Cyclistic Bikeshare Project

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(August 2021)

Overview

1. Background
2. Business Objective
3. Data Processing
4. Data Cleaning
5. Data Analysis
6. Data Visualization
7. Key Takeaways
8. Recommendations

Background

- **Cyclistic: Bike-Share company based in Chicago**

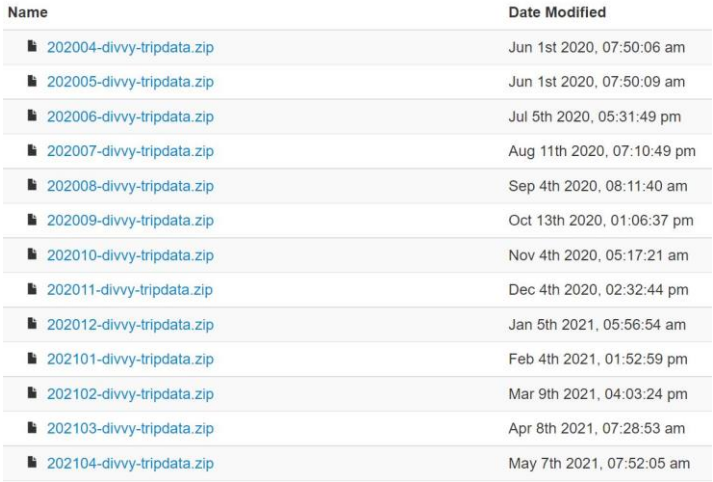
  - **Nearly 6000 bicycles and over 600+ bike stations within their program**
  - **Two different type of riders:**
    Casual and Members (Annual subscription)
  - **Director of marketing believes**
    future success -> maximizing annual memberships

Business Objective

- **Goal: Member vs Casual Riders**
  - **Identify how annual members and causal riders use Cyclistic bikes differently**
  - **Find trends/insights in the customer behavior for marketing direction on converting casual to members**
  - **Stakeholders:**
    Director of Marketing
    Cyclistic Executive Team
    Marketing Analytics Team

Data Processing

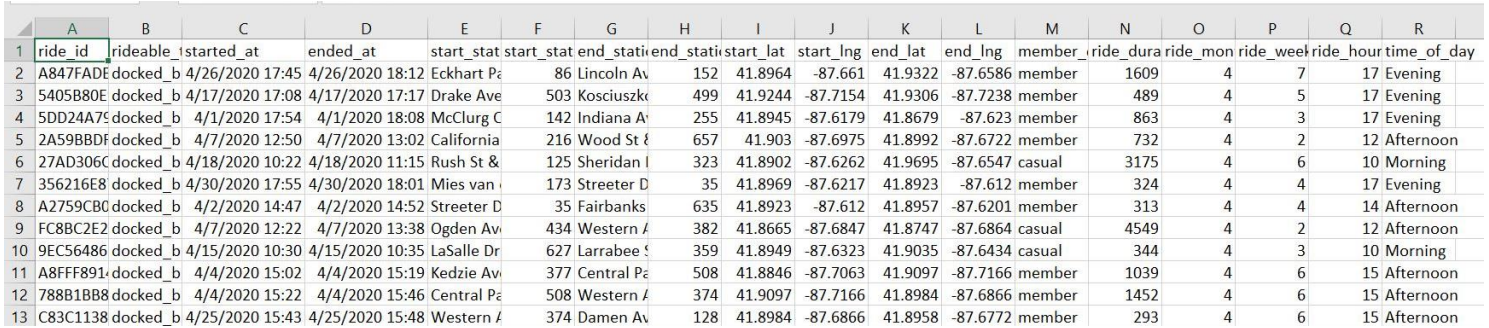
- **Datasets**
  - **Derived from divvy bike-share program, available by Motive International Inc.**
  - **Historical trip data from May 2020 – April 2021**
  - **Split into 12 CSV files, on month-to-month basis**
  - **Processed using Microsoft Excel then SQL due to memory constraints**



Name	Date Modified
202004-divvy-tripdata.zip	Jun 1st 2020, 07:50:06 am
202005-divvy-tripdata.zip	Jun 1st 2020, 07:50:09 am
202006-divvy-tripdata.zip	Jul 5th 2020, 05:31:49 pm
202007-divvy-tripdata.zip	Aug 11th 2020, 07:10:49 pm
202008-divvy-tripdata.zip	Sep 4th 2020, 08:11:40 am
202009-divvy-tripdata.zip	Oct 13th 2020, 01:06:37 pm
202010-divvy-tripdata.zip	Nov 4th 2020, 05:17:21 am
202011-divvy-tripdata.zip	Dec 4th 2020, 02:32:44 pm
202012-divvy-tripdata.zip	Jan 5th 2021, 05:56:54 am
202101-divvy-tripdata.zip	Feb 4th 2021, 01:52:59 pm
202102-divvy-tripdata.zip	Mar 9th 2021, 04:03:24 pm
202103-divvy-tripdata.zip	Apr 8th 2021, 07:28:53 am
202104-divvy-tripdata.zip	May 7th 2021, 07:52:05 am

Data Processing

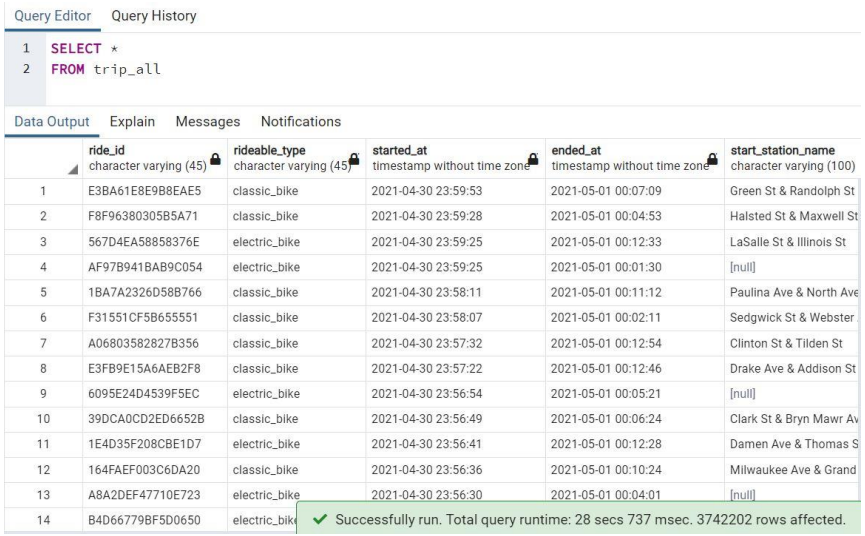
- **Microsoft Excel**
  - **13 original columns and more than 3 million rows total**
  - **Used formulas to create new columns for further analysis**
    Ex. ride_duration, ride_month, time_of_day, etc.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	ride_id	rideable_t	started_at	ended_at	start_stat	start_stat	end_statio	end_statio	start_lat	start_lng	end_lat	end_lng	member_	ride_dura	ride_mon	ride_week	ride_hour	time_of_day
2	A847FADE	docked_b	4/26/2020 17:45	4/26/2020 18:12	Eckhart Pa	86	Lincoln Av	152	41.8964	-87.661	41.9322	-87.6586	member	1609	4	7	17	Evening
3	5405B80E	docked_b	4/17/2020 17:08	4/17/2020 17:17	Drake Ave	503	Kosciuszk	499	41.9244	-87.7154	41.9306	-87.7238	member	489	4	5	17	Evening
4	5DD24A79	docked_b	4/1/2020 17:54	4/1/2020 18:08	McClurg C	142	Indiana Av	255	41.8945	-87.6179	41.8679	-87.623	member	863	4	3	17	Evening
5	2A59BBDF	docked_b	4/7/2020 12:50	4/7/2020 13:02	California	216	Wood St &	657	41.903	-87.6975	41.8992	-87.6722	member	732	4	2	12	Afternoon
6	27AD306C	docked_b	4/18/2020 10:22	4/18/2020 11:15	Rush St &	125	Sheridan I	323	41.8902	-87.6262	41.9695	-87.6547	casual	3175	4	6	10	Morning
7	356216E8	docked_b	4/30/2020 17:55	4/30/2020 18:01	Mies van	173	Streeter D	35	41.8969	-87.6217	41.8923	-87.612	member	324	4	4	17	Evening
8	A2759CB0	docked_b	4/2/2020 14:47	4/2/2020 14:52	Streeter D	35	Fairbanks	635	41.8923	-87.612	41.8957	-87.6201	member	313	4	4	14	Afternoon
9	FC8BC2E2	docked_b	4/7/2020 12:22	4/7/2020 13:38	Ogden Av	434	Western A	382	41.8665	-87.6847	41.8747	-87.6864	casual	4549	4	2	12	Afternoon
10	9EC56486	docked_b	4/15/2020 10:30	4/15/2020 10:35	LaSalle Dr	627	Larrabee S	359	41.8949	-87.6323	41.9035	-87.6434	casual	344	4	3	10	Morning
11	A8FFF891	docked_b	4/4/2020 15:02	4/4/2020 15:19	Kedzie Av	377	Central Pa	508	41.8846	-87.7063	41.9097	-87.7166	member	1039	4	6	15	Afternoon
12	788B1BB8	docked_b	4/4/2020 15:22	4/4/2020 15:46	Central Pa	508	Western A	374	41.9097	-87.7166	41.8984	-87.6866	member	1452	4	6	15	Afternoon
13	C83C1138	docked_b	4/25/2020 15:43	4/25/2020 15:48	Western A	374	Damen Av	128	41.8984	-87.6866	41.8958	-87.6772	member	293	4	6	15	Afternoon

Data Processing

- **PgAdmin4 (PostgreSQL)**
  - **Compared to Excel, SQL has capacity to analyze full dataset**
  - **Created tables for dataset, imported CSV files, and merged (UNION)**
  - **Ability to clean and analyze data, comprehensively**



Query Editor | Query History

```
1  SELECT *
2  FROM trip_all
```

Data Output | Explain | Messages | Notifications

	ride_id character varying (45)	rideable_type character varying (45)	started_at timestamp without time zone	ended_at timestamp without time zone	start_station_name character varying (100)
1	E3BA61E8E9B8EAE5	classic_bike	2021-04-30 23:59:53	2021-05-01 00:07:09	Green St & Randolph St
2	F8F96380305B5A71	classic_bike	2021-04-30 23:59:28	2021-05-01 00:04:53	Halsted St & Maxwell St
3	567D4EA58858376E	electric_bike	2021-04-30 23:59:25	2021-05-01 00:12:33	LaSalle St & Illinois St
4	AF97B941BAB9C054	electric_bike	2021-04-30 23:59:25	2021-05-01 00:01:30	[null]
5	1BA7A2326D58B766	classic_bike	2021-04-30 23:58:11	2021-05-01 00:11:12	Paulina Ave & North Ave
6	F31551CF5B655551	classic_bike	2021-04-30 23:58:07	2021-05-01 00:02:11	Sedgwick St & Webster
7	A06803582827B356	classic_bike	2021-04-30 23:57:32	2021-05-01 00:12:54	Clinton St & Tilden St
8	E3FB9E15A6AEB2F8	classic_bike	2021-04-30 23:57:22	2021-05-01 00:12:46	Drake Ave & Addison St
9	6095E24D4539F5EC	electric_bike	2021-04-30 23:56:54	2021-05-01 00:05:21	[null]
10	39DCA0CD2ED6652B	classic_bike	2021-04-30 23:56:49	2021-05-01 00:06:24	Clark St & Bryn Mawr Av
11	1E4D35F208CBE1D7	electric_bike	2021-04-30 23:56:41	2021-05-01 00:12:28	Damen Ave & Thomas S
12	164FAEF003C6DA20	classic_bike	2021-04-30 23:56:36	2021-05-01 00:10:24	Milwaukee Ave & Grand
13	A8A2DEF47710E723	electric_bike	2021-04-30 23:56:30	2021-05-01 00:04:01	[null]
14	B4D66779BF5D0650	electric_bik			

✔ Successfully run. Total query runtime: 28 secs 737 msec. 3742202 rows affected.

Data Cleaning

- **Methods used:**
  - **Check for duplicates**
  - **Identify null values**
  - **Inaccurate rows**
  - **Drop outliers – IQR Method**

Query Editor | Query History

```
1  SELECT *
2  FROM trip_all
3  WHERE ride_duration < 0
4  order by started_at asc
```

Data Output | Explain | Messages | Notifications

at	start_lng real	end_lat real	end_lng real	member_casual character varying (45)	ride_duration bigint	ride_month bigint	ride_weekday bigint	ride_hour bigint	time_of_day character varying (45)
614	-87.6762	41.9659	-87.7008	member	-70	6	1	10	Morning
908	-87.6315	41.9105	-87.6531	casual	-65	6	1	10	Morning
494	-87.6545	41.9491	-87.6486	member	-57	6	1	10	Morning
222	-87.6389	41.908	-87.6315	member	-53	6	1	10	Morning
117	-87.6268	41.9367	-87.6368	member	-36	6	1	10	Morning
828	-87.6612	41.8653	-87.6179	casual	-29	6	1	10	Morning
688	-87.6577	41.9617	-87.6546	member	-23	6	1	10	Morning
117	-87.6268	41.9139	-87.6488	member	-11	6	1	10	Morning
894	-87.6293	41.9069	-87.6262	member	-243	6	1	10	Morning
664	-87.5657	41.781	-87.5761	member	-2	6	1	10	Morning
263	-87.6308	41.984	-87.6523	member	-9	6	1	10	Morning
665	-87.6884	41.9665	-87.6884	member	-4	6	1	10	Morning

Data Analysis

- **Descriptive Analysis**
  - **Summary Statistics**
  - **Ride Count**
  - **Ride Duration**
  - **Top 5 Stations by Member_Casual**

Query Editor | Query History

```
1  SELECT 'count' as summary_statistics,
2      count(*) as rd_stats
3  FROM trip_all
4  UNION
5  SELECT 'total',
6      sum(ride_duration)
```

Data Output | Explain | Messages | Notifications

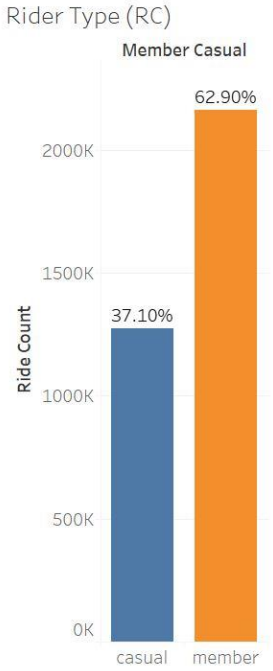
	summary_statistics text	rd_stats double precision
1	min	-1742998
2	mean	1467.54927980905
3	median	858
4	count	3742202
5	Q3	1581
6	Q1	467
7	max	3257001
8	total	5491865850
9	std_dev	22353.83654037

Data Visualization

- **Software: Tableau**
  - **Imported final CSV file for visualizations**
  - **Easier to see and share insights vs. tables/spreadsheets**
  - **Ride Count, Ride Duration**

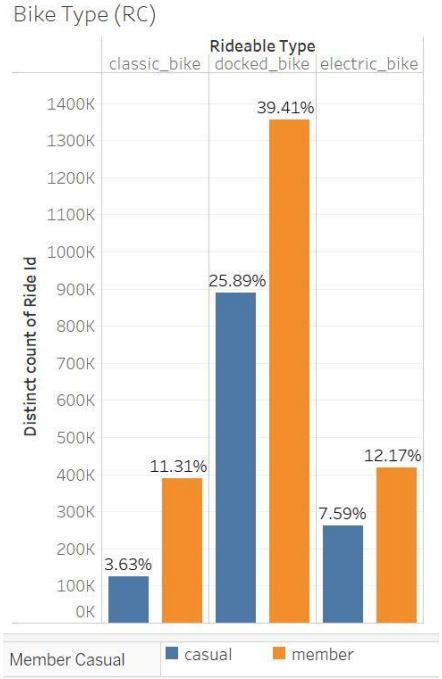
Data Visualization

Ride Count by Member/Casual:



Nearly 2/3 rides are by member riders

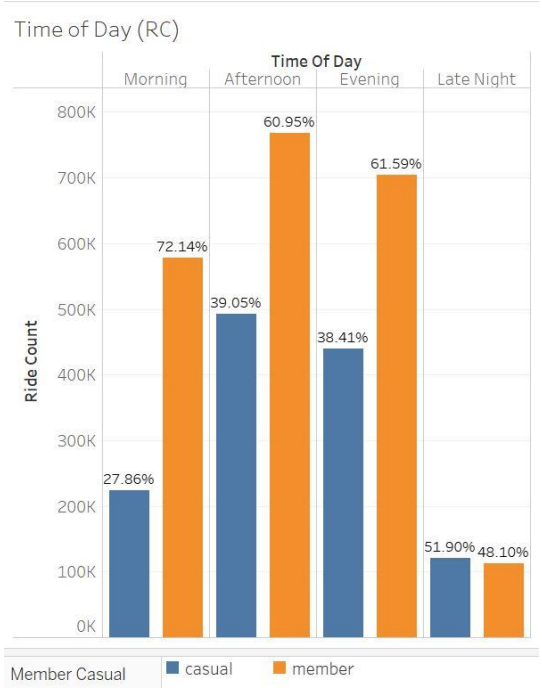
Ride Count by Bike Type:



Highest usage: Docked Bike (approx. 65%)

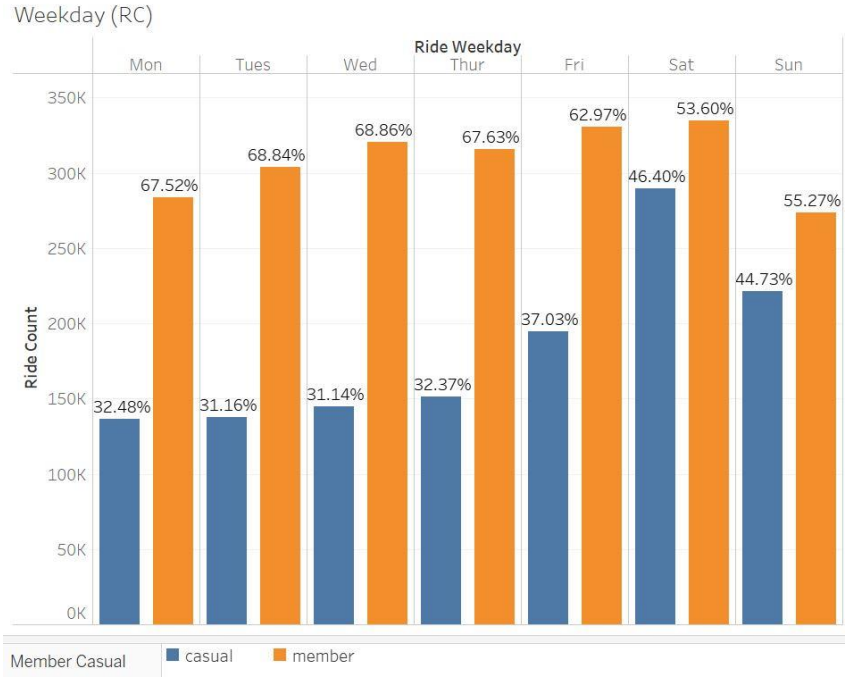
Data Visualization

Ride Count by Time of Day:



Casual riders less active during Late Nights/Mornings

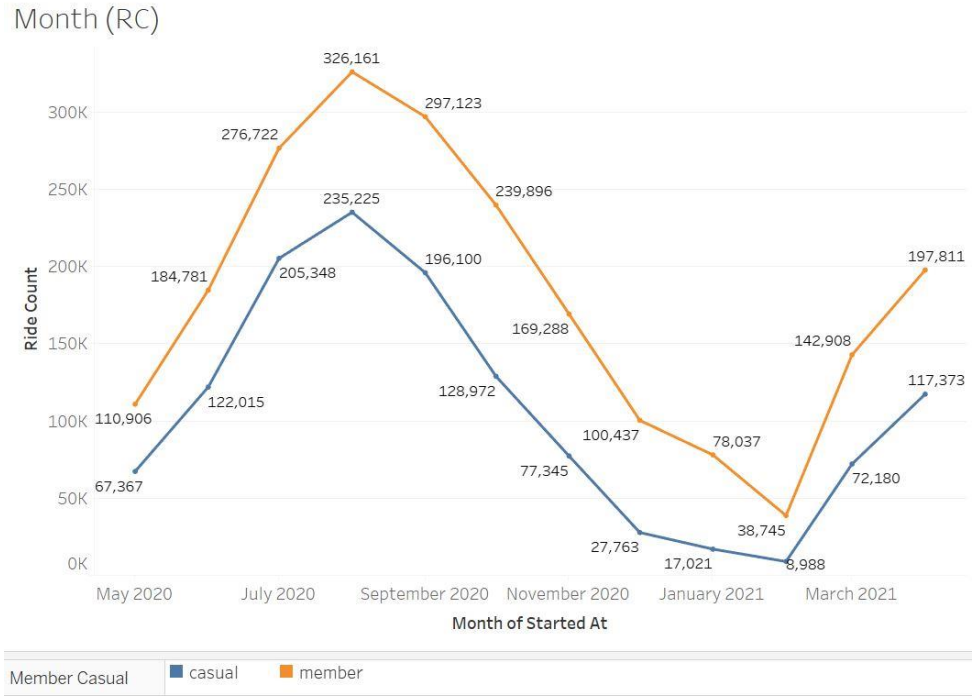
Ride Count by Day of the Week:



Increased rate of casual riders during weekends vs. weekdays

Data Visualization

Ride Count over last 12 months:

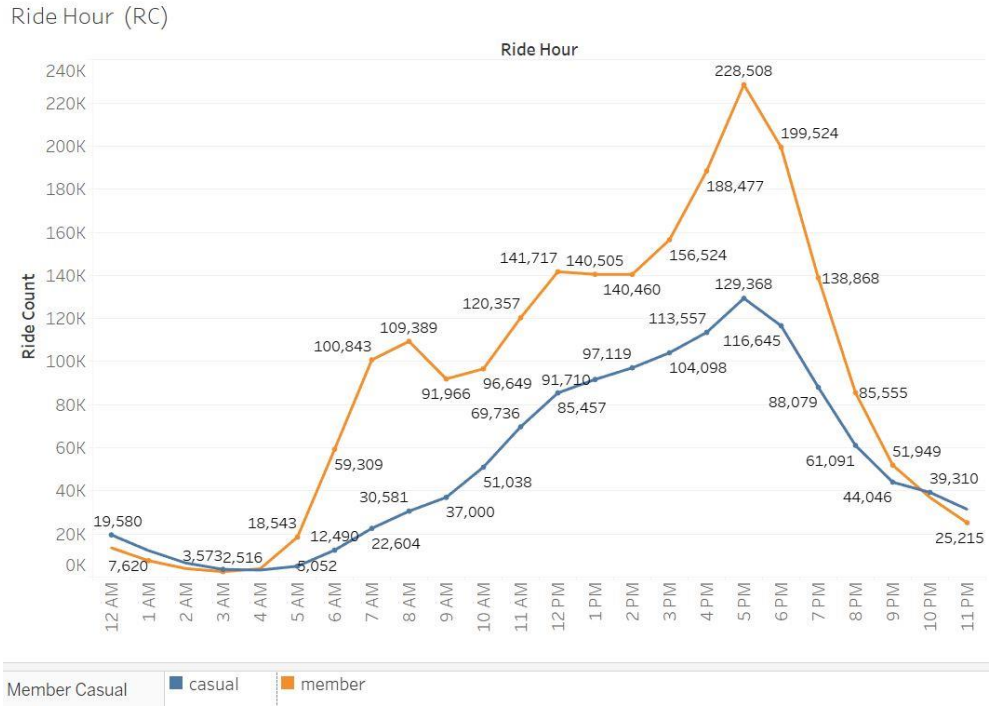


Peak ride count during Summer (July, Aug, Sept)

Lowest ride count during Winter (Dec, Jan, Feb)

Data Visualization

Ride Count by Ride Hour:

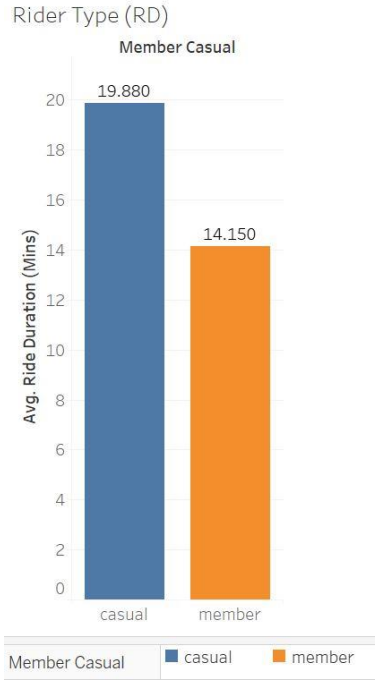


Peak ride count during 4-6 PM

Higher usage for casual riders during Late Night (10PM-2AM)

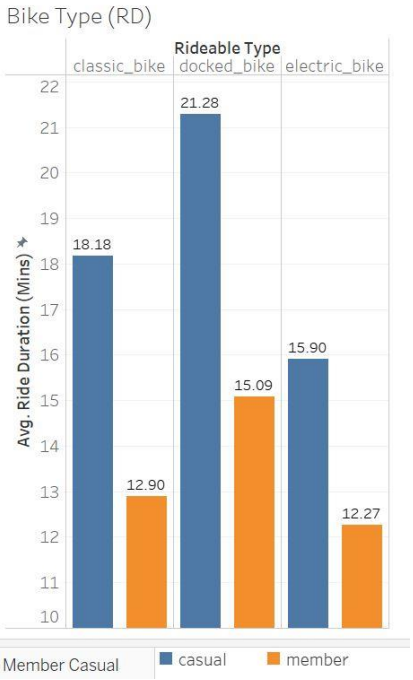
Data Visualization

Ride Duration by Member/Casual:



Casual rides are longer by avg. of 5 mins

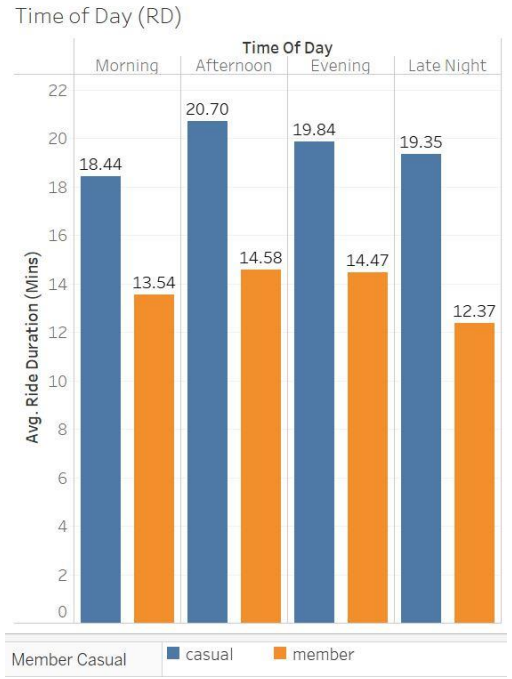
Ride Duration by Bike Type:



Longer usage: Docked Bike

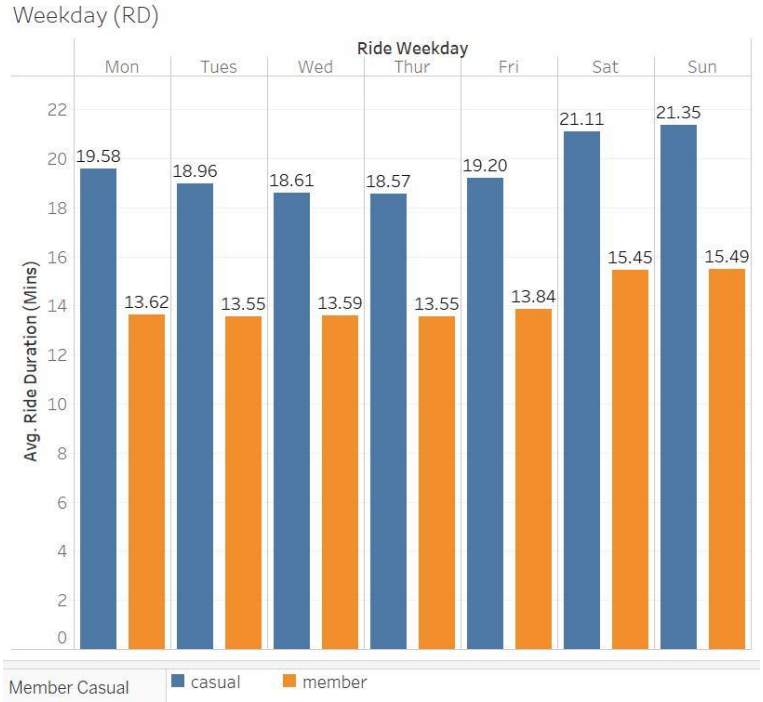
Data Visualization

Ride Duration by Time of Day:



Not much difference across the time of day

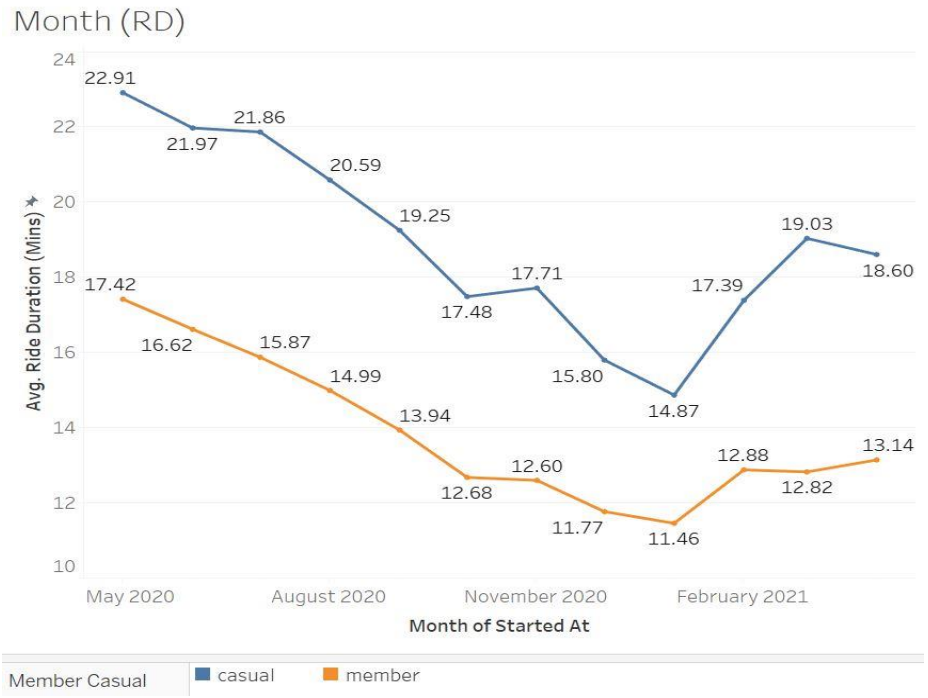
Ride Duration by Day of the Week:



Increased duration during weekends vs. weekdays

Data Visualization

Ride Duration over last 12 months:

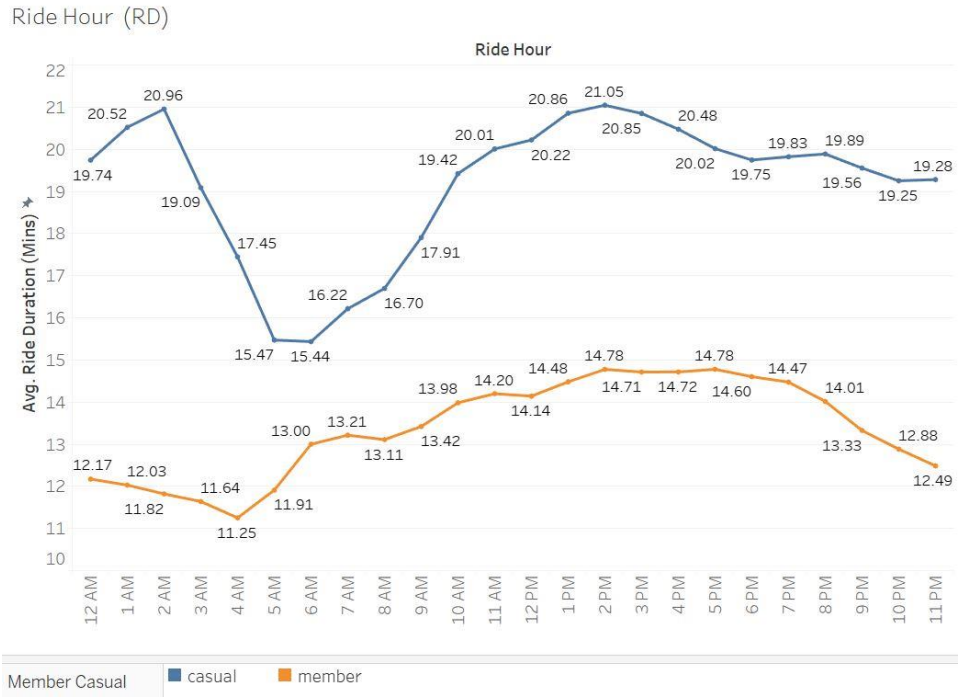


Higher ride duration during Summer (May, June, July)

Lowest ride duration during Winter (Dec, Jan, Feb)

Data Visualization

Ride Duration by Ride Hour:



Decrase in ride duration for casual riders 2AM - 6AM

Data Visualization

Top Casual Start Stations:

Top Start Stations

Start Station Na..	Member Casual: casual	member
Streeter Dr & Gr..	21,168	9,623
Lake Shore Dr & ..	17,352	9,610
Millennium Park	14,658	5,024
Theater on the L..	13,557	15,419
Lake Shore Dr & ..	11,635	14,110
Michigan Ave & ..	11,452	8,758
Clark St & Elm St	11,332	21,194
Indiana Ave & Ro..	10,532	11,152
Wells St & Conco..	9,885	16,160
Clark St & Lincol..	9,536	12,808
Michigan Ave & L..	9,382	8,158
Shedd Aquarium	9,279	4,357
Clark St & Armit..	9,200	14,390
Wells St & Elm St	9,131	15,107
Wells St & Everg..	8,730	10,865

Top Station:
Streeter Dr & Grand Ave

Top Start Station:

Top Start Stations

Start Station..	
Clark St & Elm St	32,526
Streeter Dr & Gr..	30,791
Theater on the L..	28,976
Lake Shore Dr & ..	26,962
Wells St & Conco..	26,045
Lake Shore Dr & ..	25,745
Wells St & Elm St	24,238
Broadway & Barr..	24,175
Dearborn St & Er..	23,774
Clark St & Armit..	23,590
Wells St & Huron..	23,128
Clark St & Lincol..	22,344
Indiana Ave & Ro..	21,684
Kingsbury St & Ki..	21,335
St. Clair St & Erie..	21,322
Desplaines St & ..	20,849

Top Station:
Clark St & Elm St

Top Member Start Stations:

Top Start Stations

Start Station Na..	Member Casual: casual	member
Clark St & Elm St	11,332	21,194
Broadway & Barr..	7,786	16,389
Wells St & Conco..	9,885	16,160
St. Clair St & Erie..	5,292	16,030
Dearborn St & Er..	7,758	16,016
Theater on the L..	13,557	15,419
Kingsbury St & Ki..	5,980	15,355
Wells St & Elm St	9,131	15,107
Wells St & Huron..	8,170	14,958
Clark St & Armit..	9,200	14,390
Desplaines St & ..	6,664	14,185
Lake Shore Dr & ..	11,635	14,110
Columbus Dr & R..	7,304	13,139
Lake Shore Dr & ..	7,891	12,924
Larrabee St & W..	7,909	12,850

Top Station:
Clark St & Elm St

Data Visualization

Top Casual End Stations:

Top End Stations

End Station Name	Member Casual casual	member
Streeter Dr & Gr..	22,371	9,429
Lake Shore Dr & ..	16,294	9,593
Millennium Park	15,893	5,450
Theater on the L..	14,664	15,033
Lake Shore Dr & ..	12,087	13,657
Michigan Ave & ..	11,856	8,835
Clark St & Elm St	10,708	21,646
Indiana Ave & Ro..	10,604	10,569
Wells St & Conco..	10,030	16,556
Clark St & Lincol..	9,608	12,490
Clark St & Armit..	8,997	13,234
Michigan Ave & L..	8,918	8,680
Wells St & Elm St	8,649	14,379
Michigan Ave & ..	8,472	6,804
Wells St & Everg..	8,424	10,863

Top Station:
Streeter Dr & Grand Ave

Top End Station:

Top End Stations

End Station ..
Clark St & Elm St	32,354
Streeter Dr & Gr..	31,800
Theater on the L..	29,697
Wells St & Conco..	26,586
Lake Shore Dr & ..	25,887
Lake Shore Dr & ..	25,744
Broadway & Barr..	24,767
Dearborn St & Er..	24,231
St. Clair St & Erie..	23,367
Wells St & Elm St	23,028
Clark St & Armit..	22,231
Clark St & Lincol..	22,098
Wells St & Huron..	21,831
Millennium Park	21,343
Larrabee St & W..	21,277
Wabash Ave & Gr..	21,196

Top Station:
Clark St & Elm St

Top Member End Stations:

Top End Stations

End Station Name	Member Casual casual	member
Clark St & Elm St	10,708	21,646
St. Clair St & Erie..	6,148	17,219
Broadway & Barr..	8,195	16,572
Wells St & Conco..	10,030	16,556
Dearborn St & Er..	7,702	16,529
Kingsbury St & Ki..	5,198	15,537
Theater on the L..	14,664	15,033
Wells St & Elm St	8,649	14,379
Wells St & Huron..	7,846	13,985
Wabash Ave & R..	6,979	13,667
Lake Shore Dr & ..	12,087	13,657
Larrabee St & W..	7,992	13,285
Clark St & Armit..	8,997	13,234
Lake Shore Dr & ..	8,016	13,141
Desplaines St & ..	6,238	13,069

Top Station:
Clark St & Elm St

Key Takeaways

- **Docked Bike is the most popular option for both riders**
- **Consistency between both start and end stations, relative to rider type**
- **Member/Causal trends by Ride Count**
  - ***Difference in ride count by time of year – Summer vs. Winter***
  - ***Spikes in ride count from 4PM – 6PM, but higher casual rate during 'Late Night' (10PM – 2AM)***
  - ***Increase ride count towards weekends (Fri-Sun) over weekdays (Mon-Thurs)***
- **Member/Causal trends by Ride Duration**
  - ***Casual ride duration > Member ride duration, by average of 5 mins***
  - ***Decrease in casual ride duration from 2AM – 6AM***

Recommendations

- **Marketing strategies/discounts towards casual trends (membership perks)**
  - ***Weekends, Summer, Late Night (10PM – 2AM) discounts***
  - ***Discounts towards longer ride duration (majority of casual riders)***
  - ***Exclusive or easier access to the popular 'Docked Bike' vs. rest***
  - ***Discounts/promotions related to top casual stations or nearby businesses***
- **Data Suggestions**
  - ***Ride ID consistency***
  - ***Both start and end station ID consistency***
  - ***Permissible customer data/demographics under proper ethics and data governance (age, gender, income, etc.)***

Questions/Comments