZ.sbn Description: A spatial index of the features. TAZ.sbx Description: A spatial index of the features. TAZ.shp Description: Shape format; the feature geometry itself. TAZ.xml Description: Geospatial metadata in XML format, such as ISO 19115 or other XML schema TAZ.shx Description: Shape index format; a positional index of the feature geometry to allow seeking forwards and backwards quickly.
5. Filename: Marginal_Income.xlsx
6. Filename: SE_File_v83_SE19_Net19.xlsx Household size, household population, and employment
7. Filename: Pollutant Concentration.xlsx
8. Filename: Code for Optimization
9. Filename: Code for Visualization

DOI

10.15760/TREC_datasets.10

Persistent Identifier

<https://archives.pdx.edu/ds/psu/35023>

Recommended citation:

Liu, X., Zhou, Y., Wei, R., & Golub, A. Data Files: Bi-objective Optimization for Battery Electric Bus Deployment Considering Cost and Environmental Equity. NITC-RR- 1222. Portland, OR: Transportation Research and Education Center (TREC), 2021

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Dataset description:

This dataset contains 4 file collections and 2 .xlsx files, described below.

1. BusRoutes_UTA-.zip

- BusRoutes_UTA.shx
- BusRoutes_UTA.shp.xml
- BusRoutes_UTA.shp
- BusRoutes_UTA.sbx
- BusRoutes_UTA.sbn
- BusRoutes_UTA.prj
- BusRoutes_UTA.dbf
- BusRoutes_UTA.cpj

2. BusStops_UTA-.zip

- BusStops_UTA.shx
- BusStops_UTA.shp.xml
- BusStops_UTA.shp
- BusStops_UTA.sbx
- BusStops_UTA.sbn
- BusStops_UTA.prj
- BusStops_UTA.dbf
- BusStops_UTA.cpg

3. UTA Runcut File Aug2016.xlsx**4. TAZ-.zip**

- TAZ.shx
- TAZ.shp
- TAZ.sbx
- TAZ.sbn
- TAZ.prj
- TAZ.dbf
- TAZ.cpg

5. Marginal_Income.xlsx**6. SE_File_v83_SE19_Net19.xlsx****7. Pollutant Concentration.xlsx****8. Code for Optimization-.zip**

- fileHandler.py
- ele_gui.py
- ele_glpk_solve.py
- ele_bus.py

9. Code for Visualization-.zip

- 9. Code for Visualization Folder
 - vis.html
 - thirdView.js
 - styles.css
 - secondView.js
 - screencast.mp4
 - firstView.js
 - chart.js
 - data Folder
 - busRouteTAZ.json
 - eg1_route.json
 - eg1_stop.json
 - plan0_route.json
 - plan0_stop.json
 - plan1_route.json
 - plan1_stop.json
 - plan2_route.json
 - plan2_stop.json
 - plan3_route.json
 - plan3_stop.json
 - plan4_route.json
 - plan4_stop.json
 - plan5_route.json
 - plan5_stop.json
 - plan6_route.json
 - plan6_stop.json
 - plan7_route.json
 - plan7_stop.json
 - plan8_route.json
 - plan8_stop.json
 - plan9_route.json
 - plan9_stop.json
 - UTA.png
 - utah_geo.json

File Type Descriptions:

- A .shx file contains compiled shape data (building blocks, fonts) in form of the machine language compiled version of an shp file. The file type is associated with AutoCAD , a CAD development platform, developed and sold by Autodesk, Inc (for more information on .shx files and software, please visit <https://www.file-extensions.org/shx-file-extension>).
- The .xml file type is commonly used for files written in Extensible Markup Language (XML). XML is a human-readable, machine-understandable, general syntax for describing hierarchical data, applicable to a wide range of applications (for more

information on .xml files and software, please visit <https://www.file-extensions.org/xml-file-extension>)

- The shp file extension is used for ESRI Shape format, a popular geospatial vector data format for geographic information systems software. A shapefile stores non-topological geometry and attribute information for the spatial features in a data set. A shapefile consists of a set of 3 mandatory files, along with several optional files. Each file in the set shares the shapefile name with a different extension. The main file .shp stores the geometry and must always have an index file shx. A dBASE file dbf stores all the attributes of the shapes in the main file. Additionally, a projection file prj stores the projection information (for more information on .shp files and software, please visit <https://www.file-extensions.org/shp-file-extension>).
- The sbx file extension is associated with the ArcView GIS application used to view and edit GIS data. The .sbx file contains spatial index for read-write shape used to fast access to shape files (for more information on .sbx files and software, please visit <https://www.file-extensions.org/sbx-file-extension-arcview-spatial-index-for-read-write-shape-file>).
- The sbn file extension is mainly associated with ArcView / ArcGIS geography software from ESRI. The sbn file contains binary spatial indexes, which are used only by ESRI software. The format is not documented, and is not implemented by other vendors (for more information on .sbn files and software, please visit <https://www.file-extensions.org/sbn-file-extension>).
- The prj file extension is traditionally used for files that contain projects. Projects contain settings, positions of saved windows, development notes and other raw data that won't be present in the final file (for more information on .prj files and software, please visit <https://www.file-extensions.org/prj-file-extension>).
- The dbf file extension is traditionally used for database file by many database applications. The original program, which used the DBF file extension for its database, was dBase. A major legacy of dBase is its dbf file format, which has been adopted in a number of other applications. For example, the shapefile format developed by ESRI for spatial data in a geographic information system uses .dbf files to store feature attribute data (for more information on .dbf files and software, please visit <https://www.file-extensions.org/dbf-file-extension>).
- The cpq file extension is associated with the ArcGIS, a geographic information system for Microsoft Windows operating system, developed by Esri. The cpq file stores codepage for identifying a character set (for more information on .cpq files and software, please visit <https://www.file-extensions.org/cpg-file-extension-arcgis-codepage>).
- The .xlsx and .xls file types are Microsoft Excel files, which can be opened with Excel, and other free available software, such as OpenRefine.
- The .py file extension is commonly used for files containing source code written in Python programming language. Python is a dynamic object-oriented programming language that can be used for many kinds of software development (for more information on .py files and software, please visit <https://www.file-extensions.org/py-file-extension>).
- File extension .json is associated to JavaScript Object Notation file format, a lightweight, text-based, language-independent data interchange format. JSON defines a small set of formatting rules for the portable representation of structured data. It is used by various applications as alternative option to XML file format. The data in a json file are stored in

simple text file format and the content is viewable in any simple text editor (for more information on .json files and software, please visit <https://www.file-extensions.org/json-file-extension>).

- The file extension .png is commonly used for images in Portable Network Graphics file format. PNG is a bitmap graphics format similar to GIF, that uses image compression mainly for web purposes (for more information on .png files and software, please visit <https://www.file-extensions.org/png-file-extension>).
- The mp4 file extension is used mainly for the MPEG-4 multimedia file format. These mp4 files are in a container format defined in the Systems Part of the MPEG-4 standard (ISO 14496-1). The .mp4 files support all kinds of multimedia content (multiple audio streams, video streams, subtitle streams, pictures) and advanced content (called "Rich Media" or "BIFS") like 2D and 3D graphics, user interactivity, DVD-like menus. The MP4 file format is also streamable (for more information on .mp4 files and software, please visit <https://www.file-extensions.org/mp4-file-extension>).
- The file extension .js is generally mainly related to JavaScript scripting language and used for files that contain JavaScript language source code (for more information on .js files and software, please visit <https://www.file-extensions.org/js-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 https://doi.org/10.15760/TREC_datasets.10 on 2022-04-29. 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.