

# Indian iPhone sales Data Analysis

```
[123]: import pandas as pd
import numpy as np
import plotly.express as px
import plotly.graph_objects as go
```

```
[10]: data = pd.read_csv("apple_products.csv")
```

```
[12]: data
```

```
[12]:
```

	Product Name \
0	APPLE iPhone 8 Plus (Gold, 64 GB)
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)
2	APPLE iPhone 8 Plus (Silver, 256 GB)
3	APPLE iPhone 8 (Silver, 256 GB)
4	APPLE iPhone 8 (Gold, 256 GB)
--	...
57	APPLE iPhone SE (Black, 64 GB)
58	APPLE iPhone 11 (Purple, 64 GB)
59	APPLE iPhone 11 (White, 64 GB)
60	APPLE iPhone 11 (Black, 64 GB)
61	APPLE iPhone 11 (Red, 64 GB)

	Product URL	Brand	Sale Price \
0	<a href="https://www.flipkart.com/apple-iphone-8-plus-g...">https://www.flipkart.com/apple-iphone-8-plus-g...</a>	Apple	49900
1	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900
2	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900
3	<a href="https://www.flipkart.com/apple-iphone-8-silver...">https://www.flipkart.com/apple-iphone-8-silver...</a>	Apple	77000
4	<a href="https://www.flipkart.com/apple-iphone-8-gold-2...">https://www.flipkart.com/apple-iphone-8-gold-2...</a>	Apple	77000
--	...	...	...
57	<a href="https://www.flipkart.com/apple-iphone-se-black...">https://www.flipkart.com/apple-iphone-se-black...</a>	Apple	29999
58	<a href="https://www.flipkart.com/apple-iphone-11-purpl...">https://www.flipkart.com/apple-iphone-11-purpl...</a>	Apple	46999
59	<a href="https://www.flipkart.com/apple-iphone-11-white...">https://www.flipkart.com/apple-iphone-11-white...</a>	Apple	46999
60	<a href="https://www.flipkart.com/apple-iphone-11-black...">https://www.flipkart.com/apple-iphone-11-black...</a>	Apple	46999
61	<a href="https://www.flipkart.com/apple-iphone-11-red-6...">https://www.flipkart.com/apple-iphone-11-red-6...</a>	Apple	46999

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
0	49900	0	3431	356

1	84900	0	3431	356
2	84900	0	3431	356
3	77000	0	11202	794
4	77000	0	11202	794
--	...	...	...	...
57	39900	24	95909	8161
58	54900	14	43470	3331
59	54900	14	43470	3331
60	54900	14	43470	3331
61	54900	14	43470	3331

	Upc	Star	Rating	Ram
0	MOBEXRGV7EHHTGUH		4.6	2 GB
1	MOBEXRGVAC6TJT4F		4.6	2 GB
2	MOBEXRGVGETABXWZ		4.6	2 GB
3	MOBEXRGVMZWUHCBA		4.5	2 GB
4	MOBEXRGVPK7PFEJZ		4.5	2 GB
--	...	...	...	...
57	MOBFWQ6BR3MK7AUG		4.5	4 GB
58	MOBFWQ6BTFFJKGKE		4.6	4 GB
59	MOBFWQ6BVWVEH3XE		4.6	4 GB
60	MOBFWQ6BXGJCEYNY		4.6	4 GB
61	MOBFWQ6BYYV3FCU7		4.6	4 GB

[62 rows x 11 columns]

[16]: data.head()

[16]:

	Product Name \
0	APPLE iPhone 8 Plus (Gold, 64 GB)
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)
2	APPLE iPhone 8 Plus (Silver, 256 GB)
3	APPLE iPhone 8 (Silver, 256 GB)
4	APPLE iPhone 8 (Gold, 256 GB)

	Product URL	Brand	Sale Price \
0	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900
1	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900
2	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900
3	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000
4	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
0	49900	0	3431	356
1	84900	0	3431	356
2	84900	0	3431	356
3	77000	0	11202	794

4 77000 0 11202 794

	Upc	Star	Rating	Ram
0	MOBEXRGV7EHHTGUH		4.6	2 GB
1	MOBEXRGVAC6TJT4F		4.6	2 GB
2	MOBEXRGVGETABXWZ		4.6	2 GB
3	MOBEXRGVMZWUHCBA		4.5	2 GB
4	MOBEXRGV7PFEJZ		4.5	2 GB

[20]: data.isnull().sum()

[20]:

Product Name	0
Product URL	0
Brand	0
Sale Price	0
Mrp	0
Discount Percentage	0
Number Of Ratings	0
Number Of Reviews	0
Upc	0
Star Rating	0
Ram	0

dtype: int64

**The dataset does not have any missing value**

[23]: data.describe()

[23]:

	Sale Price	Mrp	Discount Percentage	Number Of Ratings	\
count	62.000000	62.000000	62.000000	62.000000	
mean	80073.887097	88058.064516	9.951613	22420.403226	
std	34310.446132	34728.825597	7.608079	33768.589550	
min	29999.000000	39900.000000	0.000000	542.000000	
25%	49900.000000	54900.000000	6.000000	740.000000	
50%	75900.000000	79900.000000	10.000000	2101.000000	
75%	117100.000000	120950.000000	14.000000	43470.000000	
max	140900.000000	149900.000000	29.000000	95909.000000	

	Number Of Reviews	Star Rating
count	62.000000	62.000000
mean	1861.677419	4.575806
std	2855.883830	0.059190
min	42.000000	4.500000
25%	64.000000	4.500000
50%	180.000000	4.600000
75%	3331.000000	4.600000
max	8161.000000	4.700000

## Top 10 Highest-Rated iPhones on flipkart in India?

```
[52]: data.head()
```

```
[52]:
```

	Product Name \	Product URL	Brand	Sale Price \
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
0	49900	0	3431	356
1	84900	0	3431	356
2	84900	0	3431	356
3	77000	0	11202	794
4	77000	0	11202	794

	Upc	Star Rating	Ram
0	MOBEXRGV7EHHTGUH	4.6	2 GB
1	MOBEXRGVAC6TJT4F	4.6	2 GB
2	MOBEXRGVGETABXWZ	4.6	2 GB
3	MOBEXRGVMZWUHCBA	4.5	2 GB
4	MOBEXRGV7PFEJZ	4.5	2 GB

```
[54]: highest_rated = data.sort_values(by = ["Star Rating"], ascending = False)
highest_rated = highest_rated.head(10)
```

```
[56]: print(highest_rated["Product Name"])
```

```
20    APPLE iPhone 11 Pro Max (Midnight Green, 64 GB)
17    APPLE iPhone 11 Pro Max (Space Grey, 64 GB)
16    APPLE iPhone 11 Pro Max (Midnight Green, 256 GB)
15    APPLE iPhone 11 Pro Max (Gold, 64 GB)
14    APPLE iPhone 11 Pro Max (Gold, 256 GB)
0     APPLE iPhone 8 Plus (Gold, 64 GB)
29    APPLE iPhone 12 (White, 128 GB)
32    APPLE iPhone 12 Pro Max (Graphite, 128 GB)
35    APPLE iPhone 12 (Black, 128 GB)
36    APPLE iPhone 12 (Blue, 128 GB)
```

Name: Product Name, dtype: object

[36]: `print(highest_rated)` # open all data with

	Product Name \
20	APPLE iPhone 11 Pro Max (Midnight Green, 64 GB)
17	APPLE iPhone 11 Pro Max (Space Grey, 64 GB)
16	APPLE iPhone 11 Pro Max (Midnight Green, 256 GB)
15	APPLE iPhone 11 Pro Max (Gold, 64 GB)
14	APPLE iPhone 11 Pro Max (Gold, 256 GB)
0	APPLE iPhone 8 Plus (Gold, 64 GB)
29	APPLE iPhone 12 (White, 128 GB)
32	APPLE iPhone 12 Pro Max (Graphite, 128 GB)
35	APPLE iPhone 12 (Black, 128 GB)
36	APPLE iPhone 12 (Blue, 128 GB)

	Product URL	Brand	Sale Price \
20	<a href="https://www.flipkart.com/apple-iphone-11-pro-m...">https://www.flipkart.com/apple-iphone-11-pro-m...</a>	Apple	117100
17	<a href="https://www.flipkart.com/apple-iphone-11-pro-m...">https://www.flipkart.com/apple-iphone-11-pro-m...</a>	Apple	117100
16	<a href="https://www.flipkart.com/apple-iphone-11-pro-m...">https://www.flipkart.com/apple-iphone-11-pro-m...</a>	Apple	131900
15	<a href="https://www.flipkart.com/apple-iphone-11-pro-m...">https://www.flipkart.com/apple-iphone-11-pro-m...</a>	Apple	117100
14	<a href="https://www.flipkart.com/apple-iphone-11-pro-m...">https://www.flipkart.com/apple-iphone-11-pro-m...</a>	Apple	131900
0	<a href="https://www.flipkart.com/apple-iphone-8-plus-g...">https://www.flipkart.com/apple-iphone-8-plus-g...</a>	Apple	49900
29	<a href="https://www.flipkart.com/apple-iphone-12-white...">https://www.flipkart.com/apple-iphone-12-white...</a>	Apple	75900
32	<a href="https://www.flipkart.com/apple-iphone-12-pro-m...">https://www.flipkart.com/apple-iphone-12-pro-m...</a>	Apple	120900
35	<a href="https://www.flipkart.com/apple-iphone-12-black...">https://www.flipkart.com/apple-iphone-12-black...</a>	Apple	75900
36	<a href="https://www.flipkart.com/apple-iphone-12-blue-...">https://www.flipkart.com/apple-iphone-12-blue-...</a>	Apple	75900

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
20	117100	0	1078	101
17	117100	0	1078	101
16	131900	0	1078	101
15	117100	0	1078	101
14	131900	0	1078	101
0	49900	0	3431	356
29	84900	10	2101	180
32	129900	6	580	45
35	84900	10	2101	180
36	84900	10	2101	180

	Upc	Star Rating	Ram
20	MOBFKCTSRYPQNYT	4.7	4 GB
17	MOBFKCTSKDMKCGQS	4.7	4 GB
16	MOBFKCTSCAAKGQV7	4.7	4 GB
15	MOBFKCTSAPAYNSGG	4.7	4 GB
14	MOBFKCTS7HCHSPFH	4.7	4 GB
0	MOBEXRGV7EHHTGUH	4.6	2 GB
29	MOBFWBYZBTZFGJF9	4.6	6 GB

32	MOBFWBYZFDGQSDWS	4.6	6 GB
35	MOBFWBYZK3HACR72	4.6	6 GB
36	MOBFWBYZKPTZF9VG	4.6	6 GB

**How many ratings do the highest-rated iPhones on flipkart have?**

[58]: `data.head()`

[58]:

	Product Name \
0	APPLE iPhone 8 Plus (Gold, 64 GB)
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)
2	APPLE iPhone 8 Plus (Silver, 256 GB)
3	APPLE iPhone 8 (Silver, 256 GB)
4	APPLE iPhone 8 (Gold, 256 GB)

	Product URL	Brand	Sale Price \
0	<a href="https://www.flipkart.com/apple-iphone-8-plus-g...">https://www.flipkart.com/apple-iphone-8-plus-g...</a>	Apple	49900
1	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900
2	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900
3	<a href="https://www.flipkart.com/apple-iphone-8-silver...">https://www.flipkart.com/apple-iphone-8-silver...</a>	Apple	77000
4	<a href="https://www.flipkart.com/apple-iphone-8-gold-2...">https://www.flipkart.com/apple-iphone-8-gold-2...</a>	Apple	77000

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
0	49900	0	3431	356
1	84900	0	3431	356
2	84900	0	3431	356
3	77000	0	11202	794
4	77000	0	11202	794

	Upc	Star	Rating	Ram
0	MOBEXRGV7EHHTGUH	4.6	2 GB	
1	MOBEXRGVAC6TJT4F	4.6	2 GB	
2	MOBEXRGVGETABXWZ	4.6	2 GB	
3	MOBEXRGVMZWUHCBA	4.5	2 GB	
4	MOBEXRGV7PFEJZ	4.5	2 GB	

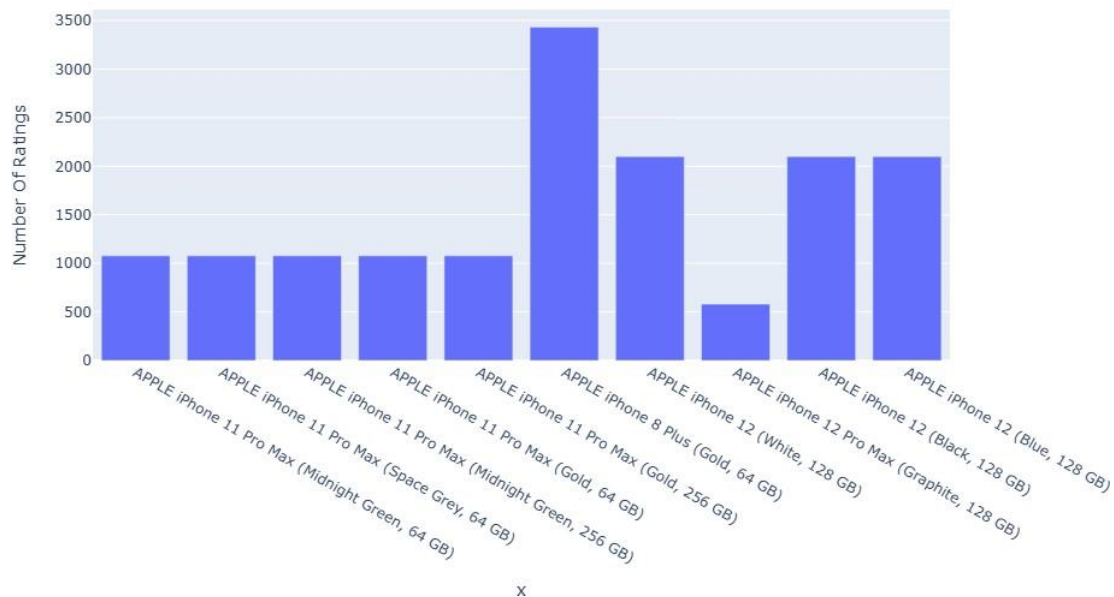
[210]:

```

iphones = highest_rated["Product Name"].value_counts()
label = iphone.index
counts = highest_rated["Number Of Ratings"]
figure = px.bar(highest_rated, x = label, y = counts, title = "number of Ratings_
of Highest Rated iPhones", width=1000, height=600)
figure.show()

```

number of Ratings of Highest Rated iPhones



**Which iPhone has the highest number of reviews on Flipkart?**

[127]: data.head()

[127]:

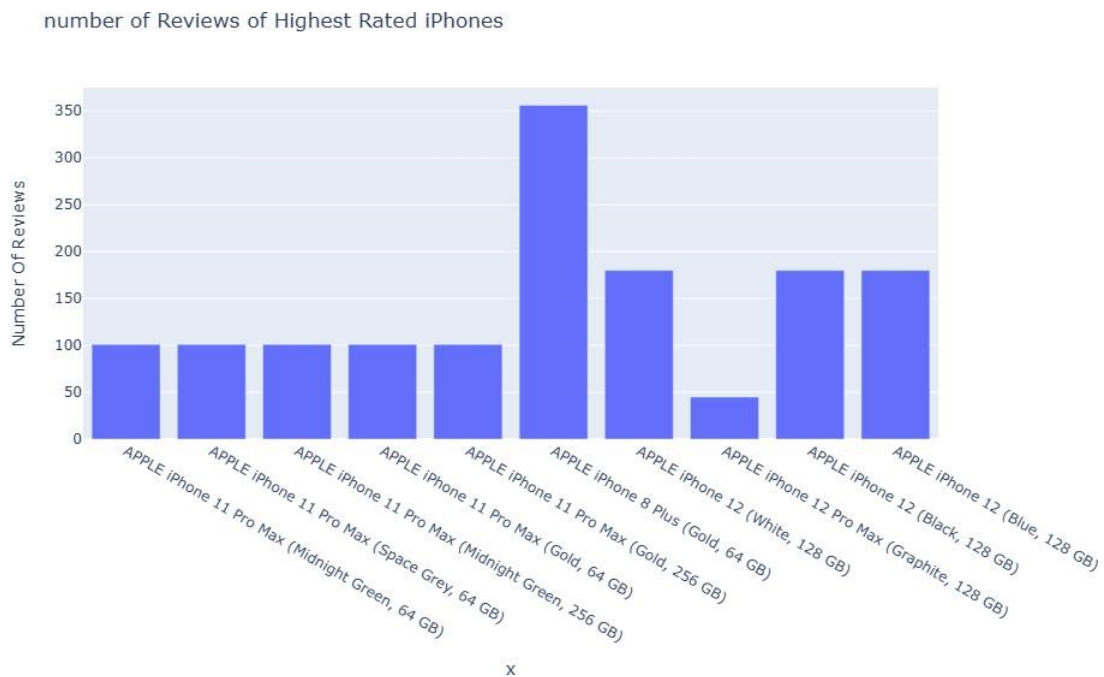
	Product Name \
0	APPLE iPhone 8 Plus (Gold, 64 GB)
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)
2	APPLE iPhone 8 Plus (Silver, 256 GB)
3	APPLE iPhone 8 (Silver, 256 GB)
4	APPLE iPhone 8 (Gold, 256 GB)

	Product URL	Brand	Sale Price \
0	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900
1	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900
2	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900
3	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000
4	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
0	49900	0	3431	356
1	84900	0	3431	356
2	84900	0	3431	356
3	77000	0	11202	794
4	77000	0	11202	794

	Upc	Star	Rating	Ram
0	MOBEXRGV7EHHTGUH		4.6	2 GB
1	MOBEXRGVAC6TJT4F		4.6	2 GB
2	MOBEXRGVGETABXWZ		4.6	2 GB
3	MOBEXRGVMZWUHCBA		4.5	2 GB
4	MOBEXRGVPK7PFEJZ		4.5	2 GB

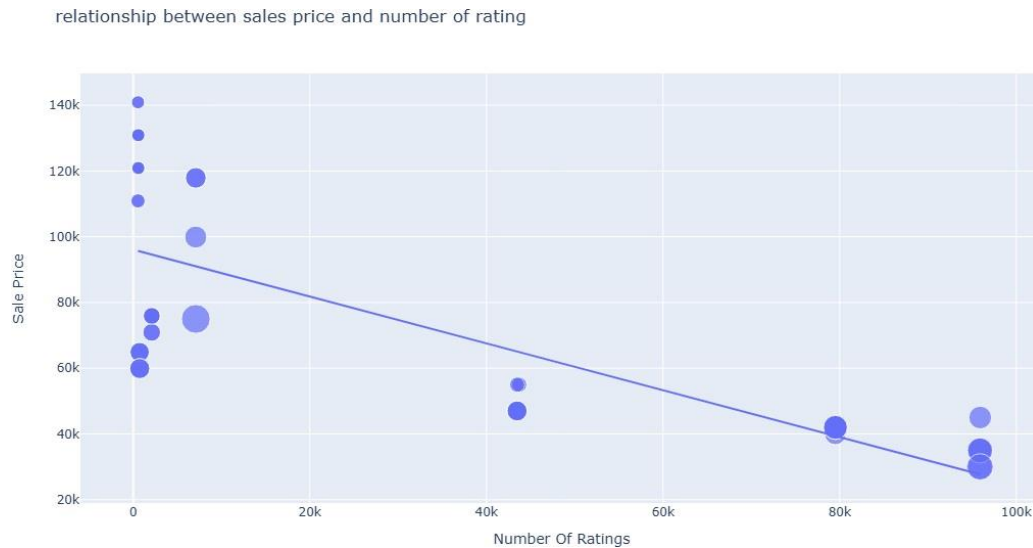
```
[212]: iphones = highest_rated["Product Name"].value_counts()
label = iphone.index
counts = highest_rated["Number Of Reviews"]
figure = px.bar(highest_rated, x = label, y = counts,title = "number of Reviews_
of Highest Rated iPhones",width=1000, height=600 )
figure.show()
```



**What is relationship between the sale price of iPhones and the number of ratings on flipkart?**



```
[218]: figure = px.scatter(data_frame = data, x = "Number Of Ratings", y = "Sale_
Price", size = "Discount Percentage", trendline = "ols", title = "
relationship between sales price and number of rating",
width=1000,
height=600)
figure.show()
```

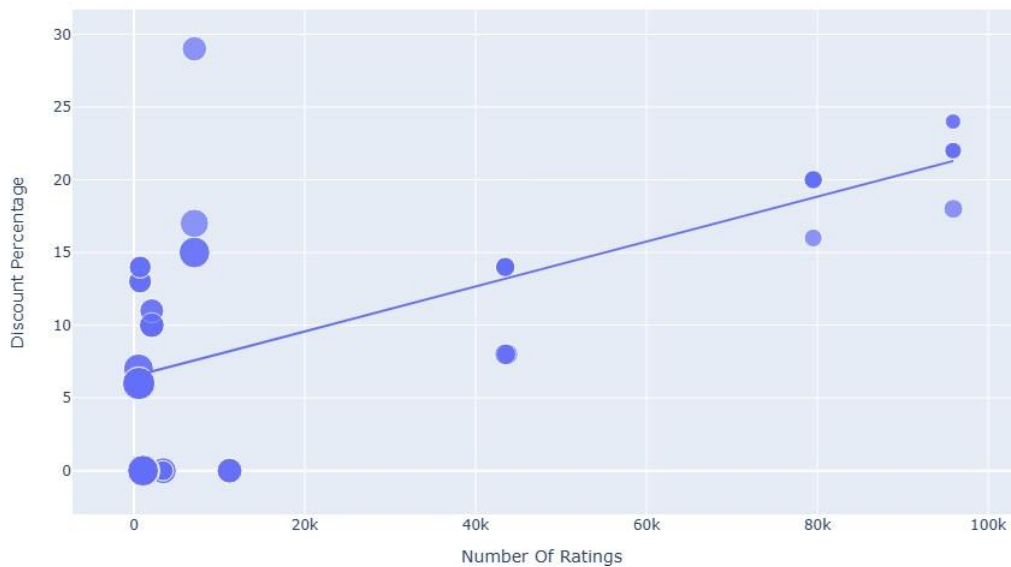


**There is a negative relationship between the sale price of iPhones and the number of ratings. It means iPhones with lower sale prices are sold more in INDIA**

**What is relationship between the discount percentage of iPhones and the number of ratings on flipkart?**

```
[196]: figure = px.scatter(data_frame = data, x = "Number Of Ratings",
y= "Discount Percentage", size = "Sale Price",
trendline = "ols",
title = "Relationship between Discount and Number of_
Ratings of iPhones",
width=1000,
height=600)
figure.show()
```

Relationship between Discount and Number of Ratings of iPhones



## Most expensive and least expensive

[216]: data.head()

[216]:

	Product Name \
0	APPLE iPhone 8 Plus (Gold, 64 GB)
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)
2	APPLE iPhone 8 Plus (Silver, 256 GB)
3	APPLE iPhone 8 (Silver, 256 GB)
4	APPLE iPhone 8 (Gold, 256 GB)

	Product URL	Brand	Sale Price \
0	<a href="https://www.flipkart.com/apple-iphone-8-plus-g...">https://www.flipkart.com/apple-iphone-8-plus-g...</a>	Apple	49900
1	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900
2	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900
3	<a href="https://www.flipkart.com/apple-iphone-8-silver...">https://www.flipkart.com/apple-iphone-8-silver...</a>	Apple	77000
4	<a href="https://www.flipkart.com/apple-iphone-8-gold-2...">https://www.flipkart.com/apple-iphone-8-gold-2...</a>	Apple	77000

	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews \
0	49900	0	3431	356
1	84900	0	3431	356
2	84900	0	3431	356
3	77000	0	11202	794
4	77000	0	11202	794

	Upc	Star	Rating	Ram
0	MOBEXRGV7EHHTGUH		4.6	2 GB
1	MOBEXRGVAC6TJT4F		4.6	2 GB
2	MOBEXRGVGETABXWZ		4.6	2 GB
3	MOBEXRGVMZWUHCBA		4.5	2 GB
4	MOBEXRGV7PFEJZ		4.5	2 GB

```
[227]: most_expensive = data.loc[data['Sale Price'].idxmax()]
least_expensive = data.loc[data['Sale Price'].idxmin()]

print("Most Expensive Product:")
print(most_expensive)

print("\nLeast Expensive Product:")
print(least_expensive)
```

Most Expensive Product:

Product Name	APPLE iPhone 12 Pro (Silver, 512 GB)
Product URL	<a href="https://www.flipkart.com/apple-iphone-12-pro-s...">https://www.flipkart.com/apple-iphone-12-pro-s...</a>
Brand	Apple
Sale Price	140900
Mrp	149900
Discount Percentage	6
Number Of Ratings	542
Number Of Reviews	42
Upc	MOBFWBYZ5UY6ZBVA
Star Rating	4.5
Ram	4 GB
Name: 24, dtype: object	

Least Expensive Product:

Product Name	APPLE iPhone SE (White, 64 GB)
Product URL	<a href="https://www.flipkart.com/apple-iphone-se-white...">https://www.flipkart.com/apple-iphone-se-white...</a>
Brand	Apple
Sale Price	29999
Mrp	39900
Discount Percentage	24
Number Of Ratings	95807
Number Of Reviews	8154
Upc	MOBFWQ6BGWDVGF3E
Star Rating	4.5
Ram	2 GB
Name: 52, dtype: object	

[ ]: