ANALYZING BIKESHARE ACTIVITY USING BINGMAP API

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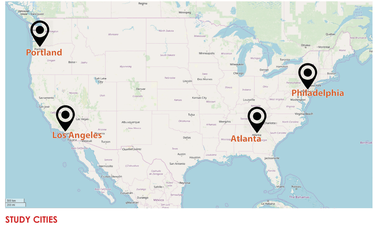
ABSTRACT

This study visualizes bike-share activity using public data for Atlanta, Portland, Los Angeles and Philadelphia. Utilizing the routing function in BingMap API, the hotspot, and route assignment results are presented through ArcMAP along with further connectivity analysis.

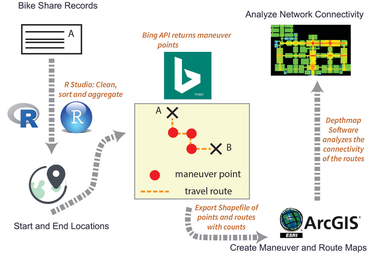
KEY POINTS

- This study inputs latitude/longitude data of every bike trip from January to June 2018 from bike-share operators in Atlanta, Portland, Los Angeles and Philadelphia. The data is organized and cleaned up using a R script, and the route assignment between each origin-destination pair is calculated using the BingMAP API tool. This poster will present the following outputs:

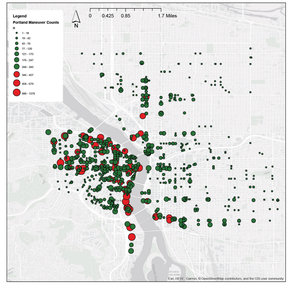
- 1. Estimation of bike-share popularity of the four cities.
- 2. The bike-share connectivity maps of the bike routes of the four cities using Depthmap Software.
- 3. The route density/count maps and maneuver point density/count maps of the four cities.



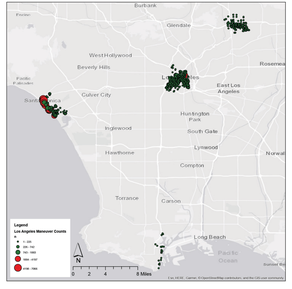
STUDY CITIES



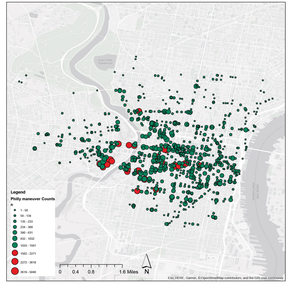
METHODOLOGY DIAGRAM[1]



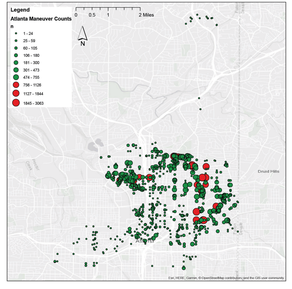
PORTLAND BIKE SHARE ACTIVITY MANEUVER POINT COUNTS MAP[2]



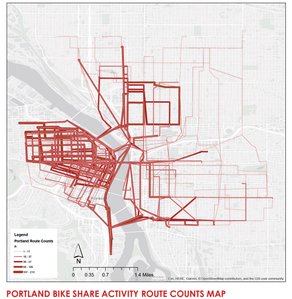
LOS ANGELES BIKE SHARE ACTIVITY MANEUVER POINT COUNTS MAP[3]



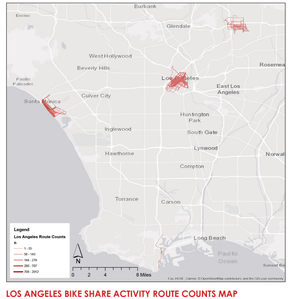
PHILADELPHIA BIKE SHARE ACTIVITY MANEUVER POINT COUNTS MAP[4]



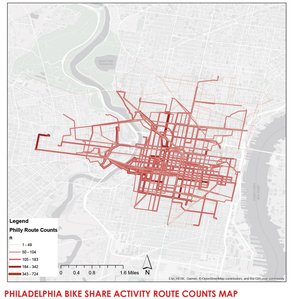
ATLANTA BIKE SHARE ACTIVITY MANEUVER POINT COUNTS MAP[5]



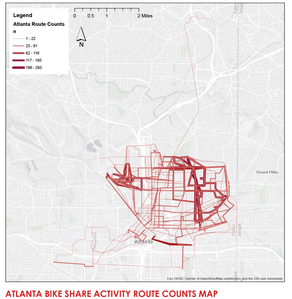
PORTLAND BIKE SHARE ACTIVITY ROUTE COUNTS MAP



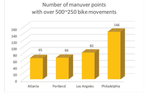
LOS ANGELES BIKE SHARE ACTIVITY ROUTE COUNTS MAP

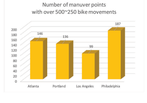


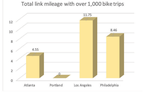
PHILADELPHIA BIKE SHARE ACTIVITY ROUTE COUNTS MAP

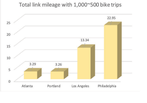


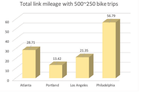
ATLANTA BIKE SHARE ACTIVITY ROUTE COUNTS MAP

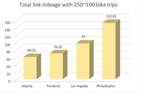












Acknowledgments and References

1. Thanks to Professor Tim Welch at Georgia Institute of Technology for his assistance on R scripting.
2. Portland Biketown Program. https://www.biketownpdx.com/
3. Los Angeles Smart Metro Bike Program. https://bikeshare.metro.net/
4. Philadelphia Indego Bike Share Program. https://www.rideindego.com/
5. Atlanta Relay Bike Share Program. http://relaybikeshare.com/
6. Depthmap User Manual. http://discovery.ucl.ac.uk/1415080/1/Al-Sayed_SpaceSyntax-manual_2018.pdf

Other References:
Bing Map API. https://www.microsoft.com/en-us/maps/choose-your-bing-maps-api
Open Street Map Basemaps. https://www.openstreetmap.org

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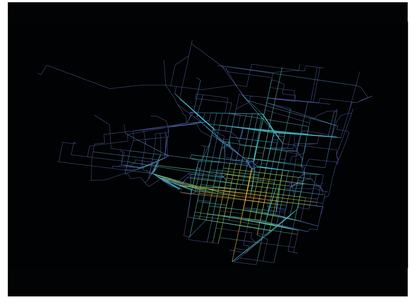
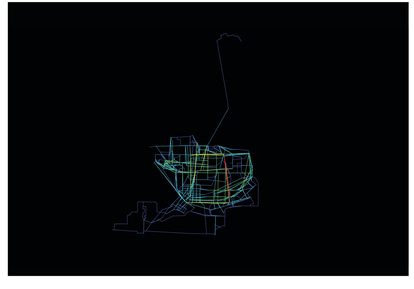
Route Connectivity

Lower Connectivity — Higher Connectivity



For the City of Philadelphia, it is very obvious that the central streets have better connectivity and surrounding streets have lower connectivity.
Broad Street is the north-south major corridor of the city, as well as the street with highest connectivity in this direction. Rather than Vine Street or Market Street, Christian Street has the highest connectivity within the east-west direction streets. Overally, Philadelphia has the best bike route connectivity among the four study cities.

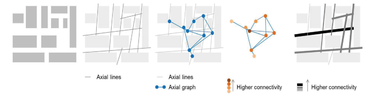
STREET CONNECTIVITY MAP OF PHILADELPHIA

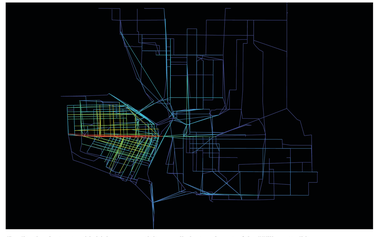


For Atlanta, the scope of area that bike share activities cover is not as big as other cities. The street that has the best connectivity is the east side BeltLine trail, a connected ring of trails and green spaces around central Atlanta.
10th Street and North Avenue also have higher connectivity. Ferst Drive in Georgia Tech campus has good connectivity. All other streets have lower connectivity. This make the overall bike route connectivity performs worse than Portland and Philadelphia.

STREET CONNECTIVITY MAP OF ATLANTA

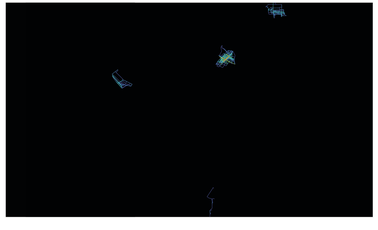
"An example for how an urban area might be represented using the Space Syntax model is demonstrated in the figure below. The urban space (a.) might be represented by the set of fewest, longest, and walkable axial lines (b.), the axial lines are then represented by a graph (c.), the different Connectivity (degree) values for each vertix is then highlighted; vertices that have more connections to their immediate neighbours will have higher Connectivity values (d.), these values of Connectivity are then illuminated on the axial map to reveal the local network structure of street spaces (e.)."[6]





For Portland, streets with higher connectivity are all clustered west of the Willamette River.
Burnside Street, as the major corridor of the city connecting the east and west, obtains the highestsreet connectivity in this study. Along Burnside Street, 17th, 18th, and 19th Street have higher connectivity values than other streets going north and south.

STREET CONNECTIVITY MAP OF PORTLAND



Bike routes in Los Angeles are spread out into four areas: Downtown, Santa Monica, Long Beach, and Pasadena. These areas are disconnected. Streets with higher connectivity value are mostly clustered in the Downtown area.
All other streets have lower connectivity values. The overall connectivity of the bike routes is not as ideal as Portland.

STREET CONNECTIVITY MAP OF LOS ANGELES