NEBRASKA
Good Life. Great Journey.
DEPARTMENT OF TRANSPORTATION

Executive Summary, Research Readiness Level Assessment, and Technology Transfer

A Big Data Approach for Improving Nebraska Cycling Routes

Research Objectives

1. Provided a framework for performing a detailed analysis of bicycle counters data extracted from Strava Metro data. This analysis informed the research team about cycling behavior and helped to provide NDOT will greater context for cycling choices to ultimately improve planning and decision making around bicycle planning in Nebraska.
2. Provided information that integrated into existing available databases, such as the NDOT geographic information system (GIS), to provide NDOT with ways to visualize bicycle activity geographically.

Research Benefits

Cycling is a sustainable and active mode of transportation, especially for college towns such as the city of Lincoln and has numerous benefits on the environment and people's health.

The outcome of this project provided NDOT with new data that can be used to understand current cycling routes traffic and helped to design new cycling routes.

This data and the comprehensive information it provides allowed NDOT to make decisions by analyzing user metrics rather than relying on qualitative information or speculation.

Principal Investigators

Fadi Alsaleem (P.I.)
Daniel Piatkowski (Co P.I.)
University of Nebraska

NDOT Lead TAC Member

Ryan Huff, Chief Strategy Officer

Background

Across the United States, cycling has become increasingly popular as users shift travel modes amid concerns of health, physical activity, air and environmental quality, and in an effort to escape roadway congestion. Despite this, the infrastructure in the U.S. (including Nebraska) traditionally caters to automobile traffic; which can hinder cycling activity due to safety concerns. A major challenge for bicycle infrastructure planning is the lack of data. Data is needed to accurately assess the attributes of present assets and to inform additional planning to more fully integrate bicycles into our transportation system.

The goal of this project was to provide a comprehensive knowledge of current cycling routes in Nebraska by utilizing big data (more specifically, Strava Metro data). This knowledge can help the Nebraska Department of Transportation (NDOT) to make better-informed decisions to improve bicycle infrastructure planning .

Conclusion

The research team found a strong association between Strava and counter data in Metro areas, for all cyclists at a specific location. Also, the investigation found a correlation between weather conditions and cycling, where the average outside temperature has the most significant effect. However, other factors influence cycling activities like rainfall, wind speed, thunderstorms, and fog in different extents. Weekends and weekdays showed different cycling patterns during peak hours, explained by the fact that most people cannot ride their bike in working hours. The spatial analysis showed that cycling is profoundly affected by the existence of cycling infrastructure. Also, it showed that trails are the most used for recreational activities.

Additionally, including bike lanes and signing within the roadway right of way are the most used for commute purposes. Moreover, the added bike lanes in Lincoln between 2017 and 2019 showed a significant rise in cycling activities. In Omaha, the research showed a significant increase in cycling activities because of the installation of signed bicycle routes. All in all, the research serves to demonstrate the accuracy of Strava cycling data in Nebraska. Furthermore, it demonstrated where and how cyclists choose their routes, which can inform NDOT planning activities around active transportation.

RESEARCH BRIEF

Executive Summary, Research Readiness Level Assessment, and Technology Transfer

NDOT Recommendations Based Off of Research Project

For NDOT, this work provided new data that can be used to understand traffic on current cycling routes and help to design new and safer cycling routes. The Department proposes a Phase II study to address the following:

- Validate Strava in rural areas using MioVision -(Portable camara that can be use for a quick corridor snapshot or permanent 24/7 traffic data collection)
- Investigate, accuracy, cost, etc. of data collection service options
- Get Strava data into a useable format – Geographic Information Systems (GIS)
  - Perform a gap analysis with the GIS data set - where are the "gaps" between the nearest Trails - consider those routes, perform a field review - partner with Traffic Engineering to consider signage
- Provide validation data to Lincoln and Omaha – The validation will provide an evidence base for decision-making regarding investments in safety bicycle infrastructure.

- As provided by Ryan Huff, Lead TAC Member

Research Readiness Level (RRL) Assessment
Level : Applied Research/Proof Concept
More supported Research is needed

RRL 2

Technology Transfer

Poster Sessions/Presentations
- Poster Session: Quantifying the effect of signage on bicycle ridership, 100th TRB Annual Meeting.
- Poster Presentation in the BikeWalk Summit in October 2019

Published Webinars/Presentations
- An Analysis of Nebraska Strava Data (Bike Walk Nebraska) on February 1st, 2021: https://www.facebook.com/events/900629174082985/

Published Journal Papers And Theses/Dissertation
- Quantifying the effect of modest interventions to promote bicycling using crowdsourced data. Accepted with revisions to Environment and Planning B: Urban Analytics and City Science journal

TV Interviews and News Articles
- https://www.1011now.com/content/news/UNL-researchers-using-thermometer-data-to-track-how-social-distancing-impacts-COVID-19-571117171.html
- https://www.klkntv.com/unl-researcher-using-smart-thermometer-data-to-track-covid-spread/
- https://news.unl.edu/newsrooms/today/article/project-investigating-fever-related-data-as-early-indicator-of-covid-19/

This brief summarizes Project SPR-P1 (19) M095
"A Big Data Approach for Improving Nebraska Cycling Routes"
Nebraska Department of Transportation Research Program

RESEARCH BRIEF