Exercise 6.1

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Data Source

Description:

The data source was published by Ryan Cummings on Kaggle.com and contains data about the mobility service Citi Bike from its launch until October 2013.
The data is published on trip level containing the date and time, the location of the start and end trip, and some general demographic data (if available) such as gender, and birth year.
The total count of rows is 50,000.

Motivation:

I've chosen this data source for analysis as I've been working in the mobility space in my previous career and am interested in mobility patterns, especially in the shared space.

Source of Data:

https://www.kaggle.com/datasets/ryanmcummings/citi-bike-dat

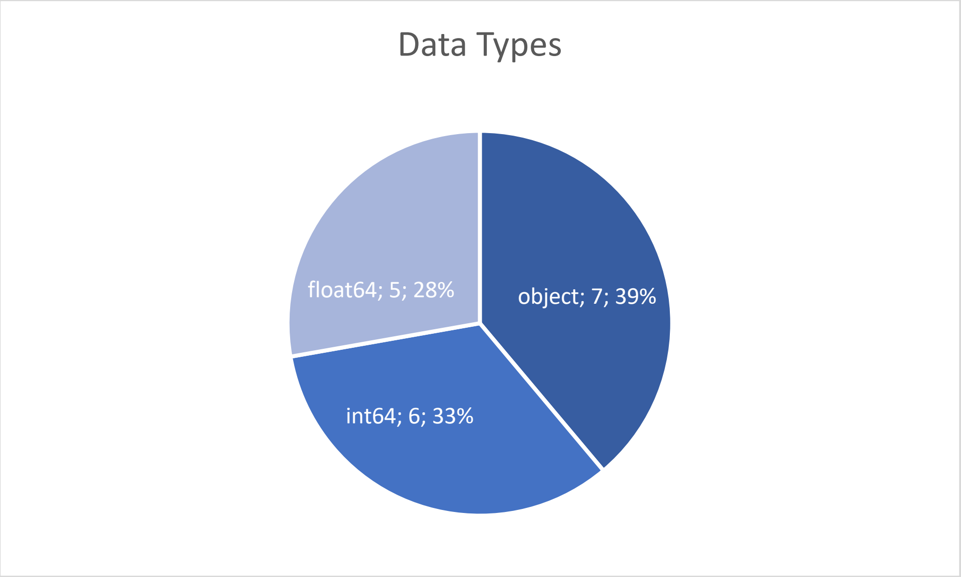
Data Profile

Column	**Example**	**Data Type**	**Description**
trip_id	**LnQzQk**	**object**	**Trip ID**
bike_id	**16013**	**int64**	**Bike ID**
weekday	**Mon**	**object**	**Day of the week**
start_hour	**18**	**int64**	**Hour of Start Trip**
start_time	**09.09.13 18:18**	**object**	**Start time of Trip**

start_station_id	**523**	**int64**	**Station ID (Trip Start)**
start_station_name	**W 38 St & 8 Ave**	**object**	**Station Name (Trip Start)**
start_station_latitude	**40,75466591**	**float64**	**Station Latitude (Trip Start)**
start_station_longitude	**-73,99138152**	**float64**	**Station Longitude (Trip Start)**
end_time	**09.09.13 18:35**	**object**	**End time of Trip**
end_station_id	**334**	**int64**	**Station ID (Trip End)**
end_station_name	**W 20 St & 7 Ave**	**object**	**Station Name (Trip End)**
end_station_latitude	**40,74238787**	**float64**	**Station Latitude (Trip End)**
end_station_longitude	**-73,99726235**	**float64**	**Station Longitude (Trip End)**
trip_duration	**993**	**int64**	**Duration of trip in minutes**
subscriber	**Subscriber**	**object**	**Subscriber vs Non-Subscriber**
birth_year	**1968**	**float64**	**Year of Birth of Customer**
gender	**2**	**int64**	**Gender of Customer**

Data types:

The data contains 5 float64, 6 int64 and 7 object data types and thus is in line with the requirements for this task.



Data Cleaning:

Column	Change	Rows affected	% of Total Rows
birth_year	Removed 'NA'	6979	0,13958
gender	removed '0'	6981	0,13962

Descriptive Statistics

bike_id	
Mean	17615,2694
Standard Error	7,49264988
Median	17584
Mode	16188
Standard Deviation	1675,40745
Sample Variance	2806990,11
Kurtosis	-1,1582525
Skewness	0,0230013
Range	6086
Minimum	14556
Maximum	20642
Sum	880763468

start_hour	
Mean	14,14524
Standard Error	0,021737
Median	15
Mode	17
Standard Deviation	4,8605409
Sample Variance	23,6248578
Kurtosis	-0,2698257
Skewness	-0,4539925
Range	23
Minimum	0
Maximum	23
Sum	707262

Count	50000

Count	50000

start_station_id	
Mean	443,3215
Standard Error	1,59458446
Median	402
Mode	459
Standard Deviation	356,559925
Sample Variance	127134,98
Kurtosis	22,4900773
Skewness	4,48678537
Range	2930
Minimum	72
Maximum	3002
Sum	22166075
Count	50000

end_station_id	
Mean	442,5397
Standard Error	1,5909893
Median	402
Mode	497
Standard Deviation	355,756022
Sample Variance	126562,347
Kurtosis	22,2330899
Skewness	4,4659459
Range	2930
Minimum	72
Maximum	3002
Sum	22126985
Count	50000

trip_duration	
Mean	838,9829
Standard Error	2,56550339
Median	672
Mode	2697
Standard Deviation	573,663997
Sample Variance	329090,382
Kurtosis	1,45271124
Skewness	1,30805023
Range	2637
Minimum	60
Maximum	2697
Sum	41949145
Count	50000

Limitations and Ethics
The data presented comes from the customer base of a specific mobility service. Population data thus are not representative for the general population in the geo. Data can not be verified as it was collected by the company running the service. Gender data is not clear, as we do not now whether 1 stands for male or female.

Key Questions

1. Trip characteristics: how long was the longest trips, the shortest trip and what's the average trip duration?
2. Trip destinations: Are most trips in the city center? Which are the busiest districts?
3. When do most trips happen? Do they follow the rush hour logic? What about weekday / weekend?
4. Who is using the service? How is the age distributed in the customer base?
5. How has the service evolved over time (number of trips) per year?