

Joint optimization of school bus routes and last mile services

Introduction

Many DMPs include an introduction. If your DMP includes an introduction, add it here.

School bus routing across multiple districts requires the coordination of many resources. In this project, we plan to understand the challenges in current school bus routing through a partnership with Allies for Children, and improve the mobility of students via decision analytical models and deployment of information technology tools. Our main focus is to find efficient, safe, and implementable multi-modal transportation methods to help children move to and from schools. Last-mile and first-mile transportation is an existing problem in this context, due to the 1-2 mile walking distance between home and bus stops for some students, which poses safety and accessibility concerns. Our goal is to design an analytical model to support the joint optimization of bus routes and last-mile and first-mile mobility services for students, and provide a deployment technology that can help connect students, parents, buses, and ridesharing services to achieve reliable transportation.

Types of data produced

Types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project. Click on box size (small | medium | full) for detailed guidance.

Data related to the transportation of students will be obtained from school districts and transportation providers, including (and not limited to): Clairton City, Duquesne City, East Allegheny, Gateway, McKeesport Area, Penn Hills, Plum Area, Riverview, South Allegheny, West Mifflin, Wilkesburg Borough, and Woodland Hills.

Main datasets include school information, demographic data, location data, movement data, and time data, service provider data -- including but not limited to:

- Number of nonpublic and charter students receiving transportation.
- Location of each school
- School district boundaries
- School attendance record
- Start and end times of schools
- Student addresses
- Age/grade of student
- Student interaction data (incidents on buses and other shared vehicles)
- Hazardous routes deemed by state
- Starting and ending school
- Routing parameters
- Weather information
- Last-mile company (e.g., Z-Trip) driver schedules
- Bus schedules
- Candidate bus stop locations
- Constraints and preferences on the max and min number of students on buses and other vehicles
- Current public, chartered, and nonpublic bus service summary
- Port Authority data related to the routes and as deemed necessary
- Survey data from students, schools, families, and service providers regarding the service quality, job satisfaction, and performance

Data and metadata standards

Standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies). Click on box size (small | medium | full) for detailed guidance.

Data are to be stored in standard CSV and XML formats for quantitative and survey datasets respectively. Geospatial data will be marked with Federal Geographic Data Committee (FGDC) standards, and survey data will be marked with Data Documentation Initiative (DDI) standards as needed.

Policies for access and sharing

Policies for access and sharing; Provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements. Click on box size (small | medium | full) for detailed guidance.

Public-use data files:

Data collected from this research will be shared under the appropriate guidelines for academic publication and research collaboration (e.g., KiltHub). Direct and indirect identifiers will be removed to minimize disclosure risk. Users with appropriate credentials and accessing from authorized IP addresses of member institutions will be able to access and re-use the data after agreeing to the appropriate data usage terms of use.

Restricted-user data files:

These files are distributed in those cases when removing potentially identifying information would significantly impair the analytic potential of the data (e.g., location data for routing). Users (and their institutions) must apply for these files, create data security plans, and agree to other access controls.

Timeliness: Some data repositories (KiltHub) may have the optional delayed dissemination policy, under which the PI has the option to not allow public access to further reduce disclosure risk.

Policies for re-use, redistribution

Policies and provisions for re-use, re-distribution, and the production of derivatives. Click on box size (small | medium | full) for detailed guidance.

Public-use data can be re-used and re-distributed with the compliance of guidelines of the publishing platforms.

Restricted-use data will be available for re-use with the agreement of partner organizations.

Plans for archiving & preservation

Plans for archiving data, samples, and other research products, and for preservation of access to them. Click on box size (small | medium | full) for detailed guidance.

Long-term preservation of data and publications will be considered and preferred while considering the options for data, publication, and deployment options. This requires the commitment of provider platforms and academic institutions to the management of successive iterations of the data and media.

Software Sharing Plan

Some NSF solicitations require software sharing plans in the DMP. Please check with your specific solicitation for this requirement.

Principal investigators and their institutions hold the copyright for the research data and software they generate and produce, and the software usage will be given limited access during the pilot phase, and broader usage access will be given after appropriate modifications and mutual agreements between the aforementioned institutions and partner organizations.