

Apple is one of the most loved tech brands globally, renowned for its productivity, exceptional user experience, and strong privacy measures. The company leverages data-driven insights to optimize sales and make informed decisions, ensuring that its products consistently meet consumer expectations. With a market capitalization exceeding \$3 trillion as of 2024, Apple remains a leader in the tech industry, driven by innovation and a commitment to protecting user data. This focus on quality and security continues to solidify Apple's position as a trusted and influential brand worldwide.

- 1) What are the top 10 highest-rated iPhones on Flipkart in India?
- 2) How many ratings do the highest-rated iPhones on Flipkart have?
- 3) Which iPhone has the highest number of reviews on Flipkart?
- 4) What is the relationship between the sale price of iPhones and the number of ratings on Flipkart?
- 5) What is the relationship between the discount percentage and the number of ratings of iPhones on Flipkart?
- 6) Can you figure out the least expensive and most expensive iPhones in the Indian market, along with all their specifications?

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import plotly.express as px
import plotly.graph_objects as go
```

## Importing Data Set

```
data = pd.read_csv("apple_products.csv")
```

```
data
```



	Product Name	Product URL	Brand	Sale Price	Mrp	Discount Percentage	Number Of Ratings
0	APPLE iPhone 8 Plus (Gold, 64 GB)	<a href="https://www.flipkart.com/apple-iphone-8-plus-g...">https://www.flipkart.com/apple-iphone-8-plus-g...</a>	Apple	49900	49900	0	3431
1	APPLE iPhone 8 Plus (Space Grey, 256 GB)	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900	84900	0	3431
2	APPLE iPhone 8 Plus (Silver, 256 GB)	<a href="https://www.flipkart.com/apple-iphone-8-plus-s...">https://www.flipkart.com/apple-iphone-8-plus-s...</a>	Apple	84900	84900	0	3431
3	APPLE iPhone 8 (Silver, 256 GB)	<a href="https://www.flipkart.com/apple-iphone-8-silver...">https://www.flipkart.com/apple-iphone-8-silver...</a>	Apple	77000	77000	0	11202
4	APPLE iPhone 8 (Gold, 256 GB)	<a href="https://www.flipkart.com/apple-iphone-8-gold-2...">https://www.flipkart.com/apple-iphone-8-gold-2...</a>	Apple	77000	77000	0	11202
...	...	...	...	...	...	...	...
57	APPLE iPhone SE (Black, 64 GB)	<a href="https://www.flipkart.com/apple-iphone-se-black...">https://www.flipkart.com/apple-iphone-se-black...</a>	Apple	29999	39900	24	95909
58	APPLE iPhone 11 (Purple, 64 GB)	<a href="https://www.flipkart.com/apple-iphone-11-purpl...">https://www.flipkart.com/apple-iphone-11-purpl...</a>	Apple	46999	54900	14	43470
59	APPLE iPhone 11 (White, 64 GB)	<a href="https://www.flipkart.com/apple-iphone-11-white...">https://www.flipkart.com/apple-iphone-11-white...</a>	Apple	46999	54900	14	43470
60	APPLE iPhone 11 (Black, 64 GB)	<a href="https://www.flipkart.com/apple-iphone-11-black...">https://www.flipkart.com/apple-iphone-11-black...</a>	Apple	46999	54900	14	43470
61	APPLE iPhone 11 (Red)	<a href="https://www.flipkart.com/apple-iphone-11-red-6">https://www.flipkart.com/apple-iphone-11-red-6</a>	Apple	46999	54900	14	43470

64 GB)

62 rows × 11 columns

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```
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	<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	MOBEXRGMZWUHCBA	4.5	2 GB
4	MOBEXRGVPK7PFEJZ	4.5	2 GB

```
data.head()
```



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



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## Data Preprocessing - Finding Missing Values in DataSet

```
data.isnull().sum()
```



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

**dtype:** int64

data.describe()



	Sale Price	Mrp	Discount Percentage	Number Of Ratings	Number Of Reviews	Star Rating
<b>count</b>	62.000000	62.000000	62.000000	62.000000	62.000000	62.000000
<b>mean</b>	80073.887097	88058.064516	9.951613	22420.403226	1861.677419	4.575806
<b>std</b>	34310.446132	34728.825597	7.608079	33768.589550	2855.883830	0.059190
<b>min</b>	29999.000000	39900.000000	0.000000	542.000000	42.000000	4.500000
<b>25%</b>	49900.000000	54900.000000	6.000000	740.000000	64.000000	4.500000
<b>50%</b>	75900.000000	79900.000000	10.000000	2101.000000	180.000000	4.600000
<b>75%</b>	117100.000000	120950.000000	14.000000	43470.000000	3331.000000	4.600000
<b>max</b>	140900.000000	149900.000000	29.000000	95909.000000	8161.000000	4.700000



## 1:- What are the top 10 highest-rated iphones on Flipkart on India?

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

```
highestRated['Product Name']
```



### 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)

```

**dtype:** object

```
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)

```

```

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

## 2:- How many ratings do the highest-rated iPhones on Flipkart have?

```

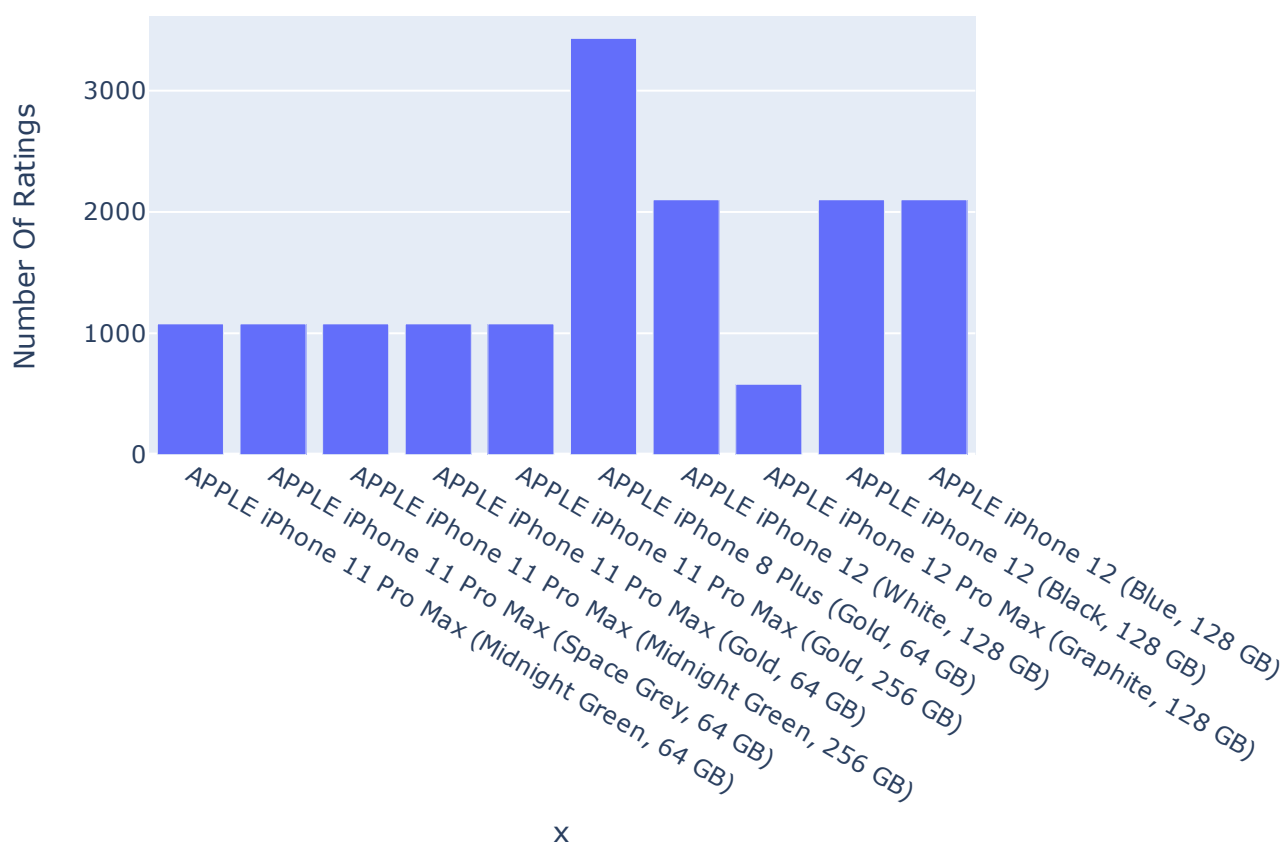
iphones = highest_rated['Product Name'].value_counts()
label = iphones.index
counts = highest_rated['Number Of Ratings']
figure = px.bar(highest_rated, x=label, y=counts, title="Number of Ratings of Highest Ra

figure.show()

```



Number of Ratings of Highest Rating



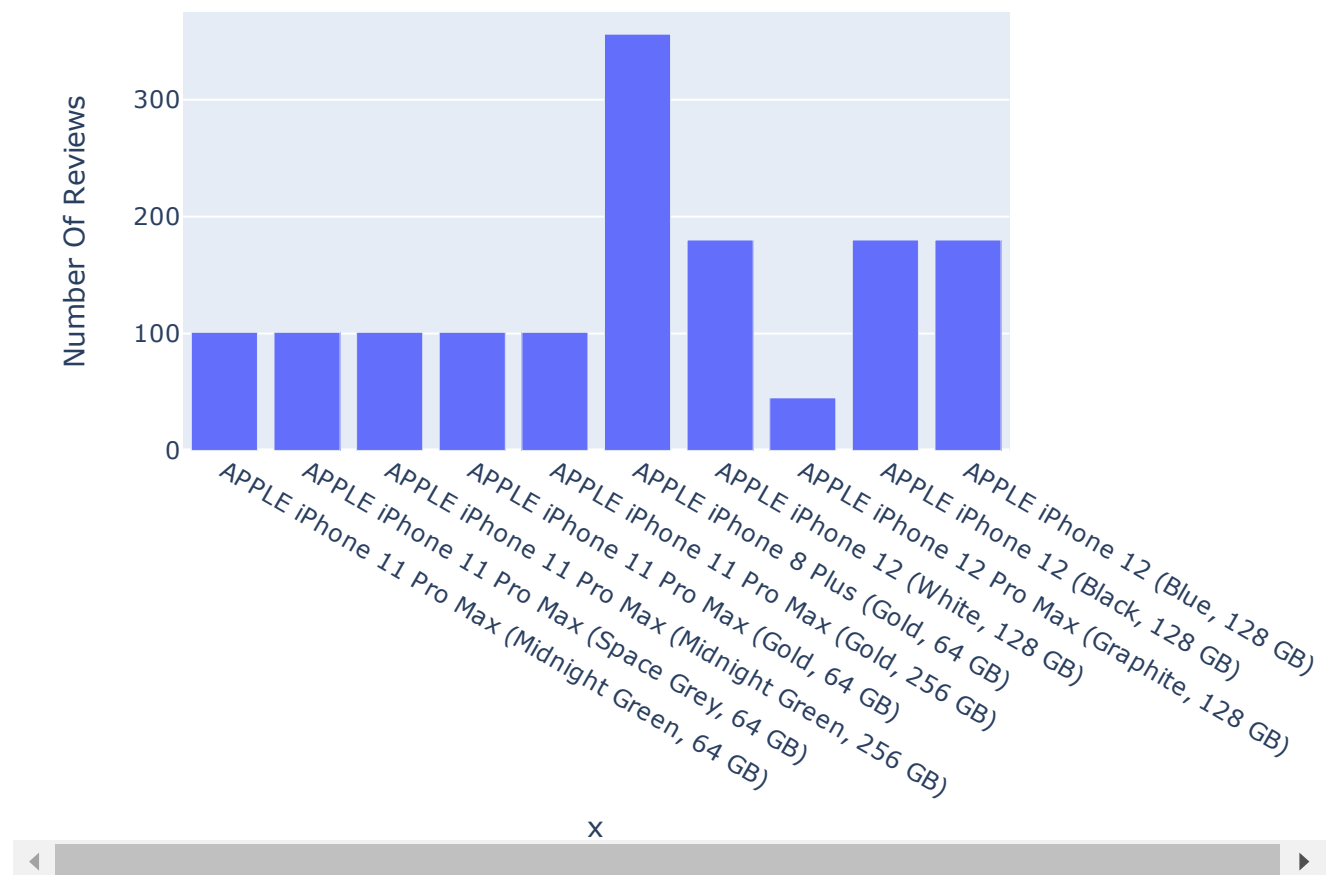
### 3:- Which iPhone has the highest number of reviews on Flipkart?

```
iphone_reviews = highest_rated['Product Name'].value_counts()
label = iphone_reviews.index
counts = highest_rated['Number Of Reviews']
figure = px.bar(highest_rated,x=label,y=counts,title="Number of Review of Highest Rated iPhones")
```

```
figure.show()
```



Number of Review of Highest Rated iPhones



### 4:- What is the relationship between the sale price of iPhones and the number of ratings on Flipkart?

```
data.head()
```





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

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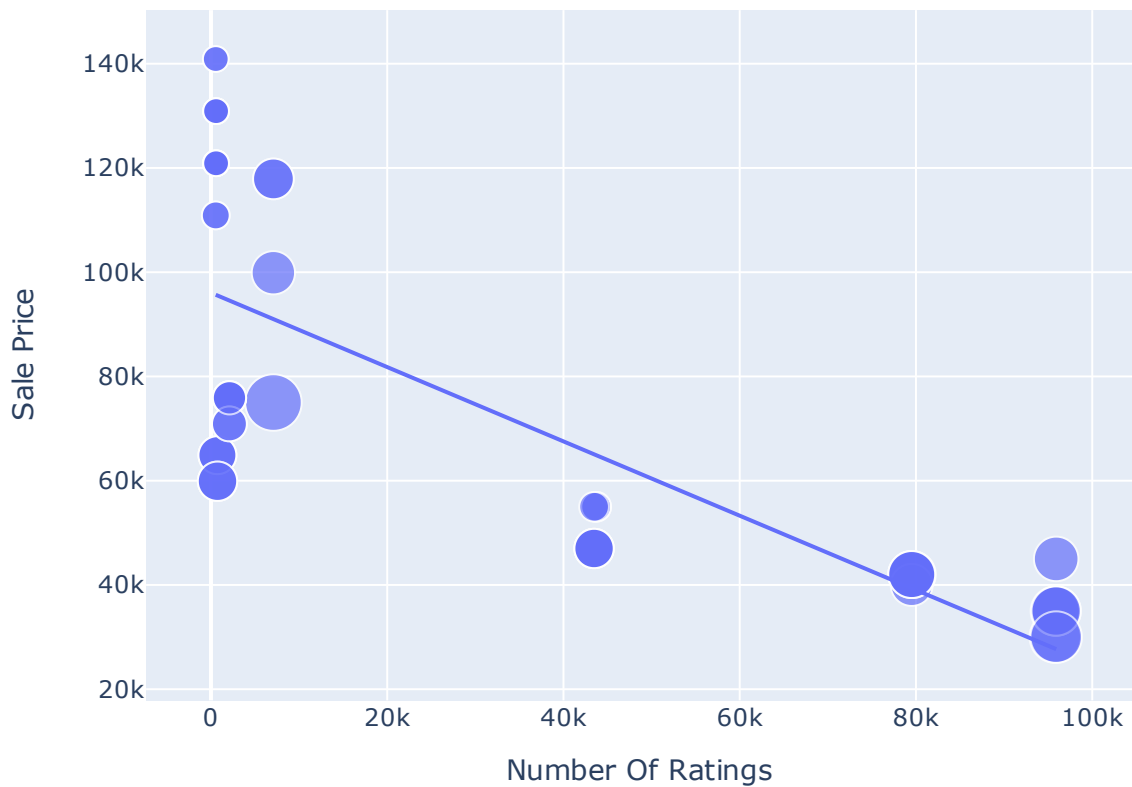
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```
#relationship creation
#using scatter plot
#many condition #negative linear relationship
figure = px.scatter(data_frame=data,x="Number Of Ratings",y="Sale Price", size= 'Discr

figure.show()
```



## Relationship between sales price and number of rating



There is a negative linear relationship between the sale price of iPhones and the number of ratings. It means iPhones are sold more in India.

5:- What is the relationship between the discount percentage and the number of ratings on Flipkart?

```
figure = px.scatter(data_frame=data, x="Number Of Ratings", y="Discount Percentage", size=
figure.show()
```



## Relationship between discount percentage and number of rating

