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A Review On Bicycle Sharing System Analysis Using Data Mining

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ABSTRACT

In this paper we analyze extensive operational data from bike-sharing systems in order to derive bike activity patterns. A common issue observed in bike-sharing systems is imbalances in the distribution of bikes. We use Data Mining to gain insight into the complex bike activity patterns at stations. Activity patterns reveal imbalances in the distribution of bikes and lead to a better understanding of the system structure. A structured Data Mining process supports planning and operating decisions for the design and management of bike-sharing systems. Shared mobility systems for bicycles and cars have grown in popularity in recentyears and have attracted the attention of the operational research community. Researchershave investigated several problems arising at the strategic, tactical and operational levels. This survey paper classifies the relevant literature under five main headings: station location, fleet dimensioning, station inventory, rebalancing incentives, and vehicle repositioning. It closes with some open research questions.

Keywords: Bike-Sharing, Data Mining, Activity Patterns, survey, shared mobility systems, bicycle and car sharing, fleet dimensioning, Inventory rebalancing, vehicle repositioning.

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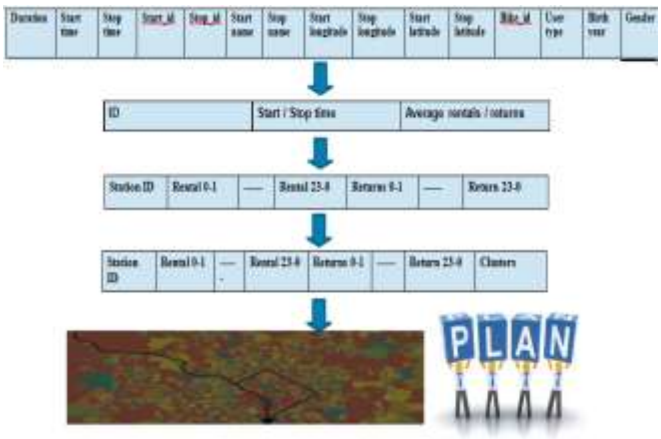
I. INTRODUCTION

The world of transportation has witnessed a mini-revolution in June 2007 with the launching of the bicycle sharing system in Paris. Initially 20,000 bicycles were deployed over1,500 free-access stations. In the year 200,000 users registered and 26 million bicycleswere rented. Since then, the phenomenon has known a considerable growth. 'was not the first bicycle sharing system, it was the first one of any major significance. TheV_elov' system in place in Lyon, which dates from 2005, is believed to be the oldest one stillin existence. However, such systems have been tested in Europe since the 1960s. Accord-ing to [32] and [48], public bicycles were first introduced in Amsterdam in 1965, within the called white bicycle plan, but most of these earlier systems ended up in failure becauseof theft and vandalism. Bicycle sharing really took o_ with the advent of communicationand information technologies which allow for automatic billing and monitoring. Today thereare currently over 7,000 bicycle sharing systems in the world, involving over 800,000 bicycles ([56]). For interesting historical accounts, see [15].In parallel, a number of car sharing systems have also been put in place. Again, the first one(Autolib') was set up in Paris in 2007. Currently the world's largest car sharing networks areZipcar with over 900,000 members and 11,000 vehicles in several countries such as Austria,Canada, France, Spain, the United Kingdom, the United States and Turkey ([58]), andCar2Go with 900,000 members and 12,000 cars in several countries such as Austria, Canada,China, Denmark, Germany, Italy, the Netherlands and the United States . NavigantConsulting (see [3]) predicts that the number of car sharing members will grow over 12million worldwide by 2020 and will generate in excess of US$ 6 billion in revenue. Accordingto the growth and expansion of car sharing systems will be fuelled by high energy costs, limited and expensive parking, improved technologies and increased demand for personal vehicle access in developing countries. The central problem faced by shared mobility systems operators is to maintain an adequate number of vehicles in every station. Indeed, too large a number can impede the return ofvehicles whereas too small a number may translate into lost demand. Locating stations, choosing the number of vehicles per station, moving vehicles between stations, inciting users1to change their destination, are all managerial decisions guided by the need to provide a good quality of service, at both end-stations. Providing efective tools to support these decisions constitutes an important motivation for researchers in this new field, especially for opera-tional researchers. However, shared mobility systems have also attracted the attention ofresearchers in other areas, such as transport economics, urban planning, sociology, and data mining, see for instance [3 and [11]. Data mining actually plays an important role in determining the values of the parameters in most of the operational research models .Our purpose is to survey the main operational research issues arising in shared mobility systems as well as the methods that have been proposed to address them. We will restrict our survey to systems made up of stations where users can take or return a vehicle. Note, however, that some car sharing systems (for example Car2Go) do not operate with stations. The shared vehicles can be bicycles or cars. To our knowledge, no other type of vehicle sharing exists. We will successively examine station location, dimensioning, station sizing, rebalancing incentives, and vehicle repositioning. For each of these topics, we provide an overview on the literature and describe one or more solution approaches that seemed important to us. This work is partially based on a preliminary survey by.

Architecture Diagram
Overview of the Process



Station location

Several researchers have studied the station location problem. have modeled the problem as a non-linear integer program which simultaneously considers the location of stations and user flows, as well as the location of bicycle lanes, with an objective function combining the operators' and users' criteria. Their model was solved by LINGO on a smallexample. [33] have formulated the problem as a joint hub location and inventory model and have expressed it as an integer non-linear program. The model was solved by CPLEX on instances containing up to 30 origins, 30 destinations and 80 candidate bicycle stations .Some researches are on real-life problems and data. [36] have presented a model to sim-ultaneously optimize the location of shared bicycle stations, the fleet dimension, and there location of bicycles throughout the day. Their model was solved through a simple relocation heuristic and was applied to data from the city of Lisbon. [31] developed a mathematical

model to locate electric car sharing stations in and around the city of Nice. The model takes into account the attractiveness of the stations to the users located in their vicinity, as well as the distance between users and facilities. The results of the model were used to make recommendations to Auto Bleu which manages the car sharing service in Nice. In particular the authors recommended caution before adding new stations in order to minimize the impact of cannibalization. [13] have developed three mixed integer linear programming models a imeda determining the best number, location, and size for the depots of a one-way car sharing system, each corresponding to a trip selection scheme. Their models were tested on data from the city of Lisbon. The authors showed that 75 depots needed to be located to fully satisfy the demand.

II. EXISTING SYSTEM

In existing system user allows to take bicycle online. User can make payment through credit cards .Currently the charges for Bicycle rents are too high which is not affordable to users .Also in the existing system the system is well proposed for the bike usage. The existing system required to be more efficient and exhaustive as well as it should be flexible. In existing system the user should has to find particular shops manually and then go there for clearing details and documentation parts which is very time consuming process. Also there is lots of paper work. The tourists, employees as well as students are not getting the proper services due to such manual work process. So to reduce such time factor we have introduced the proper bicycle sharing system.

III.PROPOSED SYSTEM

The proposed system can be made more useful in future for bicycle usage .Bicycle-sharing has received increasing attention in recent years and has goal to increase cycle usage improve the connection to other modes of transit, and lessen the environmental impacts of our transport activities. We can use advanced and secure algorithms the long key size of AES algorithm such as AES-256 bit right now we are using AES-128 bit. Also we can provide the gmail notification or the message notifications to the user. So in future this work can be done.

- Bicycle Sharing System is a sustainable short-term bicycle rental service
- Cost effective and flexible form of transportation (Customer, Subscriber)
- First BSS program was deployed on July 28, 1965

Benefits

- Health

- Use of free ride (money)
- Pollution control
- Having fun!!!!!!

Motivation For Bicycle sharing System

- Increase in the proportion of people living in urban areas.
- United Nations predicts by 2050, 86 % of the world will be urbanized.
- Most important modes of transport are public and private.
- Several problems in urban areas for transport
- Traditional urban transportation does not solve the problems.

IV. RESULTS

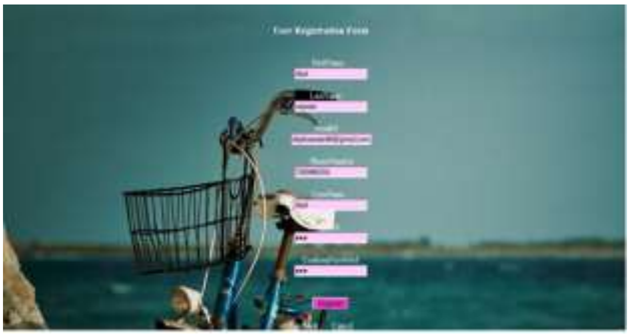


Fig 1 User registration

Fig 2 Booking details

Fig 3 Admin view

ID	Preview Image	UserName	Delete	Booking
7		mohini	Delete	Book Now
8		mohini	Delete	Book Now
9		smita	Delete	Book Now

Fig 4 Owner upload form

Fig 5 Payment form

Fig 6 Feedback form

V. CONCLUSION

In this paper, we have studied the trip prediction problem for bicycle-sharing systems to infer the potential trip destination station and trip duration. Extensive analysis about the user composition of a real-world bicycle-sharing system, individuals' temporal bike usage behavior patterns and spatial bike usage behavior patterns have been done. Based on the analysis results, two new regression based inference models have beenintroduced in this paper to predict the potential trip destinationstation and trip duration respectively. Experiments conducted on the real-world bicycle-sharing system dataset demonstrate the effectiveness of the proposed model.

VI. FUTURE WORK

1. Developing an analogy based bike sharing information system
2. Using new Artificial intelligence recommendation system
3. Developing better algorithm for predictions (taking more features)
5. Personalized data capturing for recommender system (automatic path calculation with temporal information.

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