

```
In [11]: import pandas as pd
import numpy as np
import plotly.express as px
import plotly.graph_objects as go
```

```
In [12]: data = pd.read_csv("apple_products.csv")
print(data.head())
```

	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

Before moving forward, let's have a quick look at whether this dataset contains any null values or not:

```
In [13]: print(data.isnull().sum())
```

```
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 doesn't have any null values. Now, let's have a look at the descriptive statistics of the data:

```
In [14]: print(data.describe())
```

	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

```
In [16]: data.head()
```

```
Out[16]:
```

	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	
0	APPLE iPhone 8 Plus (Gold, 64 GB)	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900	49900	0	3431	356	N
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431	356	
2	APPLE iPhone 8 Plus (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-plus-s...	Apple	84900	84900	0	3431	356	N
3	APPLE iPhone 8 (Silver, 256 GB)	https://www.flipkart.com/apple-iphone-8-silver...	Apple	77000	77000	0	11202	794	M
4	APPLE iPhone 8 (Gold, 256 GB)	https://www.flipkart.com/apple-iphone-8-gold-2...	Apple	77000	77000	0	11202	794	

iPhone Sales Analysis in India

Now I will create a new dataframe by storing all the data about the top 10 highest-rated iPhones in India on Flipkart. It will help in understanding what kind of iPhones are liked the most in India:

```
In [18]: highestRated = data.sort_values(by=["Star Rating"],
                                         ascending=False)
highestRated = highestRated.head(10)

print(highestRated['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
```


	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	https://www.flipkart.com/apple-iphone-11-pro-m...	Apple	117100
17	https://www.flipkart.com/apple-iphone-11-pro-m...	Apple	117100
16	https://www.flipkart.com/apple-iphone-11-pro-m...	Apple	131900
15	https://www.flipkart.com/apple-iphone-11-pro-m...	Apple	117100
14	https://www.flipkart.com/apple-iphone-11-pro-m...	Apple	131900
0	https://www.flipkart.com/apple-iphone-8-plus-g...	Apple	49900
29	https://www.flipkart.com/apple-iphone-12-white...	Apple	75900
32	https://www.flipkart.com/apple-iphone-12-pro-m...	Apple	120900
35	https://www.flipkart.com/apple-iphone-12-black...	Apple	75900
36	https://www.flipkart.com/apple-iphone-12-blue-...	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

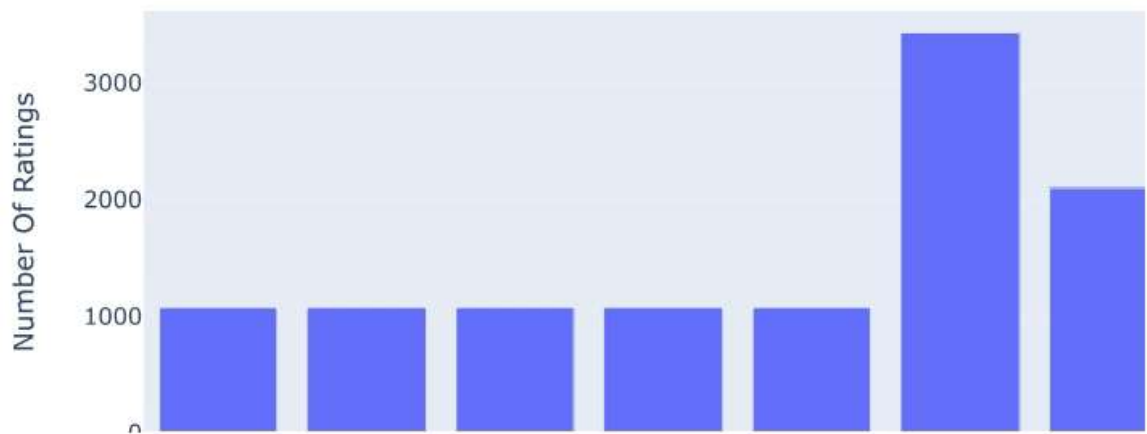
	Upc	Star Rating	Ram
20	MOBFKCTSRYPQNYT	4.7	4 GB
17	MOBFKCTSKDMKCGQS	4.7	4 GB
16	MOBFKCTSCAAKGQV7	4.7	4 GB
15	MOBFKCTSAPAYNSGG	4.7	4 GB
14	MOBFKCTS7HCHSPFH	4.7	4 GB
0	MOBEXRGV7EHHTGUH	4.6	2 GB
29	MOBFWBYZBTZFGJF9	4.6	6 GB
32	MOBFWBYZFDGQSDWS	4.6	6 GB

35	MOBFWBYZK3HACR72	4.6	6 GB
36	MOBFWBYZKPTZF9VG	4.6	6 GB

Now let's have a look at the number of ratings of the highest-rated iPhones on Flipkart:

```
In [6]: iphones = highest_rated["Product Name"].value_counts()
label = iphones.index
counts = highest_rated["Number Of Ratings"]
figure = px.bar(highest_rated, x=label,
                y = counts,
                title="Number of Ratings of Highest Rated iPhones")
figure.show()
```

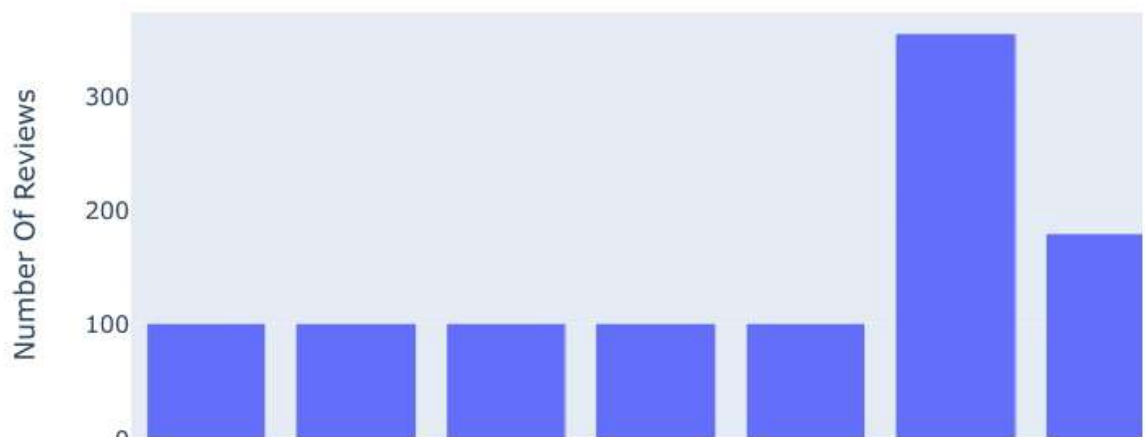
Number of Ratings of Highest Rated iPhones



According to the above bar graph, APPLE iPhone 8 Plus (Gold, 64 GB) has the most ratings on Flipkart. Now let's have a look at the number of reviews of the highest-rated iPhones on Flipkart:

```
In [7]: iphones = highest_rated["Product Name"].value_counts()
label = iphones.index
counts = highest_rated["Number Of Reviews"]
figure = px.bar(highest_rated, x=label,
                y = counts,
                title="Number of Reviews of Highest Rated iPhones")
figure.show()
```

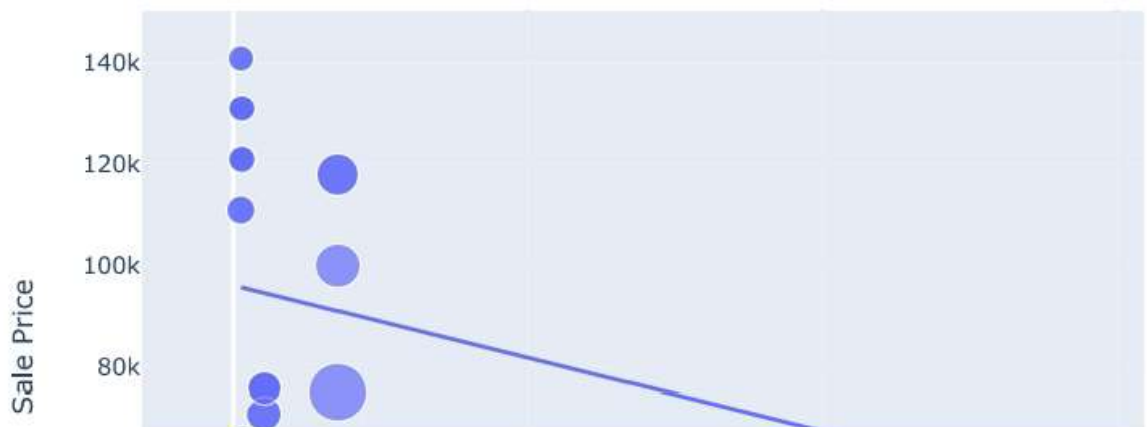
Number of Reviews of Highest Rated iPhones



APPLE iPhone 8 Plus (Gold, 64 GB) is also leading in the highest number of reviews on Flipkart among the highest-rated iPhones in India. Now let's have a look at the relationship between the sale price of iPhones and their ratings on Flipkart:

```
In [8]: figure = px.scatter(data_frame = data, x="Number Of Ratings",
                             y="Sale Price", size="Discount Percentage",
                             trendline="ols",
                             title="Relationship between Sale Price and Number of Ratings",
                             figure.show())
```

Relationship between Sale Price and Number of Ratings of iPhones



There is a negative linear relationship between the sale price of iPhones and the number of ratings. It means iPhones with lower sale prices are sold more in India. Now let's have a look at the relationship between the discount percentage on iPhones on Flipkart and the number of ratings:

Relationship Between Discount Percentage & Number of ratings of iphone


```
In [9]: figure = px.scatter(data_frame = data, x="Number Of Ratings",
                             y="Discount Percentage", size="Sale Price",
                             trendline="ols",
                             title="Relationship between Discount Percentage and Number
figure.show()
```

Relationship between Discount Percentage and Number of Ratir



Summary

APPLE iPhone 8 Plus (Gold, 64 GB) was the most appreciated iPhone in India iPhones with lower sale prices are sold more in India iPhones with high discounts are sold more in India

```
In [10]: most_expensive = data.loc[data['Sale Price'].idxmax()]
least_expensive = data.loc[data['Sale Price'].idxmin()]
```

```
# Display the results
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	https://www.flipkart.com/apple-iphone-12-pro-s... (https://www.flipkart.com/apple-iphone-12-pro-s...)
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	https://www.flipkart.com/apple-iphone-se-white... (https://www.flipkart.com/apple-iphone-se-white...)
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

In []:

In []:

In []: