Assignment_2_ Farris_wheel

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Ferris Wheels - The Bigger the Better?

Since first introduced in the 1893 World's World's Columbian Exposition in Chicago, the Ferris wheel has become synonymous with amusement parks industry. The modern Ferris wheel has evolved well beyond it's 1893 grandfather. Coming in several different shapes, sizes, capacities, and features. Some being able to be pulled by a trailer (which was important for traveling circuses) to permanent fixtures in amusement parks, and the communities they serve. Some becoming giant monoliths of their own right, and popular tourist attractions. This report below explores datapoints concerning some of the most popular Ferris wheels,

The Questions

Scenario, you and your child "Stata" are walking at your local state fair, and "Stata" points at the Ferris wheel and asks you the following questions.

Daddy/Mommy....

1. What is the biggest Ferris wheel?
2. What is Ferris wheel that can hold the most amount of patrons in a day? *(assuming running 24 hours @ full capacity)*
3. Is the biggest Ferris wheels,the same one accommodating the most people a day? What is the relationship?

You being the data science super parent, you decide to research Stata's question using the below TidyTuesday dataset (tidytuesdayR::tt_load('2022-08-09')) using R with the dyplr package.

The Source

This dataset is part of the TidyTuesday data set release on 8-09-2022. TidyTuesday is an R community that published community submitted R data every Tuesday. For a link to the datset see: https://github.com/rfordatascience/tidytuesday/tree/10ecc76b4731ce3803efaafd7c3deb00b0064030/data/2022/2022-08-09.

What is the Biggest Ferris Wheel?

The `wheels` data set gives us information on 73 popular Ferris wheels across the world as of 2015. Information listed for each ferris wheel includes the name, height, diameter, seating capacity, and number of cabins. Stata would like to know what is the "Biggest" Ferris wheel is. We do this by creating a new variable `height_diameter_rank` that is the sum of the height and diameter.

Dataset - Wheel_height_diameter

Table 1: Table 1.1 The Total Height + Diameter of each Ferris Wheel

name	seating_capacity	number_of_cabinsheight	diameter	height_diameter_rank
Golden Gate Flyer	1400	36	728.00	700.00	1428.00
Beijing Great Wheel	1920	48	692.64	642.70	1335.34
High Roller	1120	28	550.00	520.00	1070.00
Singapore Flyer	784	28	541.00	492.00	1033.00
Star of Nanchang	480	60	525.00	504.90	1029.90
London Eye	800	32	443.00	394.00	837.00
Sky Dream Fukuoka	NA	NA	394.00	361.00	755.00
Suzhou Ferris Wheel	300	60	394.00	361.00	755.00
Tianjin Eye	384	48	394.00	361.00	755.00
Zhengzhou Ferris Wheel	384	48	394.00	361.00	755.00
Diamond and Flower Ferris Wheel	408	68	384.00	364.17	748.17
Star of Lake Tai	384	64	377.00	364.00	741.00
Changsha Ferris Wheel	384	48	394.00	325.00	719.00
Daikanransha	384	64	377.00	328.00	705.00
Tempozan Ferris Wheel	480	60	369.00	330.00	699.00
Cosmo Clock 21	480	60	369.00	328.00	697.00
Shanghai Ferris Wheel	378	63	354.00	322.00	676.00
HEP Five Wheel	208	52	347.77	246.06	593.83
Great Wheel	1600	40	308.00	270.00	578.00
Aurora Wheel	NA	NA	295.00	272.00	567.00
Technostar	384	48	279.00	274.00	553.00
Miramar Ferris Wheel	288	48	316.00	233.00	549.00
Amuran	NA	36	303.00	199.80	502.80
Kaohsiung Eye	NA	36	336.00	160.00	496.00
Star of Puebla	432	54	262.00	229.00	491.00
Wiener Riesenrad	NA	15	212.00	200.00	412.00
Asiatique Sky	NA	42	200.00	200.00	400.00
Big O	NA	NA	197.00	200.00	397.00
Enclosed Ferris Wheel	144	24	190.00	157.00	347.00
Colossus	320	32	180.00	165.00	345.00
Niagara SkyWheel	336	42	175.00	166.65	341.65
Chicago Wheel	720	36	264.00	75.00	339.00
Shining Flower Wheel	64	32	164.04	147.64	311.68
Mickey's Fun Wheel	144	24	160.00	150.00	310.00
Moscow-850	320	40	240.00	70.00	310.00
Brighton Wheel	288	36	160.00	148.00	308.00
Navy Pier Ferris Wheel	240	40	150.00	140.00	290.00
Wonder Wheel	144	24	150.00	135.00	285.00

Solution

The above table has been created to be expressed in ascending order of `height_diameter_rank`

According to the table our biggest Ferris wheel is the **Golden Gate Flyer**.

Ferris Wheels plotted by Height and Diameter

plotting this out, you can see the golden gate flyer on the top rigth hand corner of figure 1.1.

```
## Warning: Removed 35 rows containing missing values (geom_point).
```

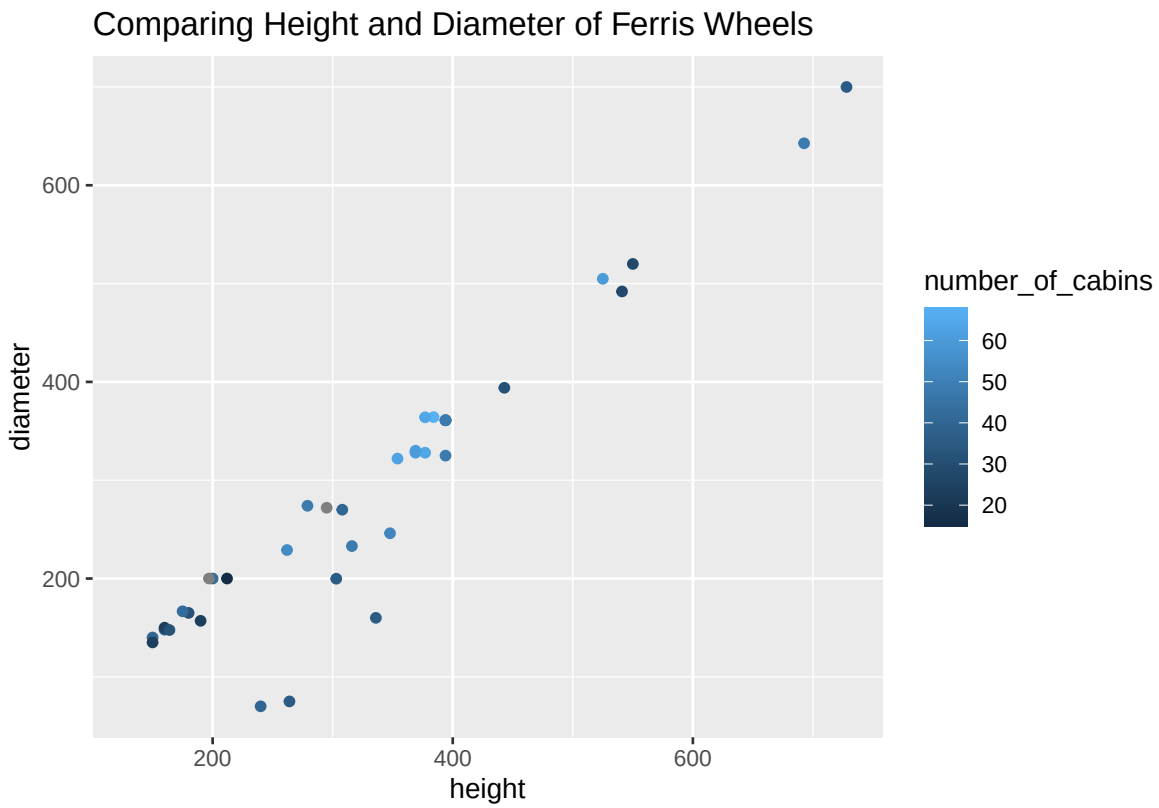

Figure 1: Figure 1.1 Comparing Height and Diameter of Ferris Wheels.

What is the Ferris Wheel that can hold the most amount of patrons in a day?

In this scenario we are going to assume that every Ferris wheel is going to run continuously, without delay, for a full 24 hours. We have to acknowledge that there is a `wheels$hourly_capacity` field in the dataset, but we are going to ignore that, since several observations in this `hourly_capacity` field are missing aka "NA".

So, to substitute we will be creating our own fields `est_passangers_per_day` which is *product* of the `seating capacity` and `rides_per_day` fields.

The `rides per day field`, is another field we create by '*total.min.*24.*hours*'/'*ride.duration.minutes*' giving us the maximum number of rides that each Ferris wheel could mathematically give us in a 24 hour period.

Dataset - Ferris Wheels ordered by estimated max # of passangers a day.

Table 2: Table 1.2 Max estimated passangers of each Ferris Wheel

name	seating_capacity	ride_duration_minutes	rides_per_day	est_passangers_per_day
Beijing Great Wheel	1920	20.0	72.00000	138240.000
Great Wheel	1600	20.0	72.00000	115200.000
Eye of the Emirates	336	6.0	240.00000	80640.000
Golden Gate Flyer	1400	30.0	48.00000	67200.000

name	seating_capacity	ride_duration_minutes	rides_per_day	est_passangers_per_day
Moscow-850	320	7.0	205.71429	65828.571
New York Wheel	1440	38.0	37.89474	54568.421
High Roller	1120	30.0	48.00000	53760.000
Chicago Wheel	720	20.0	72.00000	51840.000
Navy Pier Ferris Wheel	240	7.0	205.71429	49371.429
Niagara SkyWheel	336	10.0	144.00000	48384.000
Cosmo Clock 21	480	15.0	96.00000	46080.000
Tempozan Ferris Wheel	480	15.0	96.00000	46080.000
Eye on Malaysia (1)	336	12.0	120.00000	40320.000
Great Smoky Mountain Skywheel	336	12.0	120.00000	40320.000
Seattle Great Wheel	336	12.0	120.00000	40320.000
Wheel of Brisbane	336	12.0	120.00000	40320.000
London Eye	800	30.0	48.00000	38400.000
Sky Wheel	400	15.0	96.00000	38400.000
Singapore Flyer	784	30.0	48.00000	37632.000
Belfast Wheel	336	13.0	110.76923	37218.462
SkyVue	768	30.0	48.00000	36864.000
Technostar	384	15.0	96.00000	36864.000
Myrtle Beach Sky Wheel	252	10.0	144.00000	36288.000
Brighton Wheel	288	12.0	120.00000	34560.000
Daikanransha	384	16.0	90.00000	34560.000
Diamond and Flower Ferris Wheel	408	17.0	84.70588	34560.000
Texas Star	264	12.0	120.00000	31680.000
Orlando Eye	480	22.0	65.45455	31418.182
Mall of Asia Eye	216	10.0	144.00000	31104.000
Wheel of Perth	216	10.0	144.00000	31104.000
Colossus	320	15.0	96.00000	30720.000
Star of Lake Tai	384	18.0	80.00000	30720.000
360 Pensacola Beach	252	12.0	120.00000	30240.000
Changsha Ferris Wheel	384	20.0	72.00000	27648.000
Harbin Ferris Wheel	378	20.0	72.00000	27216.000
Observation Wheel Leeds	240	13.0	110.76923	26584.615
Miramar Ferris Wheel	288	17.0	84.70588	24395.294
SkyView	252	15.0	96.00000	24192.000
Baghdad Eye	240	15.0	96.00000	23040.000
Mickey's Fun Wheel	144	9.0	160.00000	23040.000
Star of Nanchang	480	30.0	48.00000	23040.000
Shanghai Ferris Wheel	378	25.0	57.60000	21772.800
Suzhou Ferris Wheel	300	20.0	72.00000	21600.000
Star of Puebla	432	30.0	48.00000	20736.000
Wonder Wheel	144	10.0	144.00000	20736.000
The Southern Star	420	30.0	48.00000	20160.000
HEP Five Wheel	208	15.0	96.00000	19968.000
Tianjin Eye	384	30.0	48.00000	18432.000
Zhengzhou Ferris Wheel	384	30.0	48.00000	18432.000
Sky Scraper	216	20.0	72.00000	15552.000
Shining Flower Wheel	64	11.0	130.90909	8378.182
Amuran	NA	14.5	99.31034	NA
Asiatique Sky	NA	NA	NA	NA
Aurora Wheel	NA	NA	NA	NA

name	seating_capacity	ride_duration_minutes	rides_per_day	est_passangers_per_day
Big O	NA	15.0	96.00000	NA
Enclosed Ferris Wheel	144	NA	NA	NA
Eurowheel	NA	11.0	130.90909	NA
Eye on Malaysia (2)	324	NA	NA	NA
Grande Roue de Paris	NA	8.0	180.00000	NA
Helsinki Wheel	288	NA	NA	NA
Jeddah Eye	NA	NA	NA	NA
Kaohsiung Eye	NA	15.0	96.00000	NA
Mashhad Ferris Wheel	NA	NA	NA	NA
Nippon Moon	NA	40.0	36.00000	NA
The Pacific Wheel	NA	NA	NA	NA
Polaris Tower	NA	NA	NA	NA
Roue de Paris	336	NA	NA	NA
Sky Dream Fukuoka	NA	20.0	72.00000	NA
Space Eye	NA	NA	NA	NA
Steel Pier Ferris Wheel	NA	20.0	72.00000	NA
Tbilisi Ferris Wheel	NA	15.0	96.00000	NA
The Dubai Eye	NA	NA	NA	NA
Wiener Riesenrad	NA	10.0	144.00000	NA

Solution

Table 1.2 tells us that the Ferris Wheel that can accommodate the most passengers in a day is the **Beijing Great Wheel**. This was actually second largest Ferris Wheel, on Table 1.1;

Is the biggest Ferris wheels,the same one accommodating the most people a day? What is the relationship?

Notice on Table 1.2 that the **Golden Gate Flyer** which was largest Ferris Wheel, as shown on Table 1.1 is actually #4 on this list.

There is a difference of **71,040 est_passengers_per_day** between the Beijing Great Wheel and the Golden Gate Flyer

If it's not just about being the biggest, what other factors are in play? Let's look at ride duration and the total # of cabins..

```
## Joining, by = c("name", "seating_capacity")
```

Dataset - Ferris Wheels ordered by `height_diameter_rank` & `est_passengers_per_day`

Table 3: Table 1.3 comparing height_diameter to est passangers per day

name	seating_capacity	number_of_cabins	height	diameter	height_diameter	ride_duration_minutes	rides_per_day	est_passangers_per_day
Beijing Great Wheel	1920	48	692.64	642.70	1335.34	20.0	72.00000	138240.000
Great Wheel	1600	40	308.00	270.00	578.00	20.0	72.00000	115200.000
Eye of the Emirates	336	NA	NA	NA	NA	6.0	240.00000	80640.000

name	seating_capacity	number_of_cabins	height	diameter	height_diameter	ride_duration_minutes	ride_duration_days	passengers_per_day
Golden Gate Flyer	1400	36	728.00	700.00	1428.00	30.0	48.00000	67200.000
Moscow-850	320	40	240.00	70.00	310.00	7.0	205.71429	65828.571
New York Wheel	1440	NA	NA	NA	NA	38.0	37.89474	54568.421
High Roller	1120	28	550.00	520.00	1070.00	30.0	48.00000	53760.000
Chicago Wheel	720	36	264.00	75.00	339.00	20.0	72.00000	51840.000
Navy Pier Ferris Wheel	240	40	150.00	140.00	290.00	7.0	205.71429	49371.429
Niagara SkyWheel	336	42	175.00	166.65	341.65	10.0	144.00000	48384.000
Tempozan Ferris Wheel	480	60	369.00	330.00	699.00	15.0	96.00000	46080.000
Cosmo Clock 21	480	60	369.00	328.00	697.00	15.0	96.00000	46080.000
Eye on Malaysia (1)	336	NA	NA	NA	NA	12.0	120.00000	40320.000
Great Smoky Mountain Skywheel	336	NA	NA	NA	NA	12.0	120.00000	40320.000
Seattle Great Wheel	336	NA	NA	NA	NA	12.0	120.00000	40320.000
Wheel of Brisbane	336	NA	NA	NA	NA	12.0	120.00000	40320.000
London Eye	800	32	443.00	394.00	837.00	30.0	48.00000	38400.000
Sky Wheel	400	NA	NA	NA	NA	15.0	96.00000	38400.000
Singapore Flyer	784	28	541.00	492.00	1033.00	30.0	48.00000	37632.000
Belfast Wheel	336	NA	NA	NA	NA	13.0	110.76923	37218.462
Technostar	384	48	279.00	274.00	553.00	15.0	96.00000	36864.000
SkyVue	768	NA	NA	NA	NA	30.0	48.00000	36864.000
Myrtle Beach Sky Wheel	252	NA	NA	NA	NA	10.0	144.00000	36288.000
Diamond and Flower Ferris Wheel	408	68	384.00	364.17	748.17	17.0	84.70588	34560.000
Daikanransha	384	64	377.00	328.00	705.00	16.0	90.00000	34560.000
Brighton Wheel	288	36	160.00	148.00	308.00	12.0	120.00000	34560.000
Texas Star	264	NA	NA	NA	NA	12.0	120.00000	31680.000
Orlando Eye	480	NA	NA	NA	NA	22.0	65.45455	31418.182
Mall of Asia Eye	216	NA	NA	NA	NA	10.0	144.00000	31104.000
Wheel of Perth	216	NA	NA	NA	NA	10.0	144.00000	31104.000
Star of Lake Tai	384	64	377.00	364.00	741.00	18.0	80.00000	30720.000
Colossus	320	32	180.00	165.00	345.00	15.0	96.00000	30720.000
360 Pensacola Beach	252	NA	NA	NA	NA	12.0	120.00000	30240.000
Changsha Ferris Wheel	384	48	394.00	325.00	719.00	20.0	72.00000	27648.000
Harbin Ferris Wheel	378	NA	NA	NA	NA	20.0	72.00000	27216.000
Observation Wheel Leeds	240	NA	NA	NA	NA	13.0	110.76923	26584.615
Miramar Ferris Wheel	288	48	316.00	233.00	549.00	17.0	84.70588	24395.294
SkyView	252	NA	NA	NA	NA	15.0	96.00000	24192.000

name	seating_capacity	number_of_cabins	height_in_feet	diameter_in_feet	height_+_diameter_in_feet	speed_in_mph	ride_duration_minutes	ride_capacity_per_day
Star of Nanchang	480	60	525.00	504.90	1029.90	30.0	48.00000	23040.000
Mickey's Fun Wheel	144	24	160.00	150.00	310.00	9.0	160.00000	23040.000
Baghdad Eye	240	NA	NA	NA	NA	15.0	96.00000	23040.000
Shanghai Ferris Wheel	378	63	354.00	322.00	676.00	25.0	57.60000	21772.800
Suzhou Ferris Wheel	300	60	394.00	361.00	755.00	20.0	72.00000	21600.000
Star of Puebla	432	54	262.00	229.00	491.00	30.0	48.00000	20736.000
Wonder Wheel	144	24	150.00	135.00	285.00	10.0	144.00000	20736.000
The Southern Star	420	NA	NA	NA	NA	30.0	48.00000	20160.000
HEP Five Wheel	208	52	347.77	246.06	593.83	15.0	96.00000	19968.000
Tianjin Eye	384	48	394.00	361.00	755.00	30.0	48.00000	18432.000
Zhengzhou Ferris Wheel	384	48	394.00	361.00	755.00	30.0	48.00000	18432.000
Sky Scraper	216	NA	NA	NA	NA	20.0	72.00000	15552.000
Shining Flower Wheel	64	32	164.04	147.64	311.68	11.0	130.90909	8378.182
Sky Dream Fukuoka	NA	NA	394.00	361.00	755.00	20.0	72.00000	NA
Aurora Wheel	NA	NA	295.00	272.00	567.00	NA	NA	NA
Amuran	NA	36	303.00	199.80	502.80	14.5	99.31034	NA
Kaohsiung Eye	NA	36	336.00	160.00	496.00	15.0	96.00000	NA
Wiener Riesenrad	NA	15	212.00	200.00	412.00	10.0	144.00000	NA
Asiatique Sky	NA	42	200.00	200.00	400.00	NA	NA	NA
Big O	NA	NA	197.00	200.00	397.00	15.0	96.00000	NA
Enclosed Ferris Wheel	144	24	190.00	157.00	347.00	NA	NA	NA
Eurowheel	NA	NA	NA	NA	NA	11.0	130.90909	NA
Eye on Malaysia (2)	324	NA	NA	NA	NA	NA	NA	NA
Grande Roue de Paris	NA	NA	NA	NA	NA	8.0	180.00000	NA
Helsinki Wheel	288	NA	NA	NA	NA	NA	NA	NA
Jeddah Eye	NA	NA	NA	NA	NA	NA	NA	NA
Mashhad Ferris Wheel	NA	NA	NA	NA	NA	NA	NA	NA
Nippon Moon	NA	NA	NA	NA	NA	40.0	36.00000	NA
The Pacific Wheel	NA	NA	NA	NA	NA	NA	NA	NA
Polaris Tower	NA	NA	NA	NA	NA	NA	NA	NA
Roue de Paris	336	NA	NA	NA	NA	NA	NA	NA
Space Eye	NA	NA	NA	NA	NA	NA	NA	NA
Steel Pier Ferris Wheel	NA	NA	NA	NA	NA	20.0	72.00000	NA
Tbilisi Ferris Wheel	NA	NA	NA	NA	NA	15.0	96.00000	NA
The Dubai Eye	NA	NA	NA	NA	NA	NA	NA	NA

Ferris Wheels plotted by `height_diameter_rank` & `est_passengers_per_day` sub_catagorized by Ride duration & # of cabins

```
## Warning: Removed 43 rows containing missing values (geom_point).
```

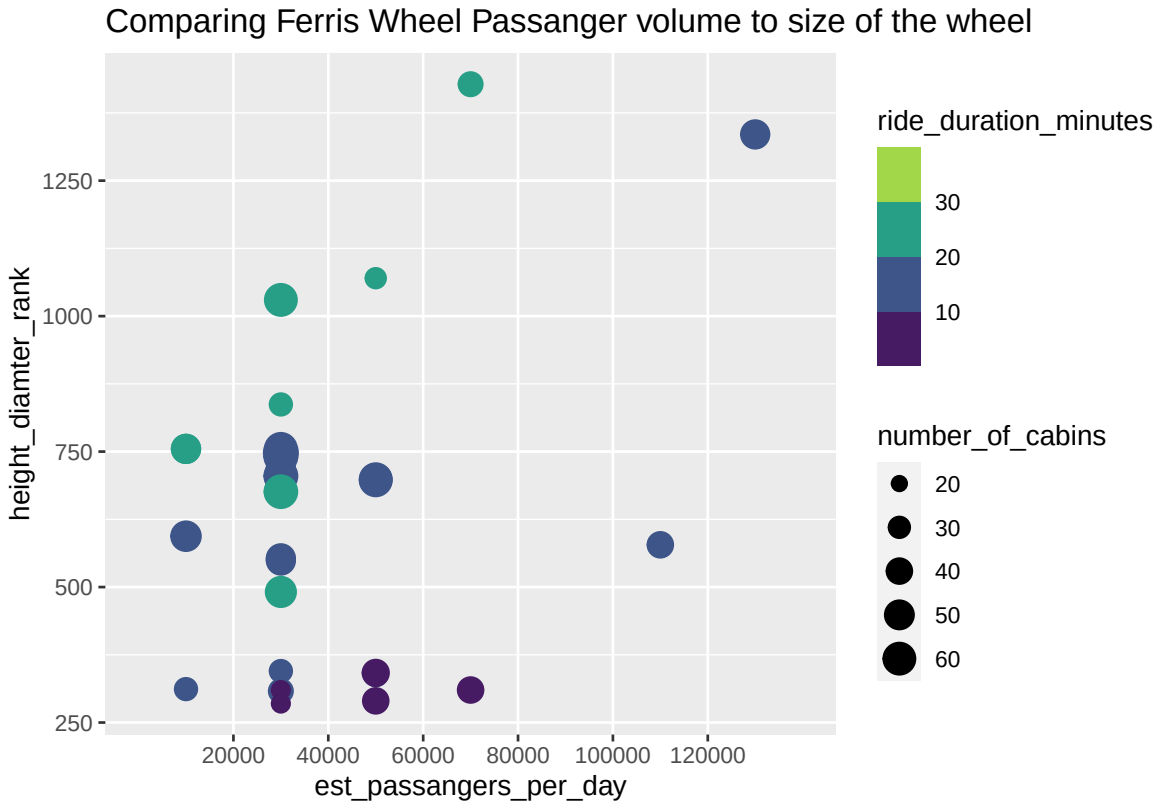

Figure 2: Figure 1.2 Comparing Ferris Wheel Passanger volume to size of the wheel.

Solution - Final

Reviewing Figure 1.2 we can see that for the most part, that several of the Ferris wheels that can accommodate 25000+ passengers actually have a 'height_diameter_rank' of 500+ units.

We can infer that there is a positive correlate relationship between `height_diameter_rank` and `est_passangers_per_day`. We could infer there may be a diminishing return on the far past the 50,000 passengers on the X axis, but in my opinion there are not enough data points to make that assumption at this point.

Also, with the exception of the Golden Gate Flyer (identified as the largest plot on the y axis) and one other sample (the High Roller) the majority of Ferris wheels that can accommodate a daily passenger volume of 40,000 + passengers, have a ride duration of 20 minutes or less.

This expresses that there is more than likely a positive correlation between `ride_duration_minutes` and `est_passangers_per_day`

While the **Golden Gate Flyer** is byfar our largest Farris wheel, We can infer from this, that the reason the **Beijing Great Wheel** can accommodate more passengers than the Golden Gate Flyer is because it's riders have a shorter rider duration, and ergo, it can churn out more passengers.

This means that bigger, does not always mean its better.