

Bike Share in Seattle Visualisation

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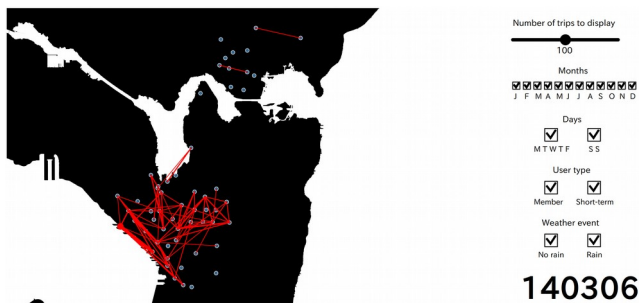
ABSTRACT

Shared bike systems are becoming more widespread around the world. Indeed, for a trip of less than 3 km in a city, the bicycle is the most effective means of transport. Shared bicycle systems help to prevent theft and mechanical problems. The City of Seattle launched its system on October 13, 2014 with 500 bicycles and 50 stations so -called "Pronto! ". To rent a bike, you can either be a member or buy a single ticket. It may be interesting to visualize on a city map the overall use that is made of this system. We created a visualization of the most frequent trips in 2015 with different filters to better understand the different profiles of users.

Keywords: Transport, bikes, trips visualization.

1 INTRODUCTION

One of the major challenges of station management is to ensure the correct distribution of bicycles. Indeed, the system becomes ineffective when several stations are empty and others full because users can no longer rent bicycles or place theirs at a terminal. Thus, in order to better manage this service, it is important to understand users' usage precisely in order to adapt the number of bikes per station, the number of stations, or the number of bicycles in circulation. It is in this context that we propose a visualization of the frequent trips associated with different filters allowing a qualitative approach to the use of the network.



2 THE DATASET

The dataset from which the visualization is based comes from Kaggle. For each trip, we have the following information: Trip ID, Start Time, Stop Time, Bike ID, Trip Duration, From Station Name, To Station ID, User Station, Gender, Birthyear. This is what allows us to make filters to analyze the behaviors of users. The dataset also included a list of stations with their GPS coordinates, as well as the weather in Seattle over the same period as the trips. We have simplified the weather file by keeping only the event "rain" or "not rain". The only full year was 2015, that's why we kept only this period for the visualization.

3 OPERATION

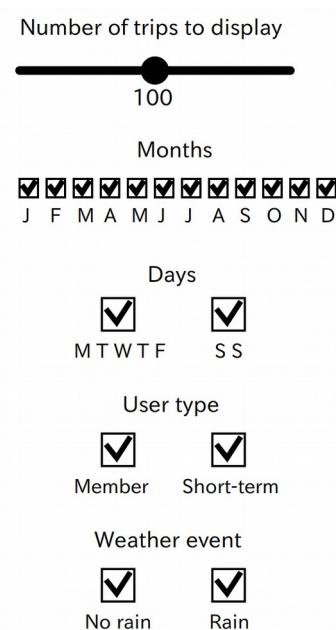
3.1 The most frequent trips

We were interested in the most frequent trips. We considered all the possible station pairs, including A A type pairs. We also distinguished A B and B A. By browsing the trips file once, we add the trip to the corresponding pair of stations. We then sort this list and display the first n most frequent trips; n being set by the slider. The thickness of the line is proportional to the number of paths. The paths of type A A are simply represented by a red circle on the station.

3.2 Filtering

The display of the most common routes gives an overview of the use of the network but for a deeper understanding of the habits of the users, it is important to filter the data. We have the possibility to choose the months, the week or the weekend, the type of user, and the rain event or not. The filtering is done using checkbox, which allows to choose from all possible combinations (unlike the double slider).

With each modification of the value of a checkbox, all the data are traversed again considering only paths corresponding to the selected sorting criteria. The list is then sorted, then the display refreshes with a transition on transparency.



3.3 THE COUNTER

The display and the filters allow a qualitative analysis of the use of the network. We added a counter at the bottom right of the visualization displaying simply the total number of trips for the

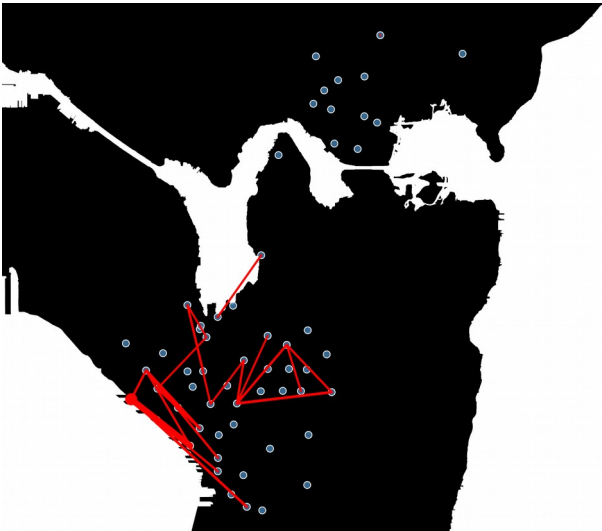
selected filters. It allows a simple and quick comparison of two situations.

140306

4 BEHAVIOR ANALYSIS

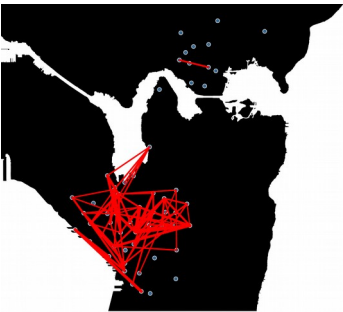
4.1 AN ACTIVITY CENTERED ON THE SOUTH OF THE CITY

Of the first 29 most frequent routes, all are concentrated in the southern part of the city. One distinguishes two clusters in the geographical distribution of the stations and those located in the north of the city are left by the users. This situation is even more marked in the summer.



4.2 TWO TYPES OF TRIPS

There is a clear distinction between pleasure trip and useful trips. For useful trips, cycling is a means of transport in the same way as the metro or the car. The leisure trips them, are often along the coast and the place of arrival is sometimes the same as the place of departure. To these two types of journeys we can distinguish two types of users: tourists who have a short time holder, who use the bike mainly on weekends and during the summer, on days when it does not rain; And the members, who use the bike mainly during the week, indifferently from the weather, and use all the stations in a homogeneous way.



Number of trips to display

101

Months

J F M A M J J A S O N D

Days

☒ M ☒ T ☒ W ☒ T ☒ F ☐ S ☐ S

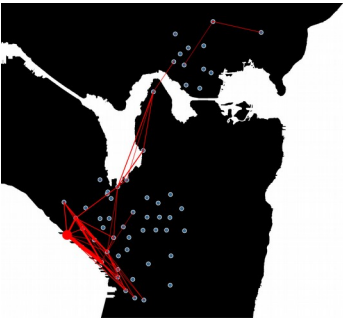
User type

☒ Member ☐ Short-term

Weather event

☐ No rain ☒ Rain

28778



Number of trips to display

101

Months

J F M A M J J A S O N D

Days

☐ M ☐ T ☐ W ☐ T ☐ F ☒ S ☒ S

User type

☐ Member ☒ Short-term

Weather event

☒ No rain ☐ Rain

17420

4.3 THE INFLUENCE OF THE SEASON

Nearly half the trips are made in May, June, July and August and four times more trips are made in July than in December. This system of shared bike remains therefore largely influenced by the season.

4 CONCLUSION

This interactive visualization prompts the user to fetch the information by modifying the filters. The fluidity of the display as well as the sober design make the use simple and pleasant. It highlights the bipolarity of network users: tourists and members.