

A Wheelie Good Time: Safe Biking in Denver

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Motivation

- **Department of Transportation and Infrastructure's Denver Moves: Bicycles Program**
 - Adding 125 miles of bike lanes by 2024
 - Extending current bike paths
 - 60% of Denver residents are “interested but concerned” in bike commuting
- **Promoting Eco-friendly Transportation**
 - Denver is planning e-bike grants
- **Improving Biking Safety**

Types of Paths



**Shared Use Path
(Shown: Cherry Creek
Trail)**

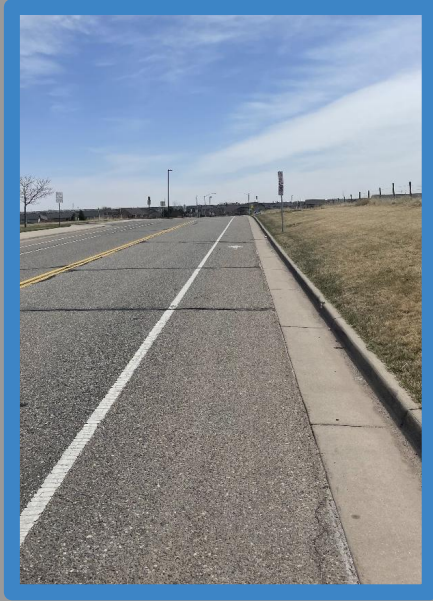


**Neighborhood Byway
(Shown: Harvard Gulch)**



**Protected Bike Lane
(Shown: Marion St Pkwy)**

Types of Paths



Unprotected Bike Lane



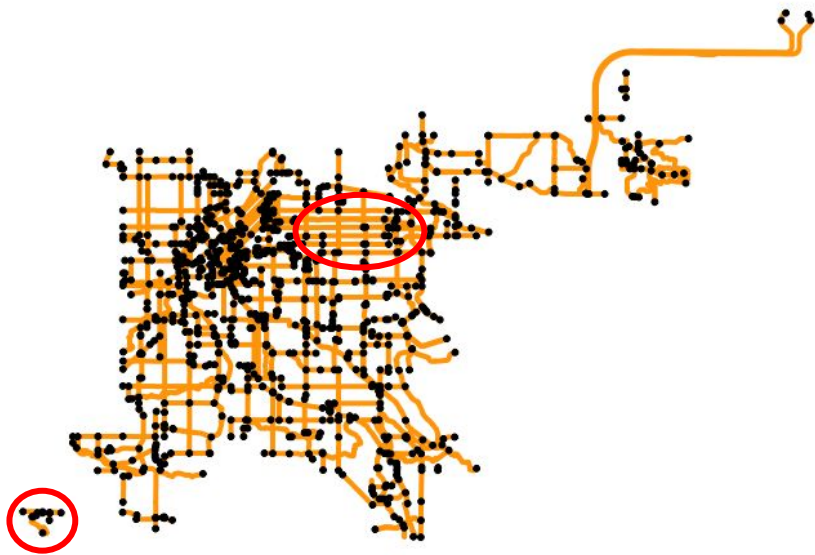
Shared Road

Data

- **Current bike paths in Denver**
 - Lat/Long
 - Type of path
 - Start and end street names (if applicable)
- **Additional Info and Adjustments**
 - Find intersections
 - Combine nodes
 - “Smooth” data
 - Compute distances (in meters)
 - Convert path type to categorical data

Network

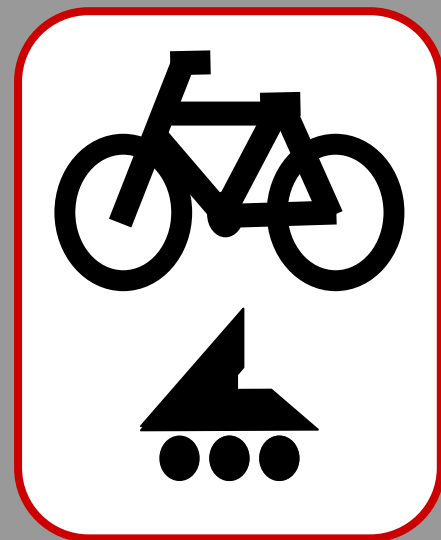
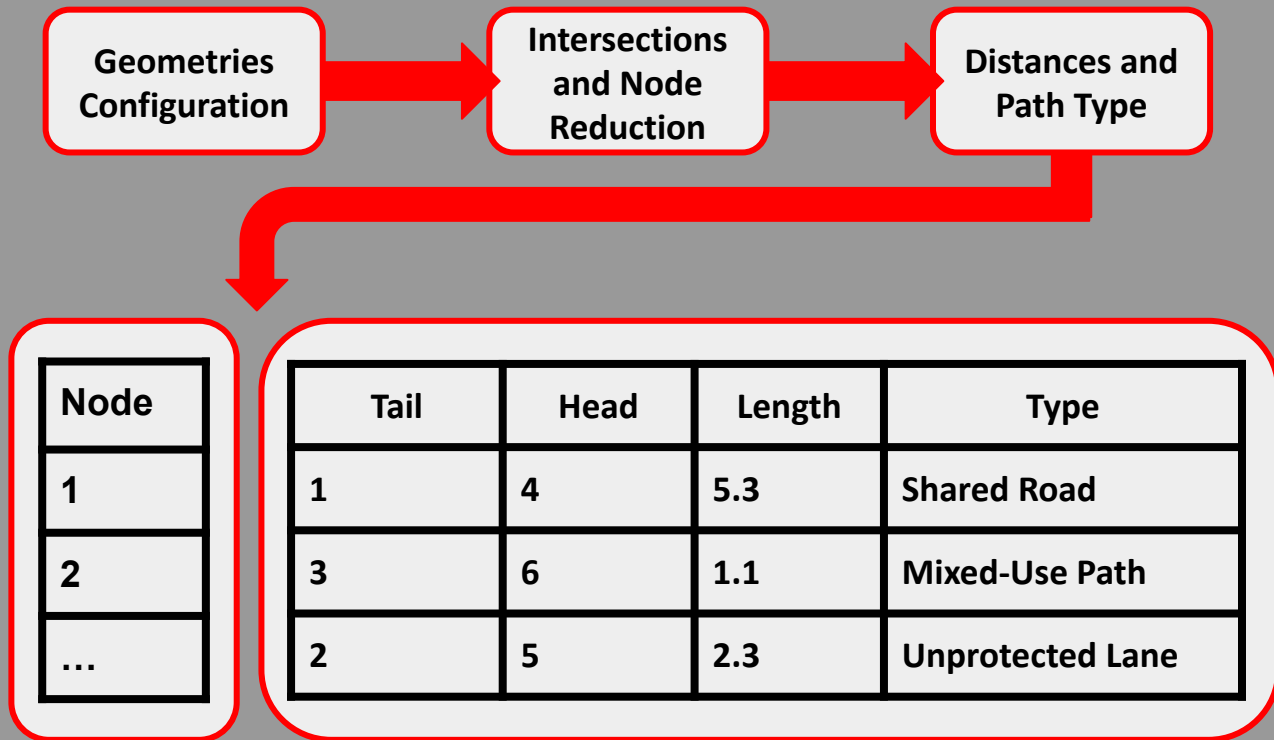
Uncleaned Network of Bike Lanes



Cleaned Network of Bike Lanes

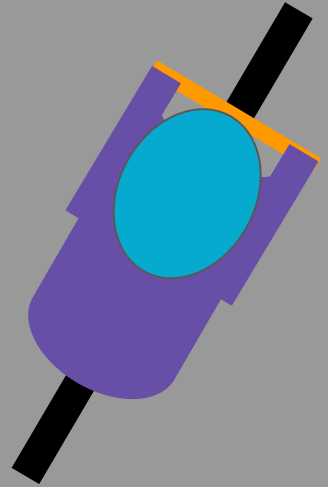


Data Processing and Sample



Algorithms

- **Shortest Path & T-Constrained Shortest Path**
 - Paths to key areas of Denver (ex. Auraria Campus, City Park, DU, Five Points, 16th St Mall)
 - T is a “risk tolerance”
 - Set $T_{SR} = 5$, others similarly
 - Find paths where $\text{length} * T$ at most 10
 - Compare distance of shortest path to T-constrained shortest path
 - Large disparities imply locations for new/upgraded bike lanes



References

1. Ahuja, R. K., Magnanti, T. L., & Orlin, J. B. (1993). Network flows: Theory, algorithms, and applications. Prentice-Hall.
2. Brasch, Sam. “Trying to Electrify Your Home, Add Solar Panels or Buy an e-Bike? Denver Wants to Help Pay for It.” *Denverite*, Denverite, 15 Apr. 2022, <https://denverite.com/2022/04/14/trying-to-electrify-your-home-add-solar-panels-or-buy-a-n-e-bike-denver-wants-to-help-pay-for-it/>.
3. *Denver moves: Bicycles program*. City and County of Denver. (n.d.). Retrieved April 11, 2022, from <https://www.denvergov.org/Government/Agencies-Departments-Offices/Agencies-Departments-Offices-Directory/Department-of-Transportation-and-Infrastructure/Programs-Services/Bicycles>

Questions

