Analysis of Bicycle Facilities in Reno/Sparks

Dian Mao
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Outline

• Introduction
• GPS Track Data Analysis
• Slope Data Analysis
• Conclusion
Introduction

• Existing problem
  – Hard to tell where bikers are
  – Can’t get bikers’ info (age, sex)

• What did RenoTracks do
  – Track biker’s route using GPS (from Nov, 2013 to Aug 2014)
  – Collect biker’s info (fill by personal will)
  – Report useful info for both bikers and city planners
RenoTracks
http://renotracks.nevadabike.org
Existing Data

Map Options
- Trips
- Streets
- Notes
- Parks
- Existing Lane
- Existing Path
- Popular Ride
- Planned Complete St
- Proposed Facility

Visualizing 1462 trips and 3339678 collected data points.
Introduction

• What did this research do
  – Convert GPS tracks to bicycle counts
  – Recognize popular ride using RenoTracks data and compare with RTC popular ride
  – Analyze utilization of existing bike facilities
Analysis

WHERE TO BIKE?

• Bike Volumes on Road Network
• Popular Bicycle Rides
• Slope Analysis of Bike Lanes/Paths
• Most Frequent Trip Distance by Bike
• Miles Traveled on Existing Bike Facilities
Bike Volumes on Road Network

Major Steps:

1. Buffer intersection
2. Erase tool
3. Multipart to Singlepart
4. Near tool
5. Calculate bike volumes

RenoTracks raw GPS tracks

Erase

Erased GPS tracks

Multipart To Singlepart

GPS tracks segments

WC road with near ID

Near

Washoe County road network

WC road with link volume

Join Field

Link volume count

Summary Statistics
Bike Volumes on Road Network

1. Buffer intersection
2. Erase tool
Bike Volumes on Road Network
## Bike Volumes on Road Network

### 3. Multipart to Singlepart

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Bike Volumes on Road Network

• 4. Near tool

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Bike Volumes on Road Network

- 5. Calculate bike volumes
Reno-Sparks Bike Counts Demo
Most Frequent Trip Distance by Bike

Trip Frequency v.s. Distance

Trip Distance (mile)

Number of Trips

0 20 40 60 80 100 120 140 160 180 200

< 1 1-2 2-3 3-4 4-5 5-6 6-7 7-8 8-9 9-10 10-11 11-12 12-13 13-14 14-15 15-20 > 20

89 166 181 110 77 43 47 46 53 34 23 24 38 28 10 103 83

fppt.com
Miles Traveled on Existing Bike Facilities

- 55% of 3795.26 miles were traveled on existing bike facilities.
- 45% of 3122.17 miles were tracked outside existing bike facilities.
Popular Bicycle Rides

- Select street volume count > 40
- Select based on RTC existing bike lanes/paths
- Connect bike lanes/paths
Popular Rides in Reno-Sparks, NV
RTC vs. RenoTracks

Legend
- Green: RenoTracks Popular Rides
- Orange: RTC Popular Rides
Slope Analysis of Bike Lanes/Paths

- 10m resolution DEM file to generate slope
- *Extract by mask* to get bike lane slope data from slope data
- Using percent rise to measure bike lane’s grade

\[
\text{Degree of slope} = \theta \\
\text{Percent of slope} = \frac{\text{rise}}{\text{run}} \times 100 \\
\frac{\text{rise}}{\text{run}} = \tan \theta
\]

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Conclusion

• RTC popular ride needs to be rectified based on RenoTracks Data
• Only 45% of total miles traveled on existing bike facilities, further improvement are needed
• Slopes have strong impact on cyclists’ route selection, percent of slope greater than 10% should be avoided in future design
Questions?