Bike Path AI

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Sprint 0

Why Urban Cyclists Need Smarter Routes

Current Issue: Apps prioritize speed over safety/scenic value (e.g., Google Maps suggests high-traffic roads).

Pain Points:

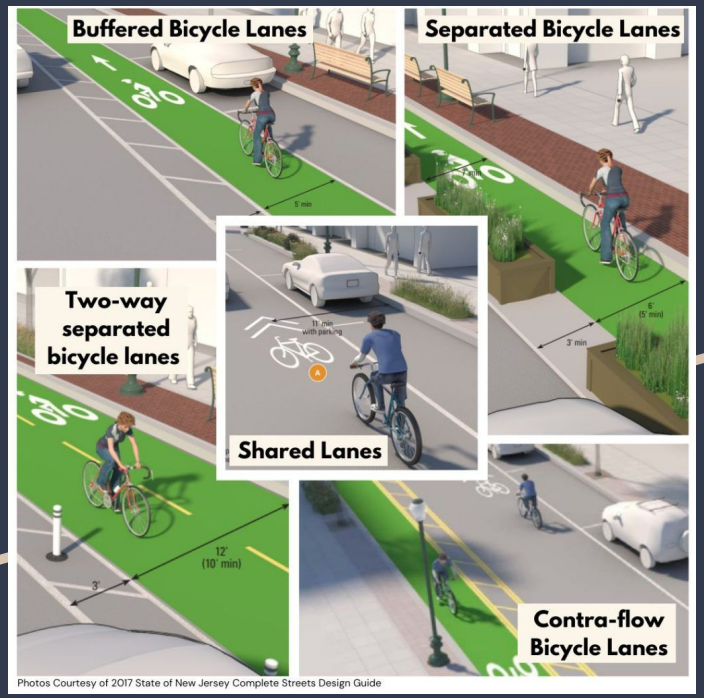
- Dangerous routes (lack of bike lanes, steep hills)
- Missed opportunities for pleasant rides (scenic paths, amenities)

Opportunity: AI-powered route optimization combining safety, efficiency, and enjoyment.

Stakeholders: Cyclists, city planners, local businesses, environmental advocates.

Visual: Side-by-side comparison of a "fast" vs. "safe/scenic" route in NYC.

Building a Smarter Bike Route Planner



Core Features:

- Safety Score: Bike lane type (1.0–3.0), street width, traffic direction.
- Pleasure Score: Elevation gain (gentle slopes), proximity to parks/waterfronts.
- Efficiency: Balanced with safety (not just shortest path).

Methodology:

- Graph-based routing (Dijkstra/A*) with multi-objective optimization.
- ML to weight preferences (e.g., "Avoid hills" vs. "Prioritize bike lanes").

Transforming Urban Cycling

For Cyclists:

- 30% fewer accidents (estimated via safe route adoption).
- Increased ridership through enjoyable routes.

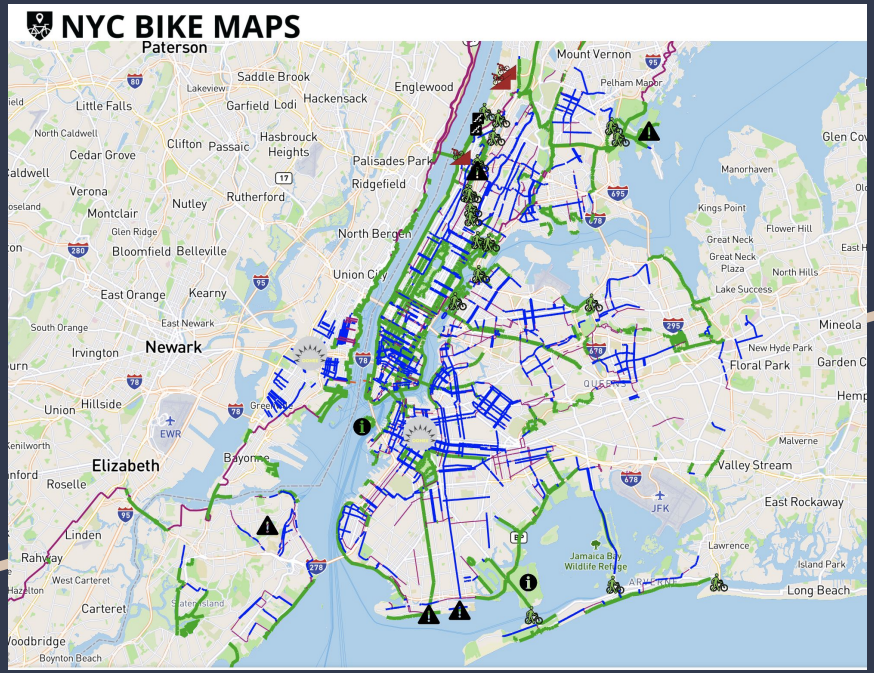
For Cities:

- Data-driven bike lane expansion insights.
- Reduced traffic congestion/carbon emissions.

For Businesses:

- Increased foot traffic from scenic route recommendations.
- Visual: Bar chart showing projected reduction in accidents or CO_2 savings.

What NYC Streets Tell Us



Dataset: Kaggle dataset based on NYCDOT streets (speed limits, bike lanes, elevation).

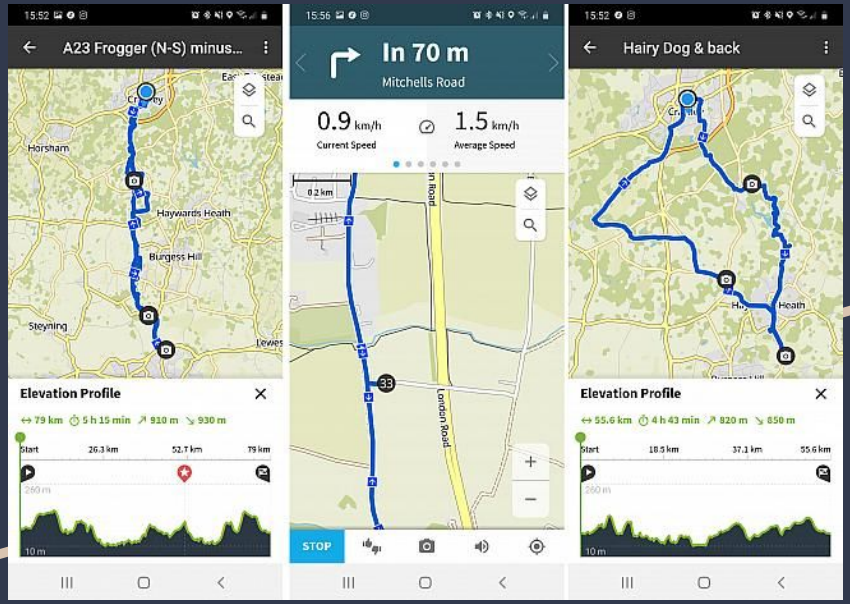
EDA Insights:

- Only 15% of streets have bike lanes (mostly type 2.0 protected).
- Bike lanes cluster in flat areas (Manhattan/Brooklyn).
- High-risk gaps: No bike lanes on 80% of wide streets (potential expansion targets).

Data Gaps: Missing bike lane coverage in outer boroughs.

# st_width	# bike_lane	bike_traf_dir	traf_dir	# rw_type	# start_contour	# end_contour
0 – 300	1 – 9	[null] 91% TW 4% Other (5456) 5%	TW 52% FT 25% Other (24494) 23%	1 – 13	4 – 99	4 – 99
35			TW	1	13	13
50	2.0	TW	TW	1	13	13
42			TW	1	13	13
40			TF	1	13	13
36			TW	1	13	13
30			TF	1	13	13
30			TF	1	13	13

From Data to Rideable Routes



Data Enrichment:

- Merge with amenities data (parks, cafes) via Google Places API.
- Add user-reported preferences (crowdsourced safety ratings).

Feature Engineering:

- Composite "Safety Score" (bike lane type × street width).
- "Scenic Score" (elevation smoothness + nearby POIs).

Baseline Model:

- Weighted graph traversal (prioritize safety scores first).
- Compare to Google Maps' routes for validation.