Optimal Automated Demand Responsive Feeder Transit Operation and Its Impact Dataset

Dataset available at: http://hdl.handle.net/11603/12127

(This dataset supports report **Optimal Automated Demand Responsive Feeder Transit Operation and Its Impact,**
https://www.morgan.edu/school_of_engineering/research_centers/urban_mobility_and_equity_center/research/completed_research/automated_feeder_transit_operation.html)

This U.S. Department of Transportation-funded dataset is preserved by the Urban Mobility & Equity Center in the Maryland Shared Open Access Repository (https://mdsoar.org/), and is available at http://hdl.handle.net/11603/12127

The related final report **Optimal Automated Demand Responsive Feeder Transit Operation and Its Impact**, is available from the National Transportation Library's Digital Repository at https://rosap.ntl.bts.gov/view/dot/41970

Metadata from the Maryland Shared Open Access Repository record:
Department: Urban Mobility & Equity Center
Program: University Transportation Centers Program
Date: 2018-09
Description: These are the results.
Abstract: Although demand responsive feeder bus operation is possible with human-driven vehicles, it has not been very popular and mostly available as a special service because of the high operating costs due to the intensive labor costs as well as advanced real-time information technology and complicated operation. However, once automated vehicles become available, small-sized flexible door-to-door feeder bus operation will become more realistic, thanks to recent technological advances and business innovations by the transportation network companies (TNCs). So, preparing for the automated flexible feeder service is necessary to catch the rapid improvement of automated vehicle technology. Therefore, this research developed an algorithm for the optimal flexible feeder bus routing, which considers relocation of buses for multi-stations and multi-trains, using a simulated annealing (SA) algorithm for future automated vehicle operation. An example was developed and tested to demonstrate the developed algorithm. The algorithm successfully handled relocating the buses when the optimal bus routings were not feasible with the available buses at certain stations. Furthermore, the developed algorithm limited the maximum Degree of Circuity for each passenger while minimizing total cost, including total vehicle operating costs and total passenger in-vehicle travel time costs. Unlike fixed route mass transit, small vehicle demand responsive service uses flexible routing, which means lower unit operating costs not only decrease total operating costs and total costs but also can affect routing and impact network characteristics. In the second part of this research, optimal flexible demand responsive feeder transit networks were generated with various unit transit operating costs using the developed routing optimization algorithm. Then network characteristics of those feeder networks were examined and compared. The results showed that when unit operating costs decline, total operating costs and total costs obviously decline. Furthermore, when unit operating

costs decline, the average passenger travel distance and total passenger travel costs decline while the ratio of total operating costs per unit operating costs increases. That means if unit operating costs decrease, the portion of passenger travel costs in total costs increases, and the optimization process tends to reduce passenger costs more while reducing total costs. Assuming that automation of the vehicles reduces the operating costs, it will reduce total operating costs, total costs and total passenger travel costs as well.
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Dataset description:
This dataset contains 7 .zip file collections described below.

Analysis_Results_Demand_Functions.zip
This collection contains 9 .xlsx files, listed below:

- Cost modeling.xlsx
- Cost Sensitivity Analysis (r=10) V3.xlsx
- Demand 120.xlsx
- Demand 140.xlsx
- Demand 160.xlsx
- Figure.xlsx
- ratio analysis -DOC.xlsx
- TR C Results 20180117.xlsx
- Two objective functions.xlsx

The .xlsx file is a Microsoft Excel file, which can be opened with Excel, and other free available software, such as OpenRefine

Drawing1.zip
This collection contains 30 total files, 26 .xml and 4 .emf. There is no clear naming structure, but some names are repeated with different numbers suggesting the possibility of multiple versions. The .xml file is a structured text file written in Extensible Markup Language (XML). XML is both human and machine readable and can be opened using any text editor. Common software that is used to open .xml files are Notepad++, Oxygen XML Editor, Atom, and TextEdit (for more information on .xml files and software, please visit https://www.file-extensions.org/xml-file-extension). The .emf file is an Enhanced Metafile Format file. (for more information on different types of .emf files and associated software, please visit https://www.file-extensions.org/emf-file-extension).

Fig 1 Automation.zip
This collection contains 30 total files, 26 .xml and 4 .emf. There is no clear naming structure, but some names are repeated with different numbers suggesting the possibility of multiple versions. Additionally, the names are for the majority consistent with the names and structure found in Drawing1.zip. The .xml file is a structured text file written in Extensible Markup Language (XML). XML is both human and machine readable and can be opened using any text editor. Common software that is used to open .xml files are Notepad++, Oxygen XML Editor, Atom, and TextEdit (for more information on .xml files and software, please visit https://www.file-extensions.org/xml-file-extension). The .emf file is an Enhanced Metafile Format file. (for more information on different types of .emf files and associated software, please visit https://www.file-extensions.org/emf-file-extension).

Additional_Files.zip:
This collection contains 19 .db files, numbered 1 to 11 and 14 to 21. The number is shown before and after ARPed in the name (eg. 01_ARPed_1.db). The file number corresponds with the numbers found in the other zip files. The .db file type is a database file format that is used by various applications (for more information on different types of .db files and associated software, please visit https://www.file-extensions.org/db-file-extension).

General Algorithm3.zip:
This collection contains a total of 16 files, 9 .m files and 7 .jpg files. The .m files contain documentation on algorithms and the .jpg files contain the graphs/figures/models that were created from the study. The m file extension is related to the MatLAB, a programming environment and programming language available for Microsoft Windows, Linux and Apple Mac OS X. NTL staff were able to open .m files with a basic text editor,
(for more information on .m files, please visit https://www.file-extensions.org/m-file-extension-matlab-function-commands-script). The .jpg file format or JPEG is an image compression algorithm that significantly reduces the file size of the original image. Common software that is used to view .jpg files is Adobe Photoshop, Preview for Mac, and Photos for Windows, (for more information on .jpg files, please visit https://www.file-extensions.org/jpg-file-extension).

timewindow.zip:
This collection contains 28 .mat files. 24 files are titled Results timewindow(1, 2, 3, 4)ratio(25, 30, 35, 40, 45, 50).mat (eg. Results timewindow2ratio35.mat), and the remaining for files are titled vrp_TimeWindow(1-4).mat. The .mat file type is a Microsoft Access file, which can be opened with Access, (for more information on .mat files and software, please visit https://www.file-extensions.org/mat-file-extension).

timewindow_pics.zip:
This collection contains 51 .jpg files, titled timewindow(1-4).jpg or timewindow(1, 2, 3, 4)ratio(25, 30, 35, 40, 45, 50)(graph or passagers).jpg (ep. timewindow3.jpg, timewindow2ratio40graph.jpg, or timewindow4ration25passengers.jpg). this naming structure corresponds with the .mat files in timewindow.zip and show graphs that are likely derived from the data found in the corresponding .mat file. The .jpg file format or JPEG is an image compression algorithm that significantly reduces the file size of the original image. Common software that is used to view .jpg files is Adobe Photoshop, Preview for Mac, and Photos for

Windows, (for more information on .jpg files, please visit https://www.file-extensions.org/jpg-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 http://hdl.handle.net/11603/12127 on 2019-10-03. 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.