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CRN NUMBER: 80606

Group 5

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INTRODUCTION

In this analysis, we are working with a dataset of Bike sharing rental system. It has bike rental records in 2011 and 2012 in Washington D.C., USA. The dataset is in .csv format and contains 731 records with 17 fields. A thorough investigation is performed using Qlik App to understand trends of the bike rentals.

DATA DESCRIPTION

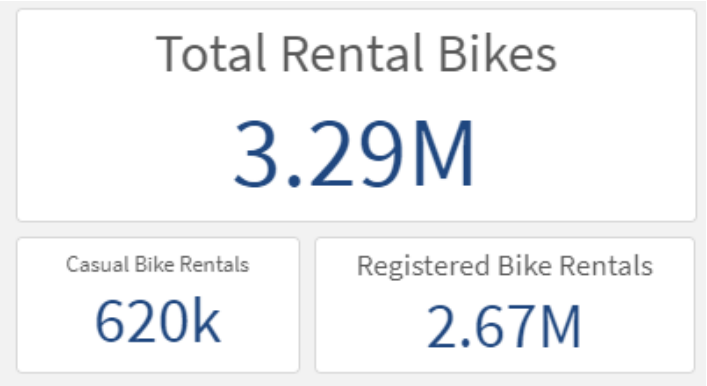
Attributes	Description
Instant	Record index
dteday	date
Season	Spring, summer, fall, winter
yr	Year (2011,2012)
mnth	Months (1 to 12)
hr	Hour (0 to 23)
holiday	Weather day is holiday or not
weekday	Day of the week
Workingday	If day is neither weekend nor holiday is 1, otherwise 0
weathersit	Various weather situation
temp	Normalized temperature in Celsius
atemp	Normalized feeling temperature in Celsius
hum	Normalized humidity
windspeed	Normalized wind speed
casual	Count of casual users
registered	Count of registered users
cnt	Count of total rental bikes including casual and registered

Table 1: Description of the attributes in the dataset

It is clearly noticeable that there are two categories of users: Casual and Registered. The analysis is carried out in three different parts. First part revolves around studying the general behavior of the users, second focuses on studying casual users and last part focuses on observing registered users. They are studied on grounds of various parameters like overall count, count by weather, count by windspeed and much more.

COMPREHENSIVE ANALYSIS

CALCULATING THE TOTAL NUMBER OF RENTAL BIKES WITH CASUAL AND REGISTERED

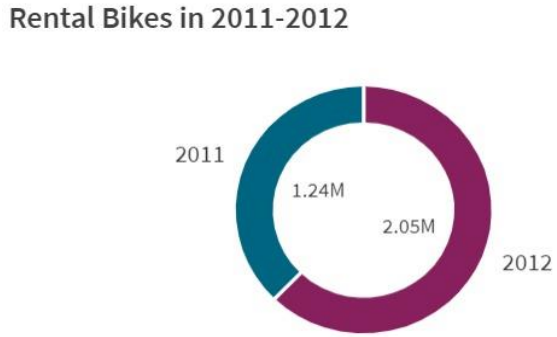


There are total of 3.29 million bike rentals registered for the span of 2011 and 2012inclusive of both types of users. The registered users sum up to be 2.67 million whereas the casual users add up to be 620 thousand users. The Count Function was executed as a measure to show total number of rentals that have occurred in the 2 years using the expression Count ([Rental Bikes]).

Figure 1: Total Count of rental bikes including casual and registered users

Overall, Registered users dominate the rental systems with constitution of 81.16 % whereas casual users have 18.84% of whole.

CALCULATING THE TOTAL NUMBER OF RENTAL BIKES ON YEARLY BASIS AND IT'S MONTLY VARIATION



The total rentals recorded in the year of 2011 are 1.24 million whereas 2012 has 2.05 million records. 2012 rentals record the maximum rentals comparatively. A pie chart was plotted to understand the pattern for the year 2011 and 2012. Apart from this, in depth study of rentals on basis of month shows that they have almost similar trend for both the years till the month of May. A line chart was chosen to understand this analysis.

Figure2: Total Count of rental bikes in 2011-2012

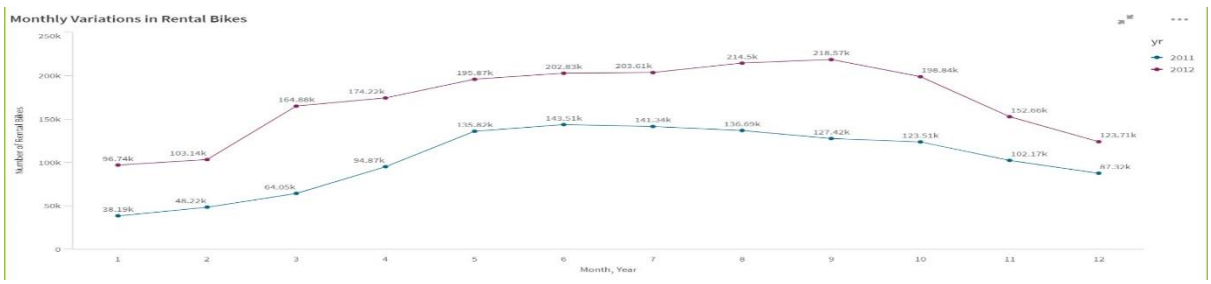
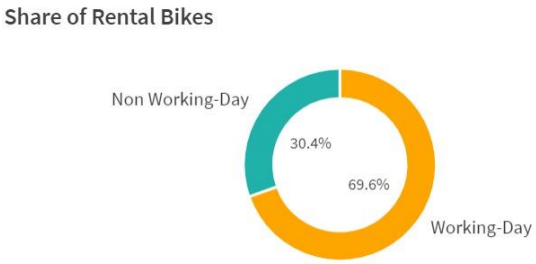


Figure 3: Monthly variation in rental bikes in 2011-2012

There was an overall subsequential increase from January to May. However, from June till December the rentals decreased gradually for 2011 whereas in 2012 it increased till September

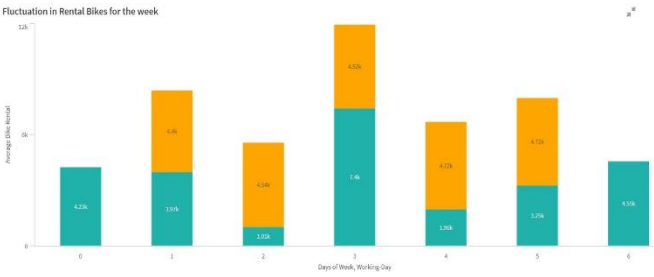
and then eventually decreased. May recorded the most rentals (195.87k) and September recorded the most rentals (127.42 k) for 2011 and 2012 respectively whereas January recorded the least for both the years (96.74k and 38.19k registrations).

CALCULATING THE PERCENTAGE OF SHARE OF RENTAL BIKES BY DAYS

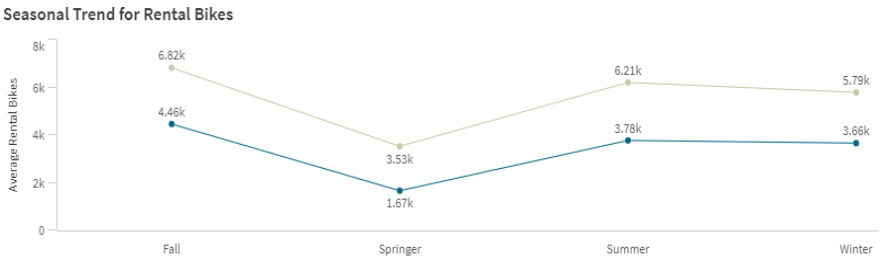


The rental for working day is more preferred over non-working days. Non-working days consists of 30.4% of the whole, while working-Day has 69.6%. To better understand the rental pattern, a pie chart was developed. Furthermore, an in-depth analysis of fluctuation between working and non-working days was also plotted for all the days of week.

Figure 4: Percentage of rental bikes on days wise



Wednesday, Sunday, and Saturday recorded the most rentals for non-working day whereas Monday to Friday recorded almost the same amount of working day rentals. Overall, Wednesday (11.92k) recorded the maximum rentals. *Figure 5: Fluctuation in Rental Bikes for Days of week*



Also, weekdays have more registrations compared to compared to weekend rentals.

Figure 6: Seasonal trend for rental bikes

Hence, working day rentals are more than non-working day rentals. A bar plot was preferred to carry out this analysis.

Seasonal trends on basis of four seasons were investigated. The trends were similar for 2011-2012. Fall has the maximum rentals (6.28k and 4.46k) whereas Springer (3.53k and 1.67k) has minimum rentals. This study was visualized using a line chart.

CASUAL BIKE USER ANALYSIS

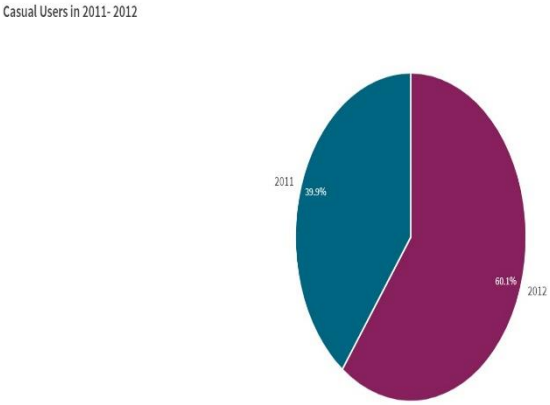


Figure 7: Casual users 2011-2012

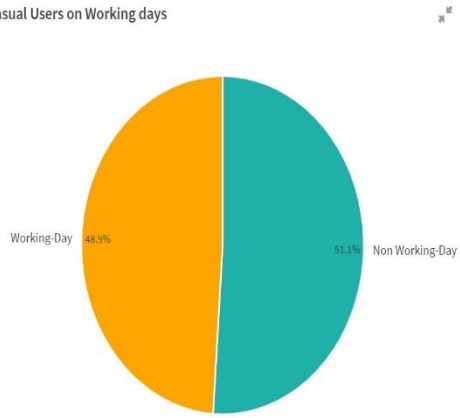


Figure 8: Share of Casual user day wise

The casual users(39.9%) were comparatively less in 2011 and the proportion of rentals for working and non- working days was almost equivalent. Pie chart was used to measure the proportion for casual users. Also, the seasonal trends were plotted for casual users which depicts the same result as overall rentals. The maximum was recorded for Fall (1.02k and 1.39k) minimum (238.06k and 430.74) was recorded for Springer. A line chart was chosen to understand trends. The rentals were more observed during the cloudy weather almost 50% regardless being clear or misty. Column chart was used to compare weather year wise. There were very less rentals during snowy weather. Also as expected, there were no rentals observed for heavy rain or snow. Apart from this, rentals were observed more during mild to above average wind speed. There were hardly any rentals for extreme wind speeds.

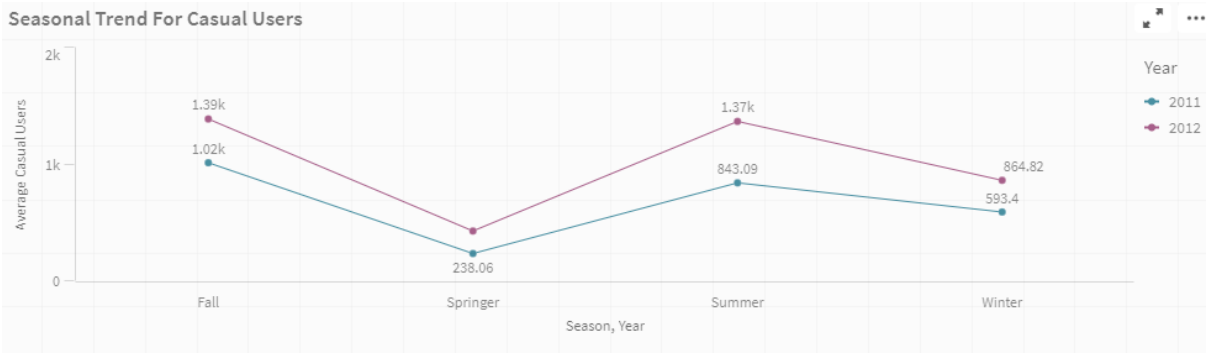


Figure 9: Seasonal trend for casual users

The casual users increased approximately 20% from 2011 to 2012. Also, the pattern of casual rentals seems same for working and non-working days. Fall (1.39k,1.02k) and Springer (864,593) recorded the most and least rentals same as the overall patterns. Windspeed did affect the rentals. With low to above average windspeed, rentals were more preferrable. Also, the

cloudy weather was more favorable for the bike rentals. To display this visualization, a scatterplot was used.

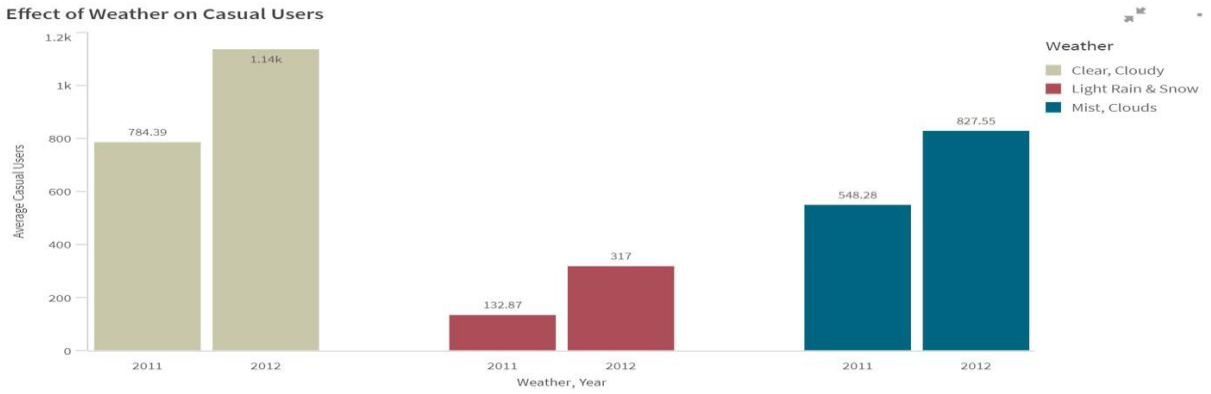


Figure 10: Effect of weather on casual users

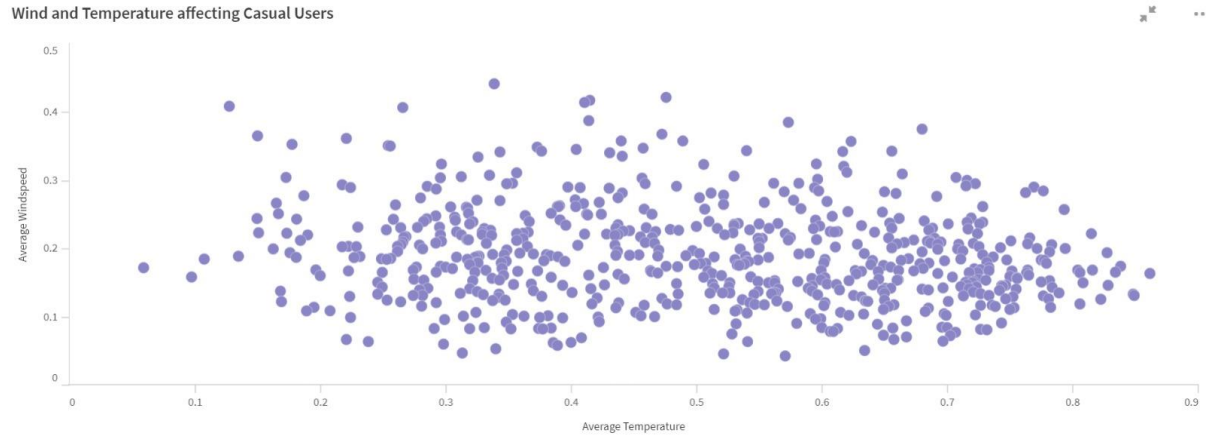


Figure 11: Wind and temperature affecting casual users

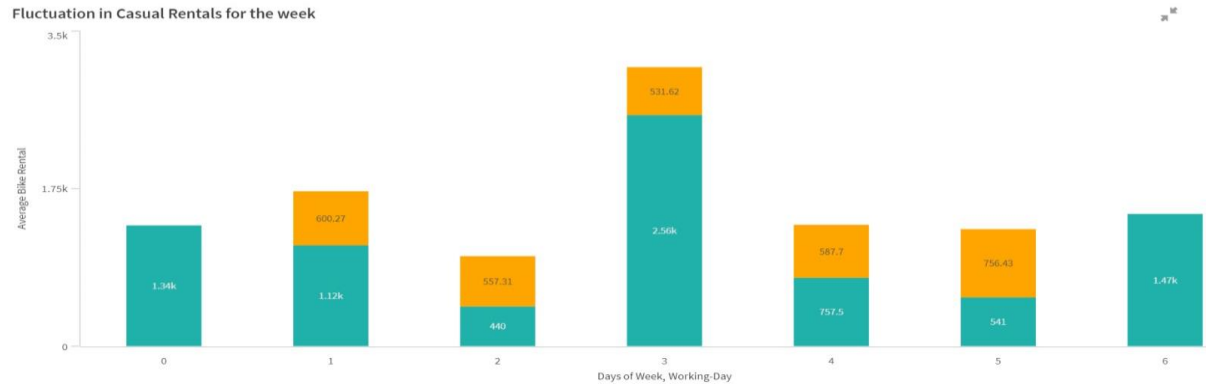


Figure 12: Fluctuation in casual users for days of week

REGISTERED BIKE USER ANALYSIS

There were more registered users in 2012 as compared to 2011. Unlike casual users, registered users (74.4%) were more during working days over non-working days (25.6%).

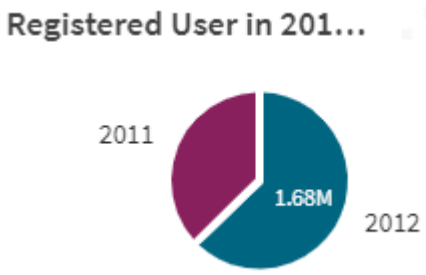


Figure 13: Registered users in 2011-2012

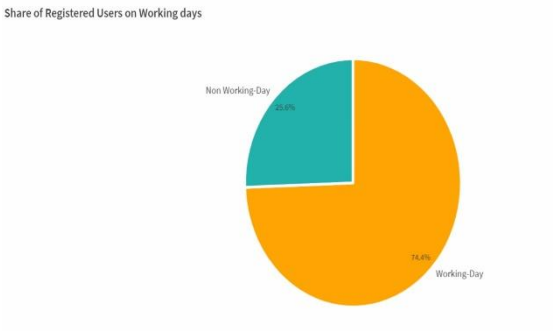


Figure 14: Share of registered users' day wise

Also, the seasonal trends for registered users were same as casual and overall user's pattern. The rentals were more preferred during cloudy and light weather change days. There were very less rentals none during snowy weather.

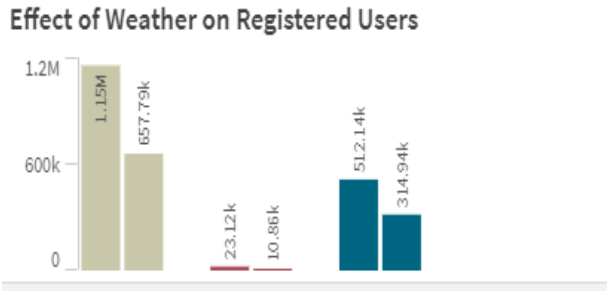


Figure 15: Effects of weather on registered users

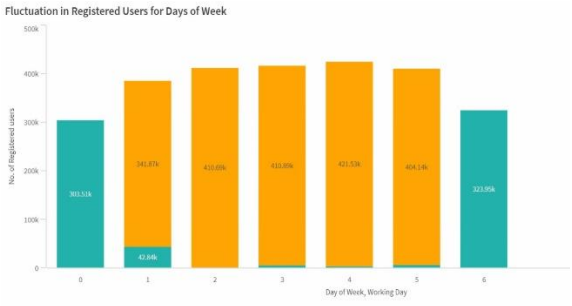


Figure 16: Fluctuation in registered users for days of week

No rentals were observed during heavy snow or rain weather. Apart from this, rentals were observed more during mild to above average wind speed. There were hardly any rentals for extreme wind speeds.

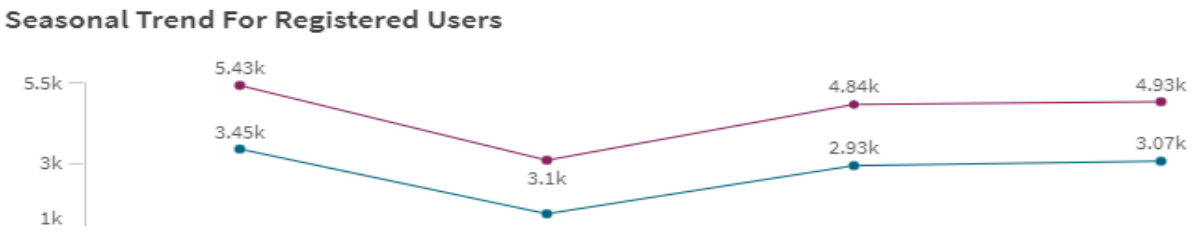


Figure 17: Seasonal trend for registered users

The registered users were more observed during 2012 as compared to 2011. Also, the pattern of rentals during working and non-working days is different from casual users. Fall and Springer recorded the most and least rentals same as the overall patterns. Windspeed did affect the rentals. With low to above average windspeed, rentals were more preferrable. Also, the cloudy weather was more favorable for the bike rentals.

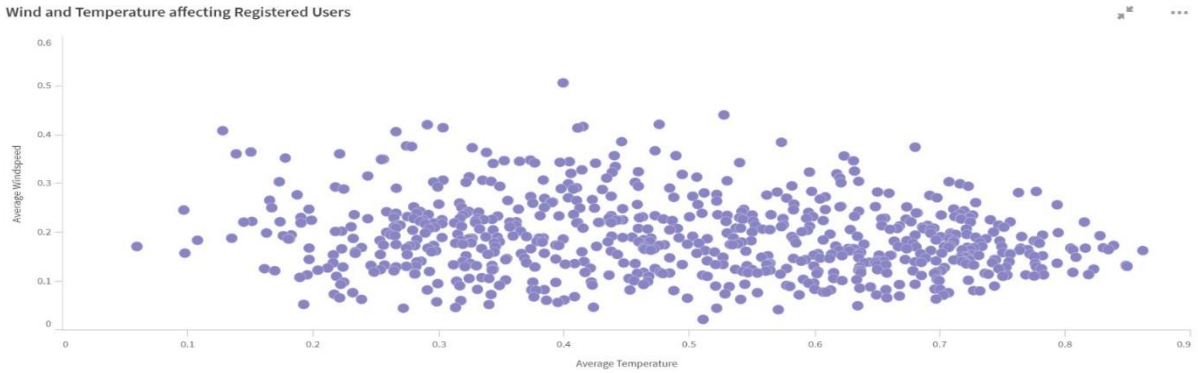
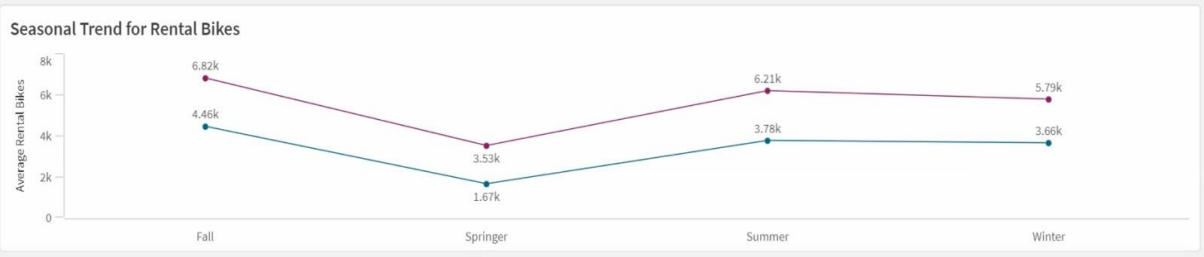
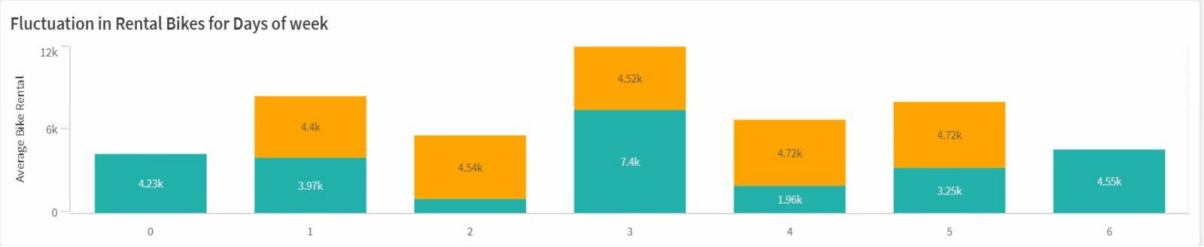


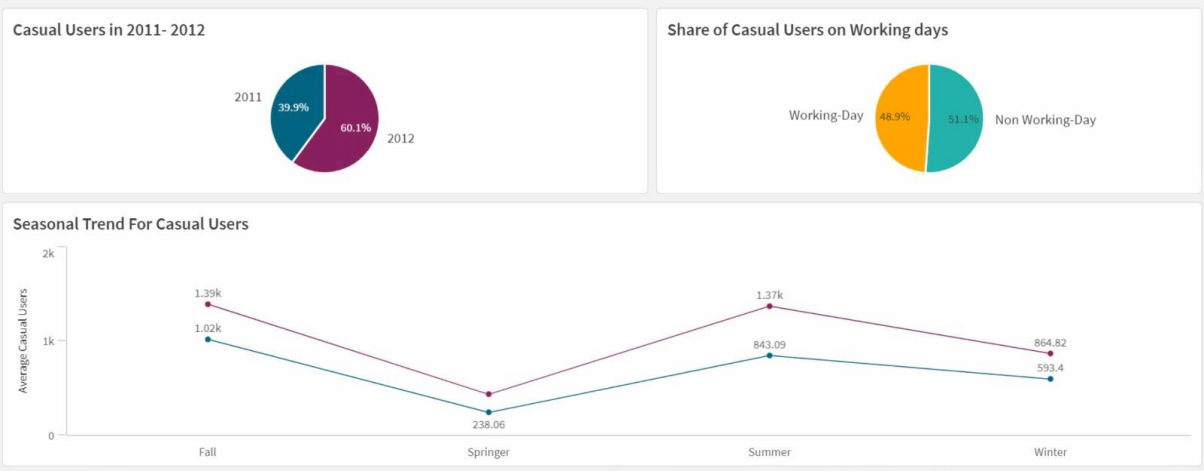
Figure 18: Wind and temperature affecting registered users

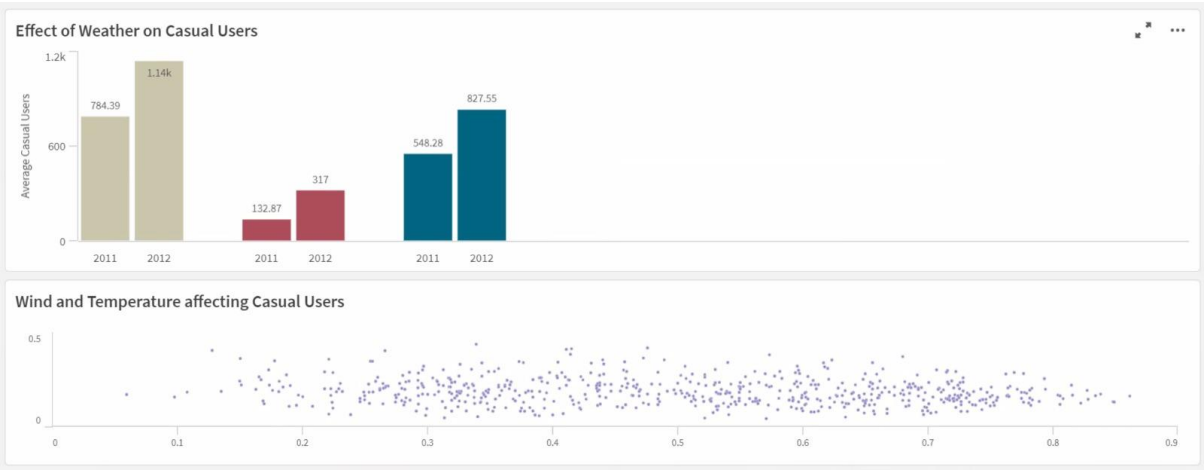
DASHBOARD

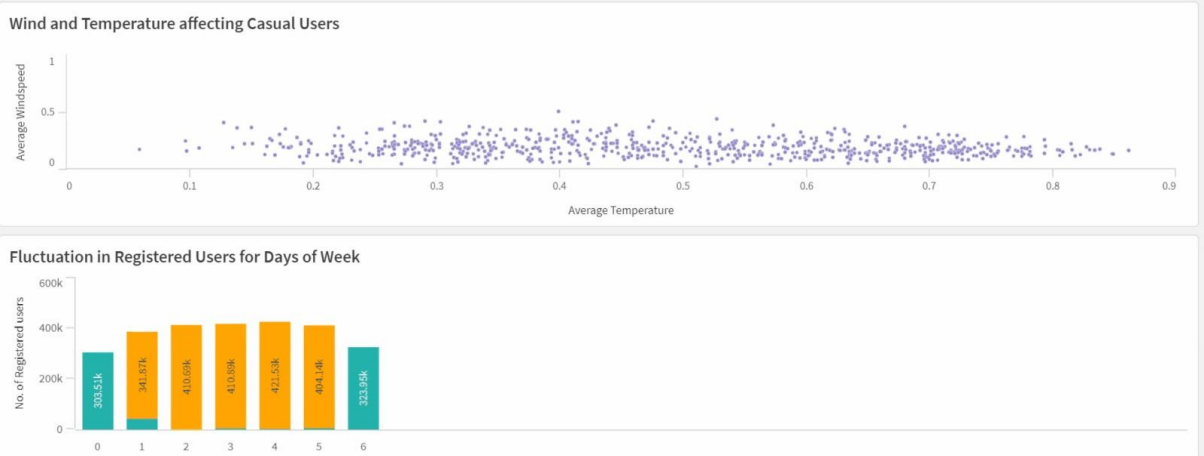


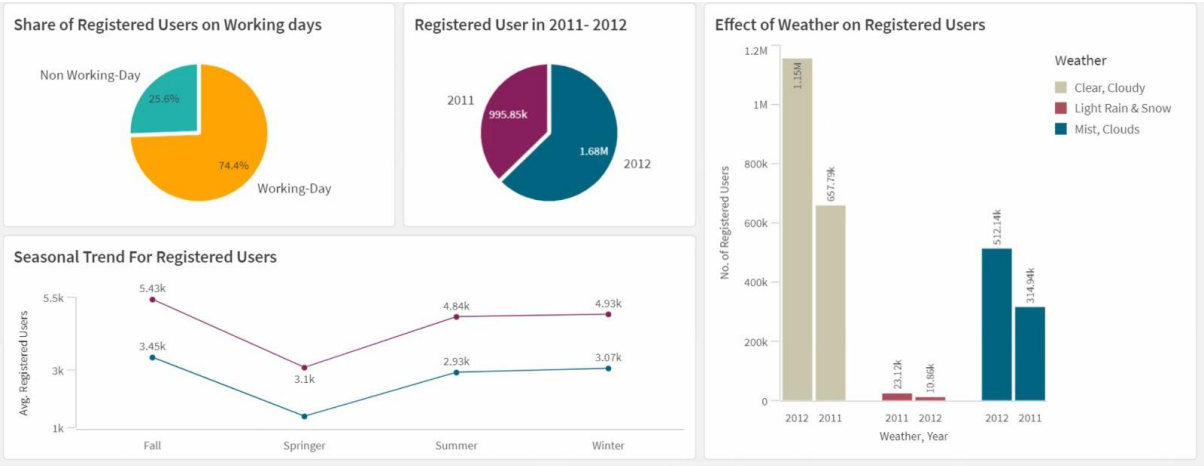


Qlik Paper on Bike Sharing Rental System









CONCLUSION

The analysis was carried to understand the behavior of the users on basis of their rental categories. It was clearly noticeable that regardless of various parameters, the rentals for 2012 were much more than 2011. This shows that the strategy used to increase users from 2011 to 2012 worked fine. Also, Comprehensive research and casual user research shows that the non-working rentals were more preferred and registered users research was contradicting their results. But, from the outcome of comprehensive research, we can conclude that that fluctuations of registered users for non-working and working day were not that significant. Casual users had more fluctuations. Also, it is evident that rentals are mostly used during weekdays so a good marketing strategy should be formulated to bring more rentals during weekends. The windspeed didn't affect the rentals apart from expectations. There were hardly any rentals for no windspeed or extreme windspeed conditions as while cycling the exertion is not tolerable during no winds and cycling is not possible during windstorms. Hence, it is safe to conclude that windspeed was not a major affecting factor. Furthermore, all the research types showed that Fall was most preferred season for rentals while Springer was least preferred. For casual users, there is a subtle drop from summer to winter unlike registered users. Hence, some promotional events like seasonal discount can bring out more rentals. Overall, it is evident that weather-related factors have a significant impact. Temperature, season, and working/non-working pattern are all strongly related to each other. As a result, these elements impact and strengthen each other to some extent. The user count was higher in 2012 over 2011 hence the current strategy was successful and can be carried forward with few changes after market and demand study.

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Qlik Paper on Bike Sharing Rental System