Big Data in Multimodal Trip Planning

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Get To Know Moovit

Moovit simplifies urban mobility all around the world
8 Billion people
1 Billion cars
Introducing Moovit

Moovit operates the world’s #1 urban mobility app on iOS, Android and the Web

Moovit owns the world’s largest repository for mobility data

Mobility as a Service solutions private-label and real time vehicle location
World's #1 urban mobility app

400 Million Users

- 45 Languages
- 90 Countries
- 2700 Cities

As of April 2019
7,000+ Transit Operators
5.6+ Million Bus/Train Stops
5+ Billion Daily passenger reports
As of April 2019
Public Transit Data
Multimodal Trip Planner for the metro area

Real-Time & delays

Combining Taxi / Carpool / Car sharing / Bikes / Bike sharing
Moovit Public Transit Data

- GTFS - static data (Routes, Stops, Trips, Shapes, etc.)
  - GTFS feeds (1,010) and Mooviters Community (650)

- Real-time - when is the bus arriving at a station OR current bus location (1,120)
  - Formats: GTFS RT, GPS location feed (from the AVL), Next arrival API
  - Types: Location based RT data - Moovit prediction algorithm | ETA

- Service Alerts (3,100 connected feeds)
Moovit Public Transit Data - Short Term Changes (STC)

- Converting Service Alerts (automatically or manually) to actual effect on data
- Data change effects are propagated to all systems / apps / APIs

<table>
<thead>
<tr>
<th>No.</th>
<th>Change Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bypass Stop(s)</td>
<td>One stop or more are not active, and the public transportation is skipping them. Bypass stop(s) at the beginning: One stop or more at the beginning of the route are not active, and the public transportation is skipping them. Bypass stop(s) at the end: One stop or more at the beginning of the route are not active, and the public transportation is skipping them. The headsign of the line will also be changed.</td>
</tr>
<tr>
<td>2</td>
<td>Detour</td>
<td>The public transportation is using other stops to perform a detour between two stops on the route. If there are stops between these two stops, then they will be removed from the trip pattern. Detour at the beginning: The first stop(s) will be replaced by the detour stops.</td>
</tr>
<tr>
<td>3</td>
<td>Split</td>
<td>One stop or more are not active, and the line is split into two lines - one that starts in the original starting stop and ends before the inactive stop, and another that starts after the inactive stops and ends in the original ending stop.</td>
</tr>
<tr>
<td>4</td>
<td>Cancel trip(s)</td>
<td>One trip or more are canceled.</td>
</tr>
</tbody>
</table>
Moovit Micro Mobility & Car-Sharing Data

- Micro Mobility
  - Docked bikes (280 connected feeds)
  - Dockless bikes, scooters, mopeds (170 connected feeds)
- Car-Share (15 connected feeds)
- Walking
Moovit Mobility Data Model

- Route
- Trip
- Stop Times
- Shape Parts
- Agency
- Services
- Shape
- Stop
- Line
- Line Group
- Trip Group
- Trip Pattern
- Trip Time Pattern
- Stop Shape Segment
Trip Plan

Multimodal Trip planner combining public transit, biking, walking, carpool, taxi, Uber & more
Trip Plan - Overview

- Moovit Trip Plan engine is a proprietary engine optimized for Public Transit
- Multimodal trip planning: Public transit, Walk, Bike, Ride hailing, Scooters, Parking, Micro-mobility
- Next generation of the Moovit Trip Plan will integrate to TomTom (Or any other Car trip plan provider with Traffic data) in order to include Multimodal with car & parking.
Trip Plan - Leg Types (segments)

- For public transit legs - Tram, Subway, Rail, Bus, Ferry, CableCar, Gondola, etc.
- Walk, Bike, Scooters
- PathWayWalk - a walk within an area (e.g. central station) ⇒ Unique to Moovit
- Wait
- WaitOnVehicle - a leg between 2 public transit legs, in which the line number has changed, but the physical vehicle remains the same, and it is only changing its physical line number. This is in order for the user to know that although there’s a change in the line number, he shouldn’t get off the public transit vehicle. ⇒ Unique to Moovit
- Coming soon - Car, Park
Smart Connection Stops Algorithm

- Moovit Trip Plan engine locates a list of potential stops, according to:
  - Max distance
  - Parking locations
  - Best PT potential (based on RT, statistical and static data)
  - User preferences and usage history
Connection Stops Availability

Filter list of potential stops according to:

- Service alerts & Disruptions
- Parking availability
Matrix Results

- For each of the potential stops run Matrix Search
- Take into account returned time in order to start comprising full suggested routes results
Moovit Public Transit Trip Plan

- Perform parallel trip plans from each stop at different departure times based on results
- Take into account RT and statistical data
1st Leg Options:
- Private Car ⇒ Parking ⇒ PT
- Private Car ⇒ Drop-off at any PT station ⇒ PT
- Private Car ⇒ Drop-off at specific location ⇒ PT
- Go to nearby Car-Share location ⇒ Car-Share ⇒ Leave at valid location ⇒ PT
- No 1st car leg (start with PT)

Last Leg Options:
- PT ⇒ Car-Share
- PT ⇒ Private Car pick-up from any PT station
- PT ⇒ Private Car from a specific location (e.g. previously parked)
- No last car leg
Insights about where, when and how people move around the city

Better transportation and infrastructure planning!
How it works

People movement
User attributes
Transit data
Additional info

Moovit Urban Mobility Analytics

Exportable Data & Results Visualization
Origin - destination matrices
Transit insights
Framingham/Worcester line and station analysis
Transit On Demand

Wide and Narrow Corridors - Case Study
Moovit Urban Mobility Analysis (MUMA)
Thank you!

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