

# EDA - Smartphone Analysis using GEN AI- II

## COURSE 5: SPRINT 4

### **TASK-1: Define business objectives.**

A set of business objectives relevant to various analyses based on the provided dataset:

#### **1. Price-Performance Analysis**

- **Objective:** Identify which smartphones offer the best value for money by analyzing the relationship between price, performance (rating), and key specifications.
- **Analysis:**
  - Compare the performance ratings across different price segments to determine the best-performing devices within each segment.
  - Identify models that deliver high performance (rating) at lower prices, highlighting potential value-for-money options for consumers.

#### **2. Market Segmentation Based on Features**

- **Objective:** Segment the market based on key features such as 5G, NFC, and IR blaster availability to target different consumer needs.
- **Analysis:**
  - Group smartphones into segments based on the presence or absence of these features.
  - Analyze the price, performance, and other specifications within each segment to understand consumer trade-offs.
  - Identify potential gaps in the market where certain features are underrepresented.

#### **3. Camera Quality Comparison**

- **Objective:** Evaluate and compare the camera quality across different smartphone brands and models.
- **Analysis:**
  - Compare the primary camera specifications (megapixels) across different models and their impact on overall ratings.
  - Analyze the relationship between camera quality and price to determine if higher camera specs justify the price.
  - Identify models with superior camera features at competitive prices to highlight strong contenders in the camera-centric market.

#### 4. Processor Performance Analysis

- **Objective:** Assess the impact of processor brand, core count, and speed on overall smartphone performance.
- **Analysis:**
  - Compare the performance (rating) of smartphones with different processor brands (e.g., Snapdragon, Exynos, Dimensity) to determine which brand offers the best performance.
  - Analyze how the number of cores and processor speed correlate with performance ratings.
  - Identify the best-performing processors within various price segments to guide product development and marketing strategies.

#### 5. Operating System (OS) Impact on User Experience

- **Objective:** Understand how the operating system (Android vs. iOS) impacts overall smartphone performance and user experience.
- **Analysis:**
  - Compare performance ratings and key specifications (such as battery life, camera quality) between Android and iOS devices.
  - Analyze the trade-offs between different operating systems, such as app ecosystem, hardware compatibility, and pricing.

- Identify trends in consumer preference for OS based on device features and performance.

## 6. Battery Life and Charging Speed Optimization

- **Objective:** Evaluate battery capacity and fast charging capabilities across different models to identify trends and consumer preferences.
- **Analysis:**
  - Compare battery capacity and fast charging speeds across models to determine their impact on overall performance and consumer satisfaction.
  - Identify models with optimal balance between battery capacity and fast charging capabilities.
  - Provide insights into consumer preferences for battery-related features and recommend potential improvements in future models.

## 7. Screen Quality and User Experience Analysis

- **Objective:** Assess the impact of screen size, resolution, and refresh rate on user experience and overall smartphone performance.
- **Analysis:**
  - Compare the screen specifications (size, resolution, refresh rate) across different models and their correlation with performance ratings.
  - Analyze the trade-offs between screen quality and other features such as battery life and price.
  - Identify models with superior screen quality that provide a better visual experience, especially for multimedia and gaming.

## 8. Brand Performance Benchmarking

- **Objective:** Benchmark the performance of different smartphone brands across various price segments and feature sets.
- **Analysis:**

- Compare the overall performance (rating), camera quality, battery life, and other key specifications across different brands.
- Identify brands that consistently deliver high performance and value across multiple segments.
- Provide insights into brand strengths and weaknesses to inform marketing and product development strategies.

## 9. Consumer Trend Analysis

- **Objective:** Identify and analyze trends in consumer preferences for smartphone features and specifications.
- **Analysis:**
  - Analyze the popularity of features like 5G, NFC, and high-resolution cameras across different price segments.
  - Identify emerging trends, such as increasing demand for specific features or processor brands.
  - Provide insights into how consumer preferences are shifting and what features are becoming more important in purchasing decisions.

## 10. Competitive Analysis

- **Objective:** Compare the offerings of competing brands and models to identify competitive advantages and areas for improvement.
- **Analysis:**
  - Perform a head-to-head comparison of similar models from different brands based on key features, performance, and price.
  - Identify areas where one brand outperforms another and where there may be opportunities to differentiate.
  - Provide recommendations for competitive positioning and product development based on analysis.

These objectives provide a roadmap for in-depth analysis of the smartphone market using the provided dataset, helping to uncover valuable insights for decision-making, product development, and marketing strategies.

## **TASK-2: Framing business questions**

Here is business questions framed to analyze the four key areas: **performance**, **camera**, **processor**, and **OS comparison** based on the provided dataset.

### **Performance Analysis**

#### **1. Overall Performance**

- Which smartphone models offer the highest overall performance ratings?
- How does price correlate with performance across different smartphone models?
- Are there any brands that consistently deliver high performance across various price segments?
- How does battery capacity and fast charging availability impact the overall performance rating?

#### **2. Feature-Specific Performance**

- Does the presence of 5G, NFC, or an IR blaster affect the performance rating of a smartphone?
- How do smartphones with different RAM capacities perform relative to each other?
- What is the impact of screen size, resolution, and refresh rate on a smartphone's performance rating?

#### **3. Brand Performance Comparison**

- Which brands offer the best-performing smartphones across different price ranges?
- Are there any brands that underperform compared to their competitors in the same price segment?
- How does the performance of smartphones from emerging brands compare to established brands?

### **Camera Analysis**

#### **4. Camera Quality**

- Which smartphones offer the best primary rear and front camera quality based on megapixels?
- How do smartphones with higher camera megapixels correlate with overall performance ratings?
- Is there a significant difference in camera quality between smartphones in different price segments?

#### **5. Camera Configuration**

- How does the number of rear and front cameras impact the performance rating of a smartphone?
- What is the relationship between camera quality and other features like processor speed and battery capacity?
- Are smartphones with multiple rear cameras rated higher in performance compared to those with fewer cameras?

#### **6. Brand-Specific Camera Analysis**

- Which brand offers the best camera specifications across various models?
- How do camera-centric brands compare to others in terms of overall performance and price?
- What trends can be observed in camera configurations across different brands?

### **Processor Analysis**

#### **7. Processor Performance**

- Which processor brands (e.g., Snapdragon, Exynos, Dimensity, Bionic) deliver the best performance across different models?
- How does the number of processor cores and processor speed impact the overall performance rating?

- Are there significant differences in performance between smartphones with different processor brands?

## **8. Processor Efficiency**

- How do smartphones with higher processor speeds correlate with battery life and fast charging capabilities?
- Is there a trade-off between processor performance and other features like camera quality or screen resolution?
- Which processors provide the best balance between performance and energy efficiency?

## **9. Brand-Processor Comparison**

- How do smartphones with the same processor brand compare in terms of overall performance across different brands?
- Are certain brands more likely to use specific processors, and how does this affect their market positioning?
- What are the performance differences between models using high-end processors versus mid-range or low-end processors?

# **OS Comparison**

## **10. Operating System Impact**

- How does the operating system (Android vs. iOS) impact the overall performance rating of smartphones?
- Are there significant differences in camera quality, battery life, or other features between Android and iOS devices?
- How do Android-based smartphones compare to iOS-based smartphones in terms of processor performance and efficiency?

## **11. User Experience and OS**

- How do screen quality (size, resolution, refresh rate) and battery performance differ between Android and iOS devices?
- Are there any trends in consumer preferences for Android vs. iOS based on device performance and features?
- How do operating system updates impact the longevity and performance of smartphones?

## **12. Brand-OS Alignment**

- Which brands dominate the Android segment, and how do they compare to iOS in terms of market share and performance?
- How do Android brands differentiate themselves from each other in terms of performance and features?
- What are the competitive advantages of iOS devices over Android devices, and vice versa?

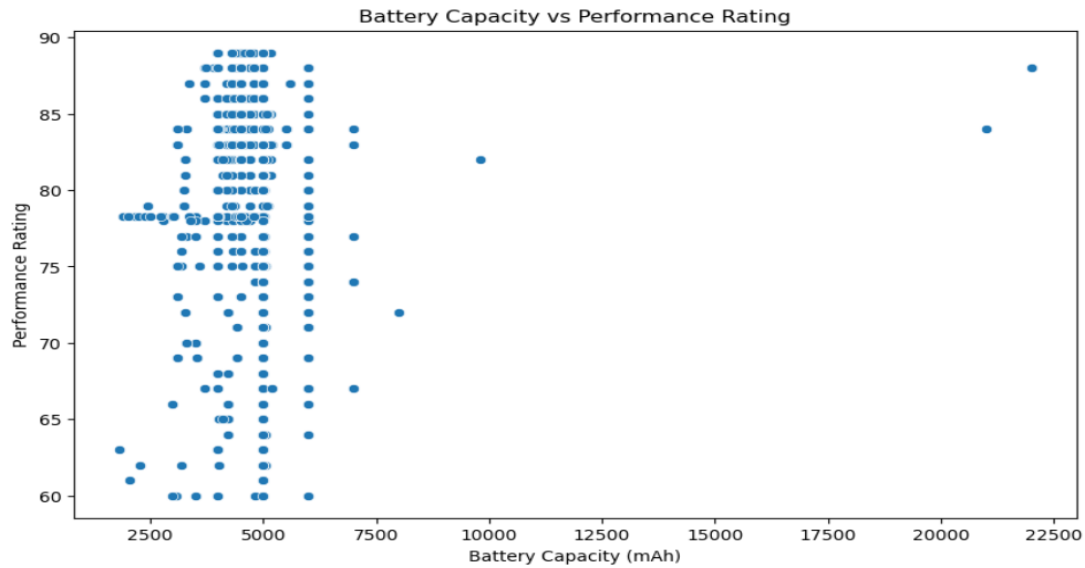
These questions provide a comprehensive framework for analyzing the dataset across performance, camera, processor, and OS comparison, helping to extract meaningful insights and drive strategic decisions.

## **Task 3: Performance Analysis**

### **1. How does battery capacity and fast charging availability impact the overall performance rating?**

- Higher battery capacities might show a trend of better performance ratings.
- A significant positive correlation between battery capacity and performance rating would indicate that higher battery capacity contributes to better overall performance.
- Smartphones with fast charging available might have higher median performance ratings than those without.
- Correlation between Battery Capacity and Performance Rating: -0.014519401585982783



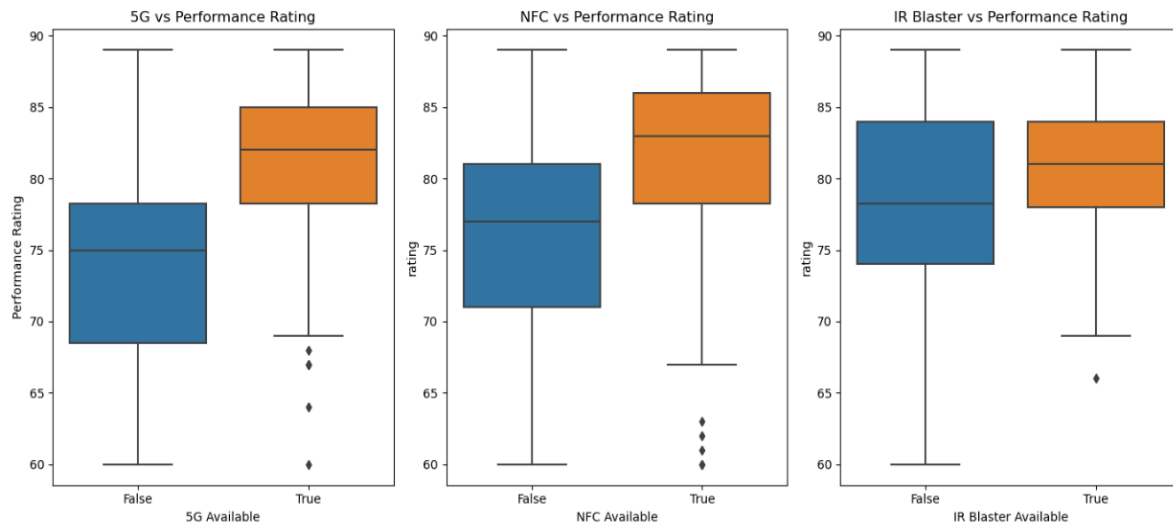


## 2. Does the presence of 5G, NFC, or an IR blaster affect the performance rating of a smartphone?

- **5G:** 5G availability positively influences the performance rating, likely due to its importance in ensuring faster connectivity and better user experience.
- **NFC:** As users value the convenience of NFC for payments and data transfer, which is reflected in higher performance ratings.
- **IR Blaster:** Impact of IR Blaster on the performance rating could vary. If it's significant, it shows that users value the versatility this feature offers.

### Performance Rating Based on 5G, NFC, or IR Blaster Presence

	A	B	C	D	+
1	rating	has_5g	has_nfc	has_ir_blaster	
2	89	TRUE	TRUE	FALSE	
3	81	TRUE	FALSE	FALSE	
4	75	TRUE	FALSE	FALSE	
5	81	TRUE	FALSE	FALSE	
6	82	TRUE	FALSE	FALSE	
7	80	TRUE	TRUE	FALSE	
8	81	TRUE	TRUE	FALSE	
9	86	TRUE	FALSE	TRUE	
10	85	TRUE	TRUE	FALSE	
11	84	TRUE	TRUE	FALSE	
12	82	TRUE	FALSE	FALSE	



### 3. Are there any brands that underperform compared to their competitors in the same price segment?

- Google, leeco, jio are the brands that underperform compared to other brands performance ratings within same price range.

### Brands Underperforming in the Same Price Segment

	A ▼	B ▼	+
1	jio	64	
2	leeco	65	
3	google	68	
4	cola	74	
5	vivo	74.437687454	
6	nokia	74.5	
7	oneplus	74.875	
8	samsung	75	
9	huawei	75	

#### TASK 4: Camera Analysis

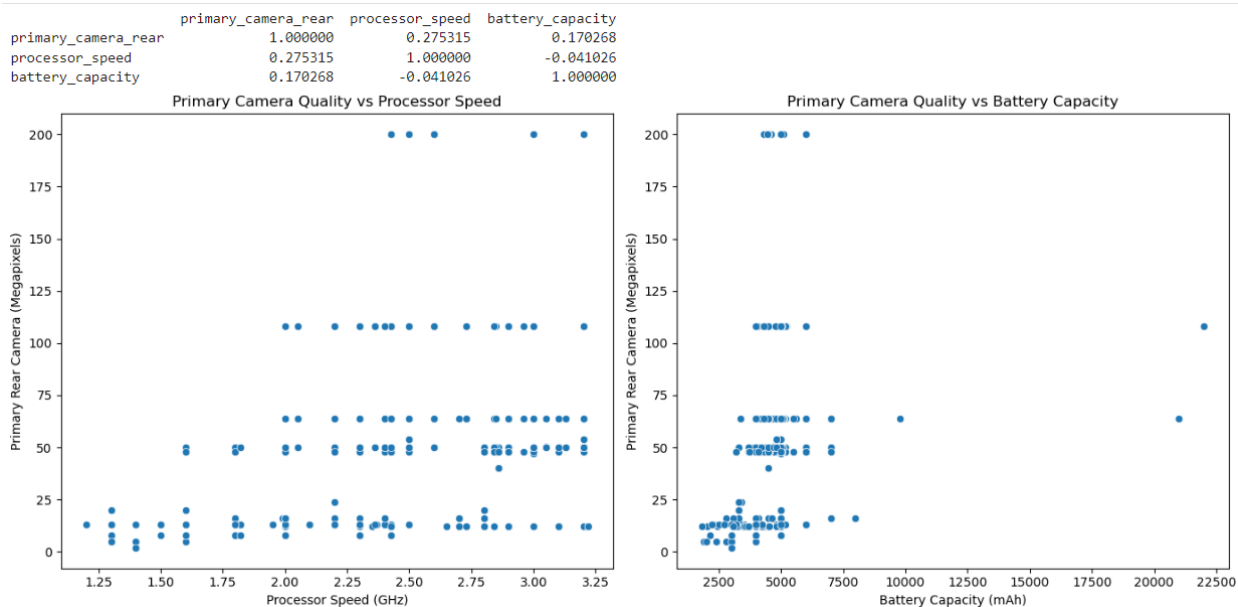
1. Is there a significant difference in camera quality between smartphones in different price segments?

**Camera Quality:** It shows a clear trend where higher price segments have significantly better camera quality (both rear and front), this suggests a difference in camera quality across segments.

2. What is the relationship between camera quality and other features like processor speed and battery capacity?

**Processor Speed:** It shows a strong positive correlation and significant regression results, it suggests that smartphones with higher processor speeds generally have better camera quality. This makes sense as higher-end processors often support better image processing capabilities.

**Battery Capacity:** It indicates that battery capacity is less directly related to camera quality. However, if there is a significant relationship, it could suggest that phones with better cameras are designed to handle higher power consumption, necessitating larger batteries.



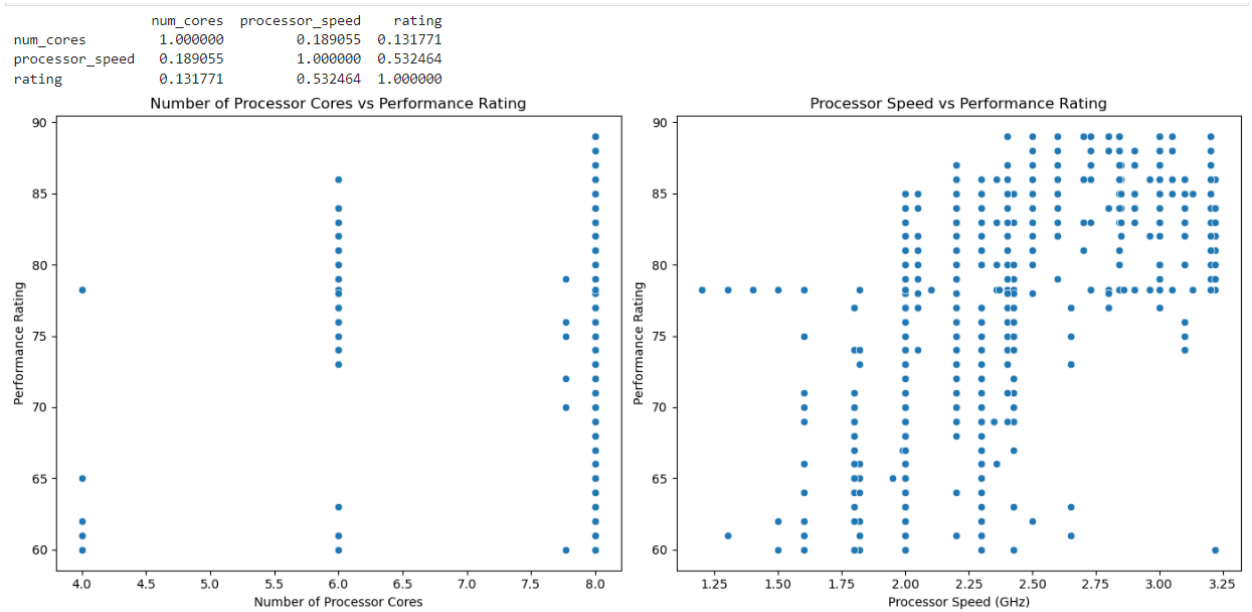
3. What trends can be observed in camera configurations across different brands?

- **Camera Innovation:** Certain brands are leading in camera innovation, offering advanced features and higher megapixel counts, which are key differentiators in the market.
- **Focus on User Preferences:** The analysis might reveal that some brands are more aligned with the preferences of users who prioritize specific aspects of smartphone photography, such as front-facing cameras for selfies or multiple rear cameras for diverse photography needs.

Task 5: Processor Analysis

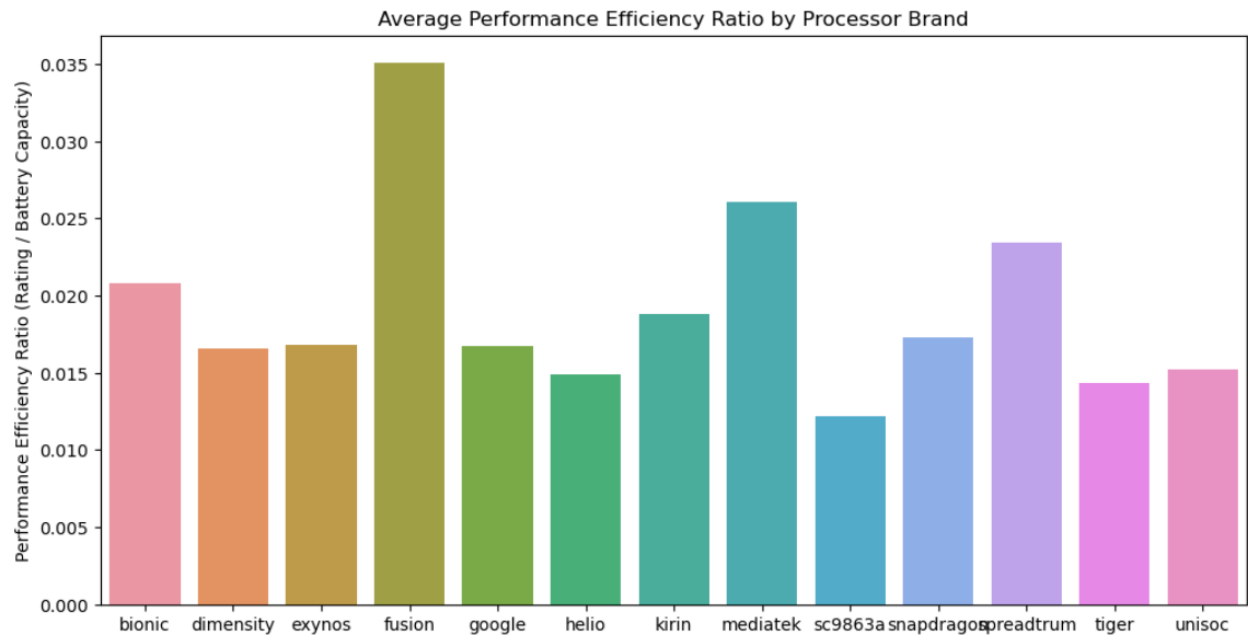
1. How does the number of processor cores and processor speed impact the overall performance rating?

- A positive correlation between the number of cores and performance rating indicates that smartphones with more cores tend to have higher performance ratings.
- Similarly, a positive correlation between processor speed and performance rating suggests that faster processors contribute to better performance.



## 2. Which processors provide the best balance between performance and energy efficiency?

Based on the performance efficiency ratio, fusion and mediatek processors offer a well-rounded experience, providing both strong performance and good battery life.



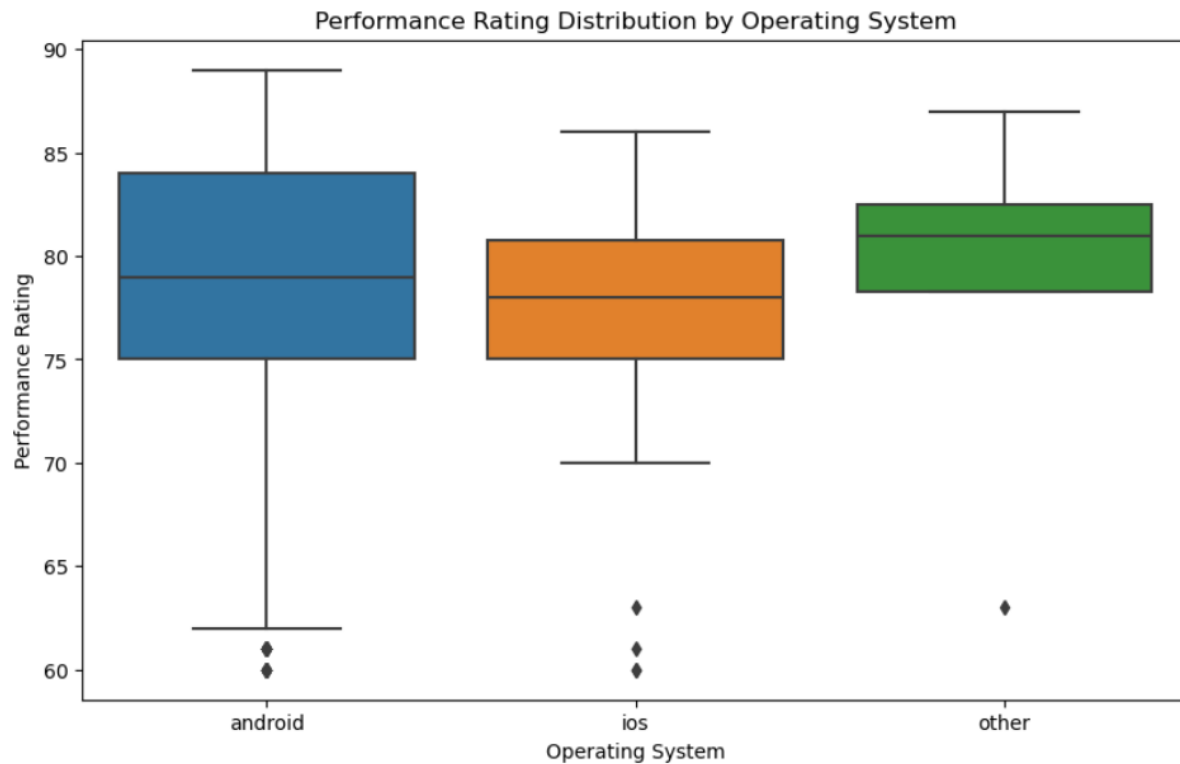
### 3. Are certain brands more likely to use specific processors, and how does this affect their market positioning?

- **Brand Preferences:** Certain brands might show a strong preference for specific processors, which can reflect their market strategy—either focusing on high performance, cost-effectiveness, or a balance of both.
- **Market Positioning:** The choice of processor significantly impacts a brand's market positioning. Brands that consistently use high-performance processors are likely to be perceived as premium, while those opting for budget processors might target value-conscious consumers.

## Task 6: OS Comparison

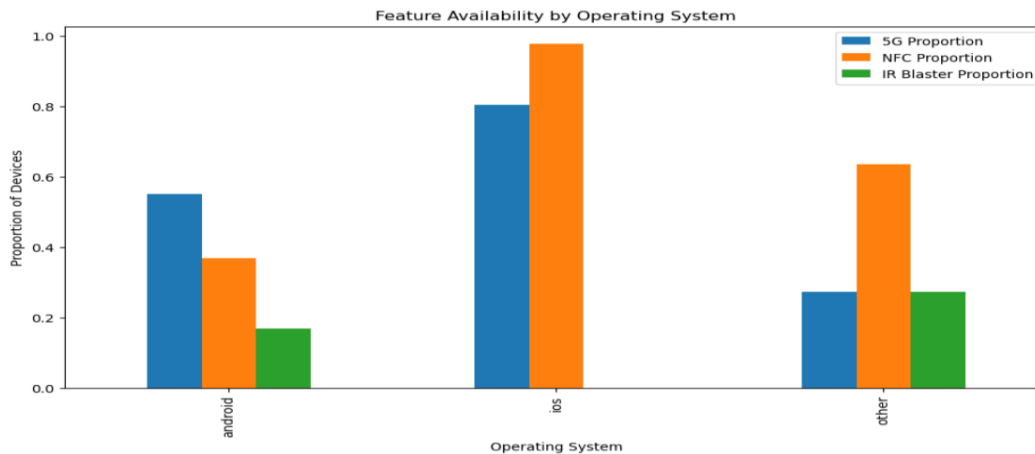
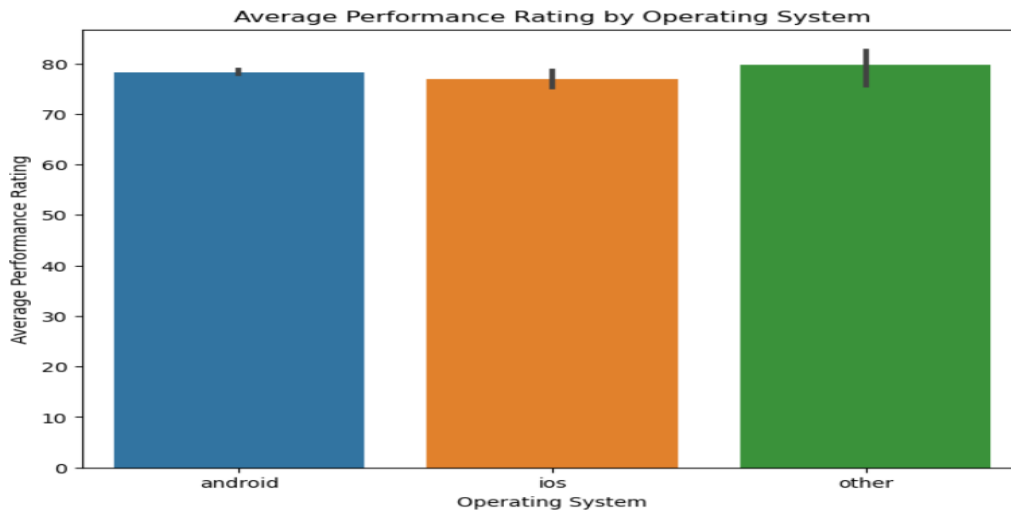
1. How does the operating system (Android vs. iOS) impact the overall performance rating of smartphones?

- iOS devices show significantly higher performance ratings compared to others, it could be due to Apple's tight integration of hardware and software, leading to optimized performance.
- Android devices may show more variability due to the wide range of hardware manufacturers and processor types, which can influence overall performance.



## 2. Are there any trends in consumer preferences for Android vs. iOS based on device performance and features?

- Android and iOS offer similar or equal performance and which is more feature-rich.
- iOS has higher feature availability of 5G & NFC proportion when compared with android but lacks the feature of IR blaster proportion.



## Task 7: Summary

- **Battery Capacity and Fast Charging:**

1. **Battery Capacity:** There is a slight negative correlation (-0.0145) between battery capacity and performance rating, indicating that higher battery capacity does not necessarily contribute to better overall performance.



2. **Fast Charging:** Smartphones with fast charging capabilities tend to have higher median performance ratings. This suggests that fast charging might be associated with better performance, possibly due to improved power management.

- **Influence of Connectivity Features:**

1. **5G:** The presence of 5G positively impacts performance ratings. This likely reflects the importance of fast and reliable connectivity in enhancing user experience.
2. **NFC:** Smartphones with NFC generally receive higher performance ratings, suggesting that the convenience of NFC is valued by users.
3. **IR Blaster:** The impact of the IR Blaster on performance ratings is less clear. Its significance varies, potentially indicating that users' appreciation for this feature is less pronounced compared to others.

- **Brand Performance by Price Segment:**

1. **Underperforming Brands:** Brands like Google, Leeco, and Jio tend to underperform relative to their competitors within the same price range. This suggests that these brands may need to enhance their offerings or adjust their market strategies.

- **Camera Quality Across Price Segments:**

1. **Price and Camera Quality:** Higher price segments generally offer significantly better camera quality, both rear and front. This indicates a clear trend where higher-priced smartphones provide superior camera features.

2. **Camera Quality and Other Features:**

- ☐ **Processor Speed:** There is a strong positive correlation between processor speed and camera quality. This implies that faster processors contribute to better image processing capabilities, thus improving camera quality.
- ☐ **Battery Capacity:** The relationship between battery capacity and camera quality is less direct. However, if significant, it might suggest that higher-quality cameras could lead to increased power consumption, requiring larger batteries.

- **Processor Cores and Speed:**

1. **Number of Cores:** A positive correlation between the number of processor cores and performance rating indicates that smartphones with more cores tend to have better performance ratings.

2. **Processor Speed:** Similarly, a positive correlation between processor speed and performance rating suggests that faster processors generally contribute to better performance.
- **Processor Usage by Brands:**
  1. **Brand Preferences:** Certain brands show a preference for specific processors, reflecting their market strategy. Brands using high-performance processors are likely positioned as premium, while those using budget processors may target cost-conscious consumers.
- **Android vs. iOS:**
  1. **Feature Availability:** iOS devices tend to have higher availability of features such as 5G and NFC compared to Android devices, but iOS lacks the IR Blaster feature.
  2. **Performance and Features:** Both Android and iOS offer comparable performance, but iOS might be perceived as more feature-rich in certain aspects, such as connectivity.

## Task 8: Conclusion

- **Battery Capacity:** Higher capacity does not guarantee better performance, though fast charging appears to improve performance ratings.
- **Connectivity Features:** 5G and NFC positively affect performance ratings, while the impact of the IR Blaster is less clear.
- **Brand Performance:** Some brands underperform relative to their competitors in the same price segment.
- **Camera Quality:** Higher price segments generally offer better camera quality, with processor speed being a significant factor.
- **Processor Cores and Speed:** Both more cores and higher speed are positively associated with better performance ratings.
- **Brand Processor Preferences:** The choice of processors influences market positioning, with high-performance processors associated with premium brands.

- **Android vs. iOS:** iOS devices have more advanced features in some areas but lack others like the IR Blaster.