

# Real World Smartphone Dataset

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## Dataset:

Contains 21 features and 1 output variable – price and have 980 instances.

Dataset does contains some missing values and have both numerical and categorical variables.

Dataset does not contain any duplicate entries.

## Imputation:

### 1. Imputation of avg\_rating by mean per Brand

The **average rating** of a smartphone is primarily influenced by the brand's reputation, build quality, software, and customer satisfaction.

### 2. Imputation of processor\_speed by mode per Processor Brand

Each processor brand produces chips with a specific range of speeds, meaning that the most common speed within each brand is a reasonable assumption for missing values. Using the **mode** (most frequent value) is better than the mean here because processor speeds are usually standardized at specific frequencies (e.g., 2.0 GHz, 2.2 GHz, 2.8 GHz).

### 3. Imputation of fast\_charging by mode per Brand

Whether a smartphone has **fast charging** is strongly related to the brand's design decisions. Certain brands (e.g., OnePlus, Realme) frequently include fast charging, while others (e.g., Apple) may not.

### 4. Imputation of num\_cores by mode per Processor Brand

The **number of cores** is defined by the processor manufacturer (e.g., Qualcomm, MediaTek). Most processors from the same brand tend to follow a common pattern (e.g., MediaTek often uses octa-core, while Apple uses hexa-core).

## 5. Imputation of primary\_camera\_front by mode per Brand

The **front camera resolution** is often similar across models from the same brand. Brands follow specific design choices for front cameras (e.g., Apple often has 12 MP, budget brands may have 8 MP).

## 6. Imputation of processor\_brand by mode per Brand Name

The **processor brand** (e.g., Qualcomm, MediaTek, Exynos) is typically associated with a smartphone manufacturer. Most smartphone brands use a limited set of processor brands.

## 7. Imputation of OS by mode per Brand Name

The **operating system (os)** is strongly tied to the **smartphone brand**.

## EDA:

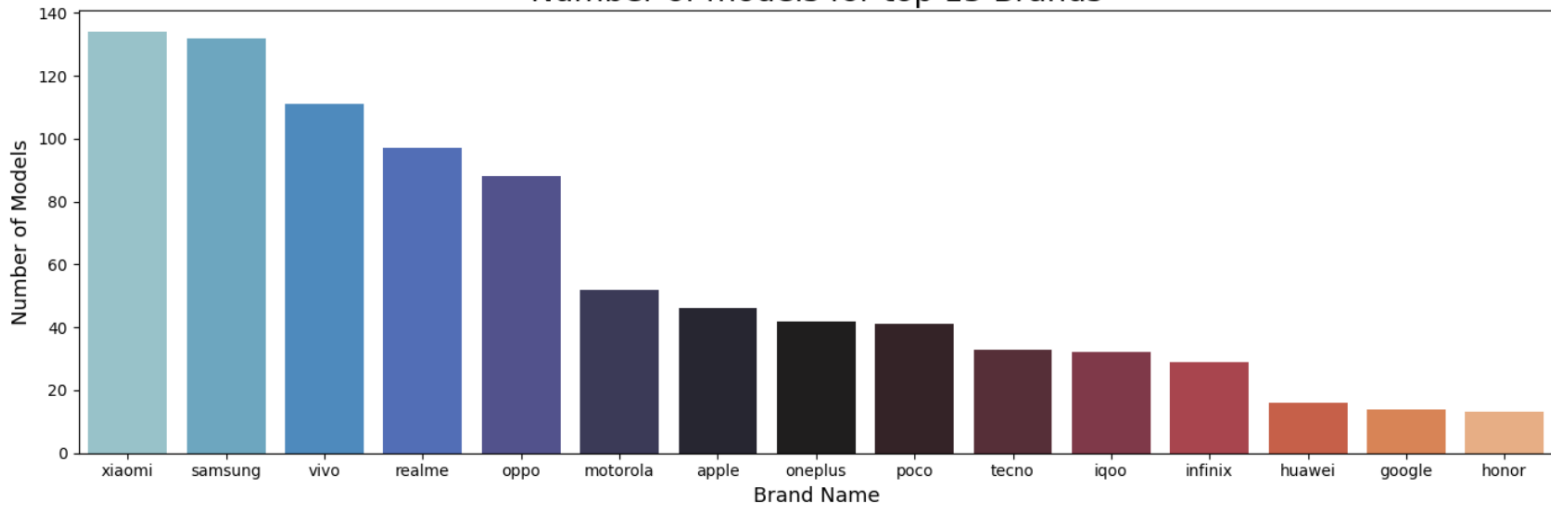
Give a brief statistics of the each column like mean , median , mode , min , max and percentile at 25 , 50 , 75 % .

By plotting various histograms of various features price, avg\_rating, processor\_speed, battery\_capacity, screen\_size and resolution size we get an idea of distribution of these values for various brand names.

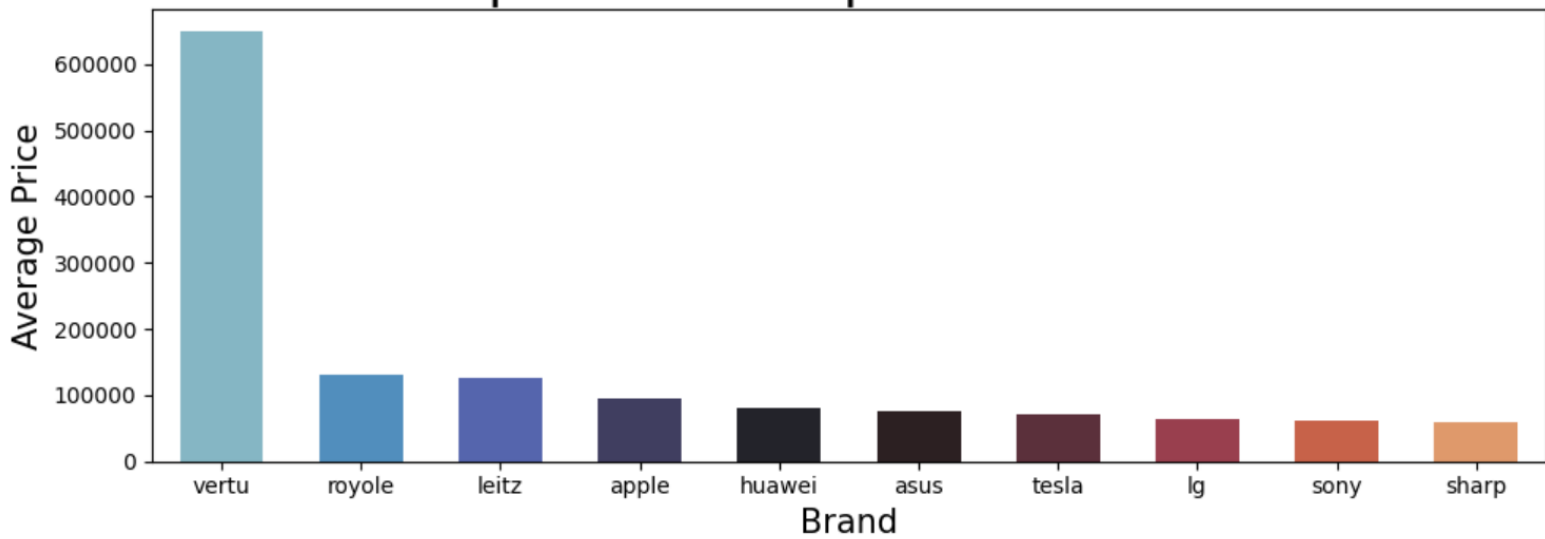
Understanding the distribution of key smartphone features is crucial for evaluating market trends, identifying brand-specific patterns, and making informed decisions. By analyzing **histograms of various numerical attributes** such as **price, average rating, processor speed, battery capacity, screen size, and resolution**, we gain valuable insights into how these specifications vary across different smartphone brands.

During exploration

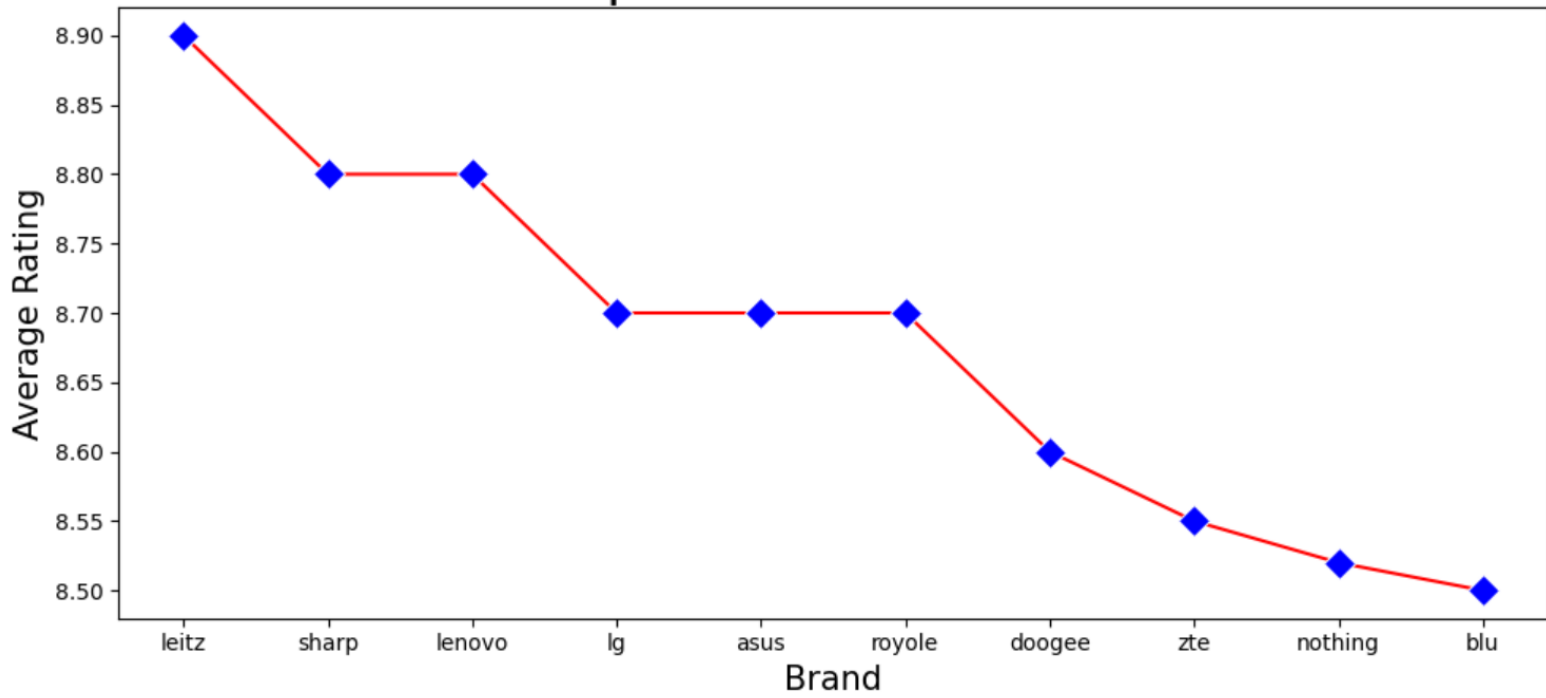
Number of models for top 15 Brands



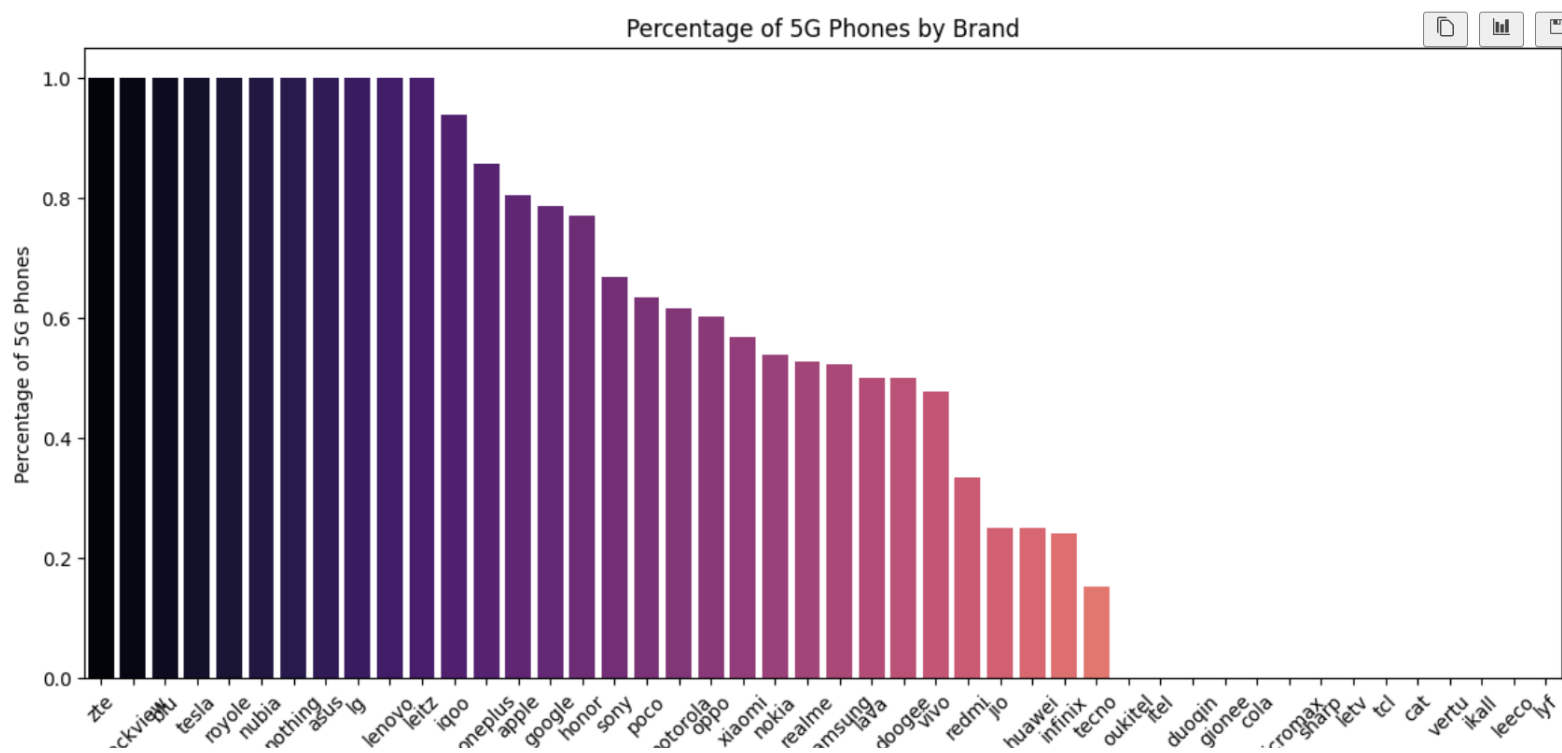
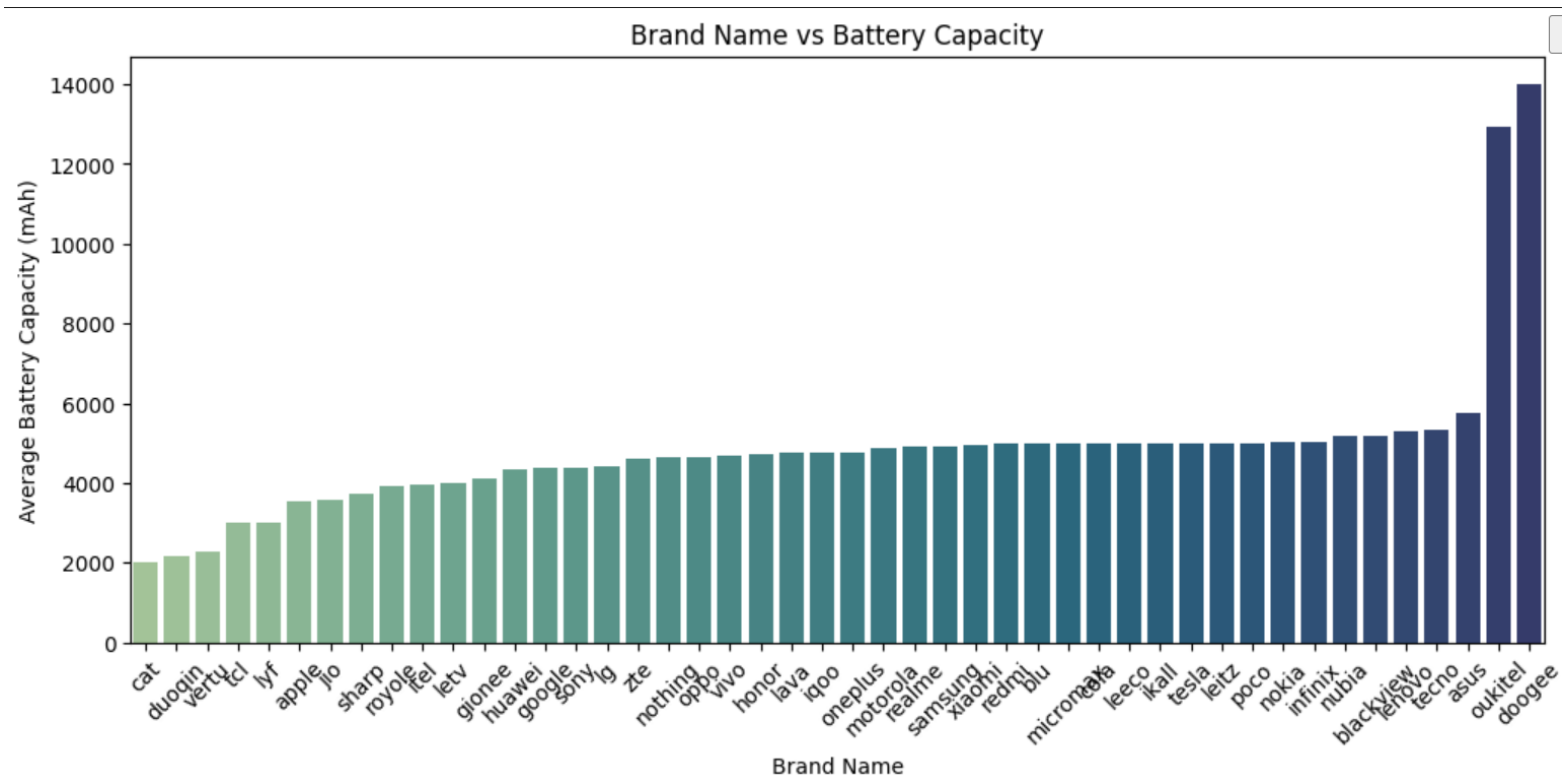
Top 10 Most Expensive Brands



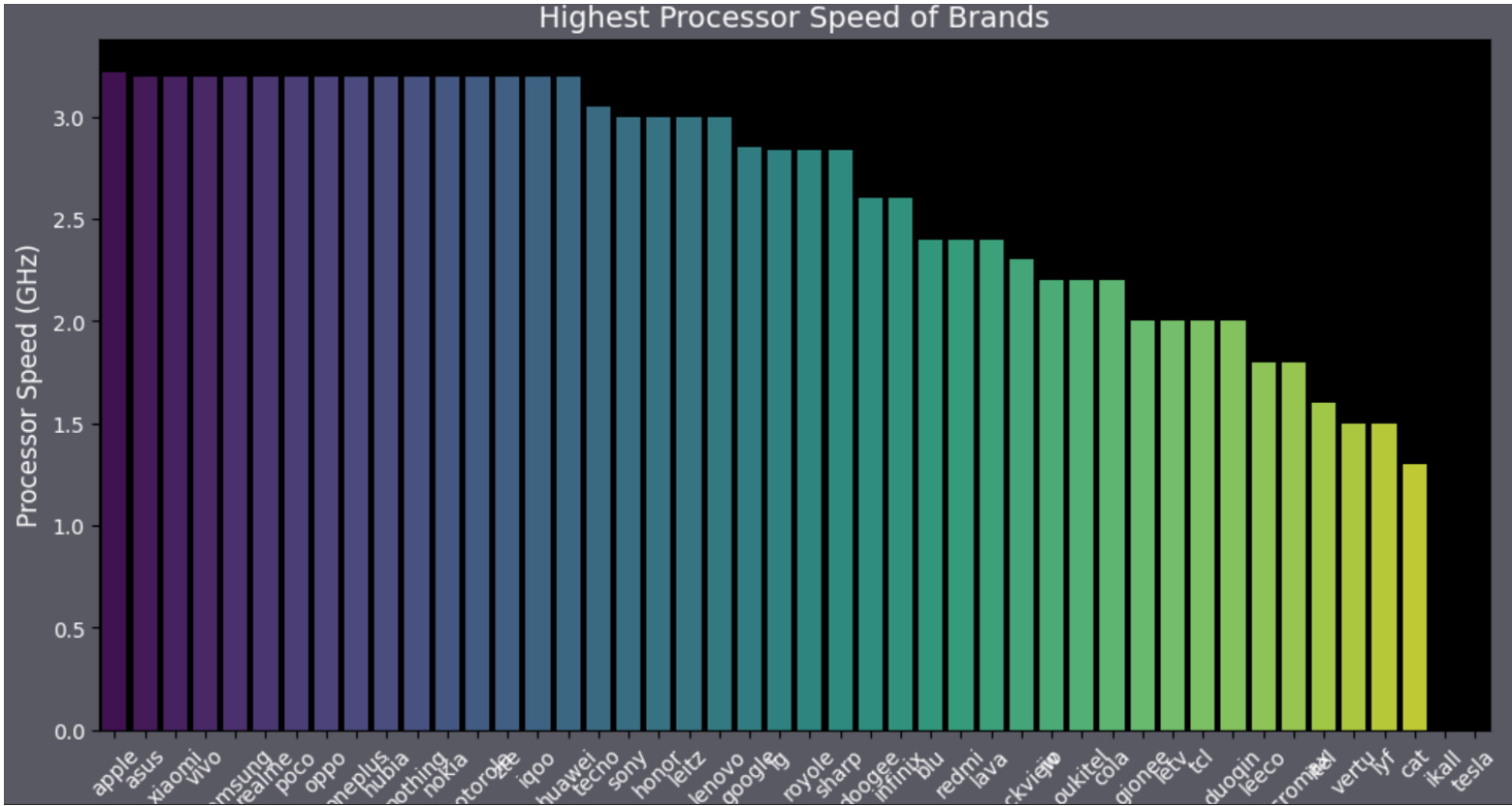
## Top 10 Rated Brands



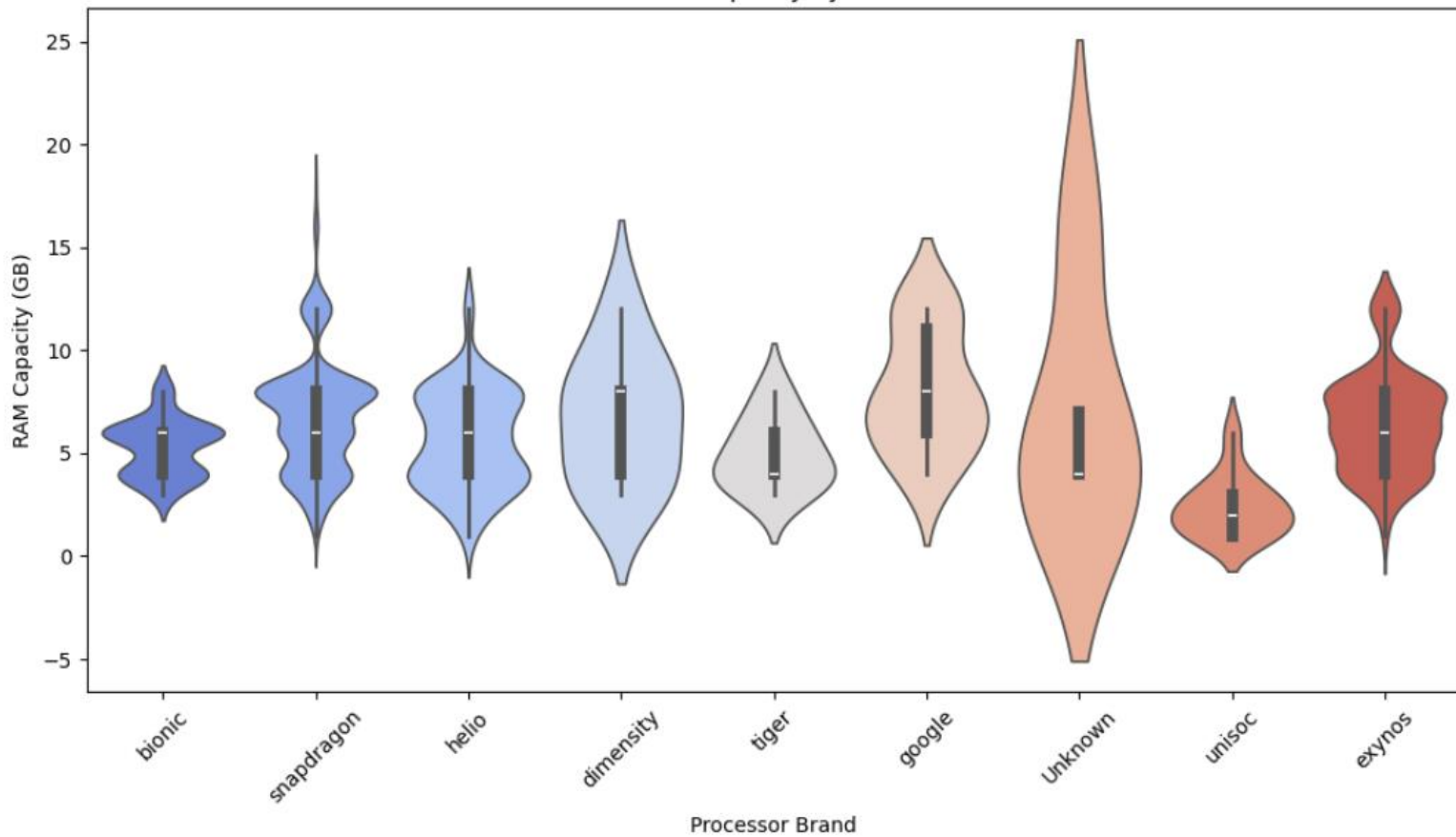
Also performance analysis of different brands



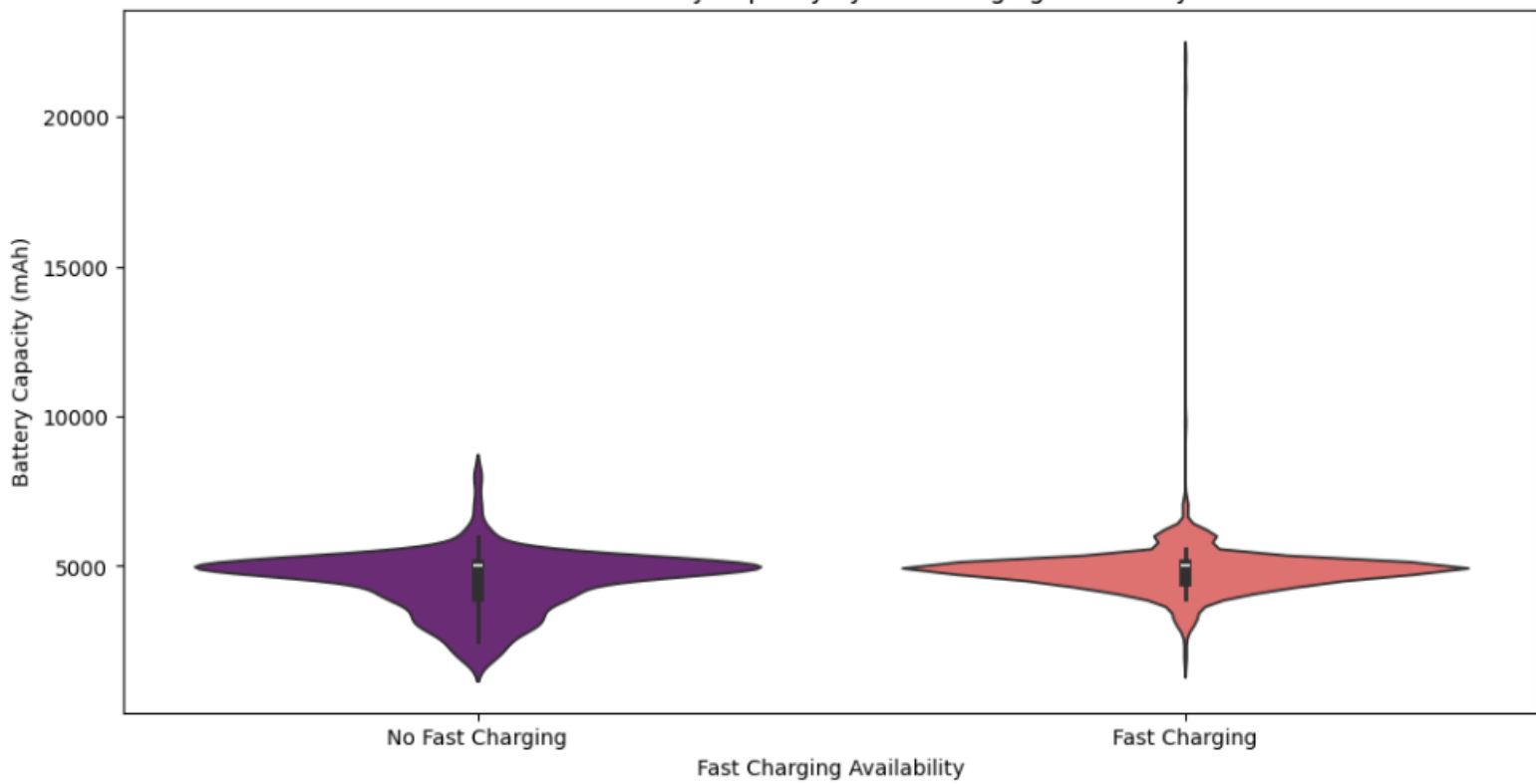
some



Violin Plot: RAM Capacity by Processor Brand

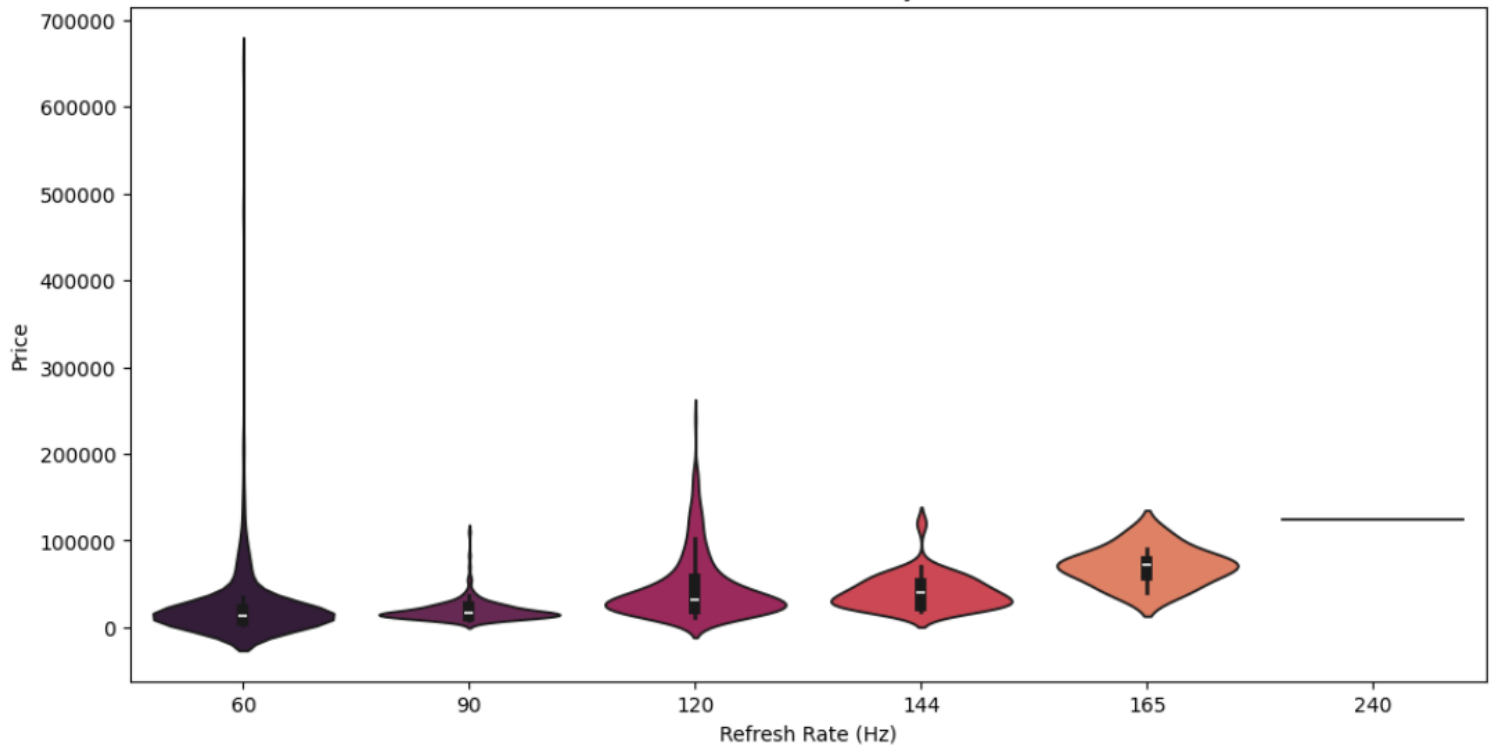


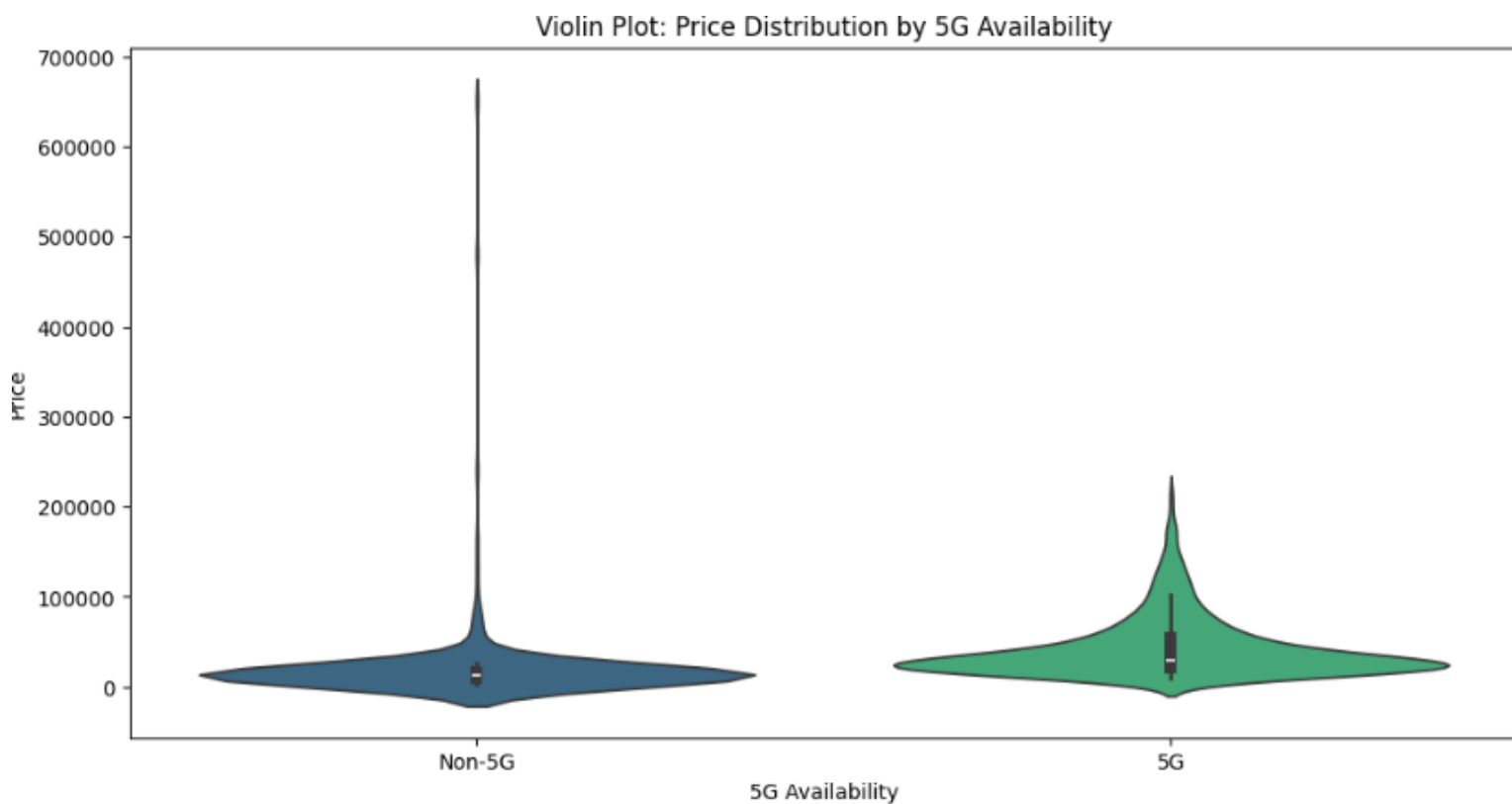
Violin Plot: Battery Capacity by Fast Charging Availability





Violin Plot: Price Distribution by Refresh Rate





## 1. RAM Capacity by Processor Brand

The violin plot displays RAM distribution across various processor brands. Key observations include:

- **Bionic, Snapdragon, and Helio** processors tend to have a **moderate range of RAM**, typically between 4GB and 10GB.
- **Dimensity and Google** processors exhibit a **wider RAM distribution**, with values reaching **up to 16GB**.
- **Unisoc and some "Unknown" brands** tend to have lower RAM capacities.
- **Exynos and Tiger** processors show moderate RAM capacities but with a few high-end models reaching above 10GB.

### Insights:

- Flagship processors (Google, Dimensity) generally support **higher RAM capacities**.

- Budget-oriented processors (Unisoc, some Unknown brands) tend to have **lower RAM limits**.
  - Snapdragon and Helio appear to target a balance between mid-range and high-end configurations.
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## 2. Battery Capacity by Fast Charging Availability

This plot compares battery capacities between devices with and without fast charging.

- **Devices with fast charging** show a **wider distribution**, with some extreme outliers exceeding **20,000 mAh**.
- **Devices without fast charging** typically range between **3000mAh and 6000mAh**, with fewer extreme values.

### Insights:

- **Higher battery capacities** are more common in fast-charging devices, suggesting they are designed to handle **power-hungry features**.
  - Some non-fast-charging devices still have **large batteries**, likely targeting long battery life instead of quick recharging.
  - The extreme outliers in the **fast-charging group** may represent **power banks or rugged phones**.
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## 3. Price Distribution by Refresh Rate

This visualization shows how smartphone prices vary based on screen refresh rates.

- **60Hz models** display the **widest price range**, including an extreme outlier above **600,000**.
- **Higher refresh rates (120Hz, 144Hz, 165Hz, 240Hz)** show a trend of increasing median prices.
- **90Hz and 120Hz models** are the most balanced in terms of price distribution.
- **240Hz** has a **single data point**, likely a **high-end gaming phone**.

### Insights:

- The presence of high-end **60Hz phones** suggests that some flagship models prioritize other features (e.g., **cameras, design**) over refresh rates.
  - **120Hz and 144Hz screens dominate the mid-to-high-end segments.**
  - **165Hz and 240Hz models are niche products**, likely gaming-focused.
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## 4. Price Distribution by 5G Availability

This plot compares smartphone prices based on **5G capability**.

- **Non-5G phones have a wider price range**, with a few extreme outliers.
- **5G phones tend to be more expensive**, but there is a **concentration around mid-to-high price points**.

### Insights:

- **5G capability is generally found in mid-to-premium smartphones.**
- Some **budget devices still lack 5G**, indicating that **affordable 5G adoption is still evolving**.
- The **outliers in the non-5G category** may be premium 4G phones that focus on **other premium features like build quality or camera technology**.