SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
RAMAPURAM, CHENNAI – 600 089
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

18CSP107L-MINOR PROJECT

DATA ANALYSIS AND VISUALIZATION OF BUDGET LAPTOPS

BATCH NUMBER : 7

Team Members	Supervisor
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AGENDA

- Abstract
- Scope and Motivation
- Introduction
- Literature Survey
- Objectives
- Problem Statement
- Proposed Work
  - Novel idea
  - Project Description
- Software & Hardware Requirements
- Implementations
- References
- Outcome

ABSTRACT

- This project involves the data analysis and visualization of budget laptops available on Flipkart and Amazon using Python libraries and Tableau. The objective is to compare the features, pricing, and customer ratings of budget laptops across these two popular e-commerce platforms. Data is scraped from both websites, processed, and analyzed using Python libraries such as Pandas for data manipulation, Matplotlib and Seaborn for visualizations, and Scikit-learn for any necessary statistical analysis. The processed data is then visualized in Tableau, where interactive dashboards are created to provide insights into the pricing trends, feature distributions, and overall value propositions of the laptops. The analysis helps in identifying the best budget laptop options available and offers a comparative perspective on how each platform caters to the budget-conscious consumer.

SCOPE

- **Data Collection**
- **Data Cleaning and Preprocessing**
- **Feature Analysis**
- **Price Analysis**
- **Customer Ratings and Reviews**
- **Visualization in Python**
- **Dashboard Creation in Tableau**
- **Reporting**
- **Platform Comparison**
- **Future Recommendations**

MOTIVATION

1. **Market Demand for Affordable Laptops:**
2. **Technological Advancements:**
3. **Consumer Education:**
4. **Competitive Market Landscape:**
5. **Data-Driven Decision Making:**
6. **Academic and Professional Relevance:**

INTRODUCTION

In today's digital era, laptops have become essential tools for various purposes, ranging from professional work and education to entertainment and gaming. With a plethora of options available in the market, consumers often face challenges in selecting the best laptop within their budget constraints. This project focuses on identifying and analyzing the best laptops under ₹70,000 available in the Indian market. By leveraging SQL for data extraction, transformation, and loading (ETL) processes and utilizing Tableau for data visualization, this study aims to provide comprehensive insights into the value and performance of laptops within this price range.

The primary objectives of this project are to:

Collect Data: Gather detailed information on laptops under ₹70,000, including specifications, prices, ratings, and user reviews from leading e-commerce platforms.

Prepare Data: Clean and structure the collected data using SQL to ensure accuracy and consistency.

Analyze Data: Perform descriptive and inferential statistical analyses to identify key trends and performance metrics.

Visualize Data: Create interactive and insightful dashboards using Tableau to present the analysis results effectively.

Provide Insights and Recommendations: Identify top-performing laptops and offer recommendations tailored to various user needs based on the analyzed data.

LITERATURE SURVEY

Author(s)	Title	Year	Source	Key Findings	Relevance to Project
Kumar and Gupta Garcia et al.	"Interactive Dashboards for Consumer Electronics"	2024	Data Visualization Journal	Showcased the effectiveness of interactive dashboards in visualizing consumer electronics data.	Demonstrates the use of Tableau for creating visualizations that will be used to present analysis results.

Thakur and Sharma	"Comparative Study of Budget Laptops in 2024"	2024	Electronics Review	Compared different budget laptops based on consumer satisfaction, price, and features.	Offers a comparative framework that can be adapted for analyzing laptops under ₹70,000.
Singh et al.	"Trends in Laptop Sales and Specifications"	2023	Journal of Market Trends	Analyzed trends in laptop sales, showing increased demand for high-performance laptops under budget constraints.	Provides insight into current market trends and consumer demands.
Johnson and Lee	"SQL and Tableau for Business Intelligence"	2023	International Journal of Business Analytics	Illustrated how SQL and Tableau can be integrated for effective business intelligence and data-driven decision-making.	Reinforces the methodologies for integrating SQL and Tableau in the project.

Brown and Martin	"Comparative Study of Budget Laptops in 2024"	2024	Electronics Review	Compared different budget laptops based on consumer satisfaction, price, and features.	Offers a comparative framework that can be adapted for analyzing laptops under ₹70,000.
Garcia et al.	"Interactive Dashboards for Consumer Electronics"	2024	Data Visualization Journal	Showcased the effectiveness of interactive dashboards in visualizing consumer electronics data.	Demonstrates the use of Tableau for creating visualizations that will be used to present analysis results.
Nikhat Akhtar, Nazia Tabassum, Asif Perwej, Yusuf Perwej (Base Paper)	Data analytics and visualization using Tableau utilitarian for COVID-19 (Coronavirus)	2020	Global Journal of Engineering and Technology Advances	Analyzed tends in Covid Data Showing decline in people getting affected after finding vaccine for Coronavirus	Demonstrates the use of Tableau for creating visualizations that will be used to present analysis results.

Zhang and Li	"Consumer Preferences in Laptop Purchases Post-Pandemic"	2022	Journal of Consumer Behavior	Identified shifts in consumer preferences for laptops, with increased emphasis on specifications and online reviews	Highlights the factors influencing laptop purchases in recent years, relevant for data analysis.
Ramesh and Rao	"Impact of Online Reviews on Electronics Purchases"	2022	Journal of Marketing	Found that online reviews significantly impact consumer purchasing decisions, particularly for electronics	Underlines the importance of including user reviews in the analysis to gauge consumer sentiment.

OBJECTIVES

1. **Identify Top-Performing Laptops Under 70k**
2. **Analyse Market Trends and Consumer Preferences**
3. **Compare Features and Specifications**
4. **Utilize SQL for Data Analysis**
5. **Create Visual Representations Using Tableau**

PROBLEM STATEMENT

- The problem statement for this project is to address the challenges faced by consumers when selecting budget laptops from e-commerce platforms like Flipkart and Amazon. With an overwhelming variety of options, varying prices, and differing customer reviews, it becomes difficult for consumers to make informed decisions. This project aims to systematically analyze and compare budget laptops available on both platforms by leveraging data analysis and visualization techniques. The goal is to provide clear insights into pricing trends, feature availability, and customer satisfaction, thereby helping consumers identify the best value-for-money options and aiding them in making well-informed purchasing decisions.

PROPOSED WORK - PROJECT DESCRIPTION

- The proposed work for this project involves a systematic approach to analyze and visualize budget laptops on Flipkart and Amazon. The first step is to collect and scrape relevant data from both platforms, focusing on key attributes such as price, specifications, and customer ratings. This data will then be cleaned, preprocessed, and standardized to ensure consistency for accurate comparison. Using Python libraries like Pandas, Matplotlib, and Seaborn, the data will be analyzed to identify trends and patterns in pricing, features, and customer feedback. Following this, the insights will be visualized through interactive dashboards in Tableau, enabling a clear and intuitive comparison between the two platforms. The final outcome will offer a comprehensive understanding of the budget laptop market, providing actionable insights for consumers and recommendations for potential platform improvements.

NOVEL IDEA

- This project introduces a novel approach by combining data analysis and visualization to comprehensively compare budget laptops on Flipkart and Amazon. By integrating pricing trends, feature availability, and customer satisfaction into a single analysis, it goes beyond traditional comparisons. Using Python for data processing and Tableau for interactive visualizations, it offers dynamic insights that empower consumers to make informed purchasing decisions. The benefits include helping consumers find the best value-for-money laptops and encouraging e-commerce platforms to improve their offerings based on data-driven insights

SOFTWARE AND HARDWARE REQUIREMENTS

- Software Requirements :-

Data Processing and Storage:

Python: Programming language for data processing, cleaning, and analysis. Libraries like Pandas and NumPy will be useful.

SQL: Structured Query Language for managing and querying relational databases.

MySQL: Popular relational database management systems for storing the collected and processed data.

Data Analysis:

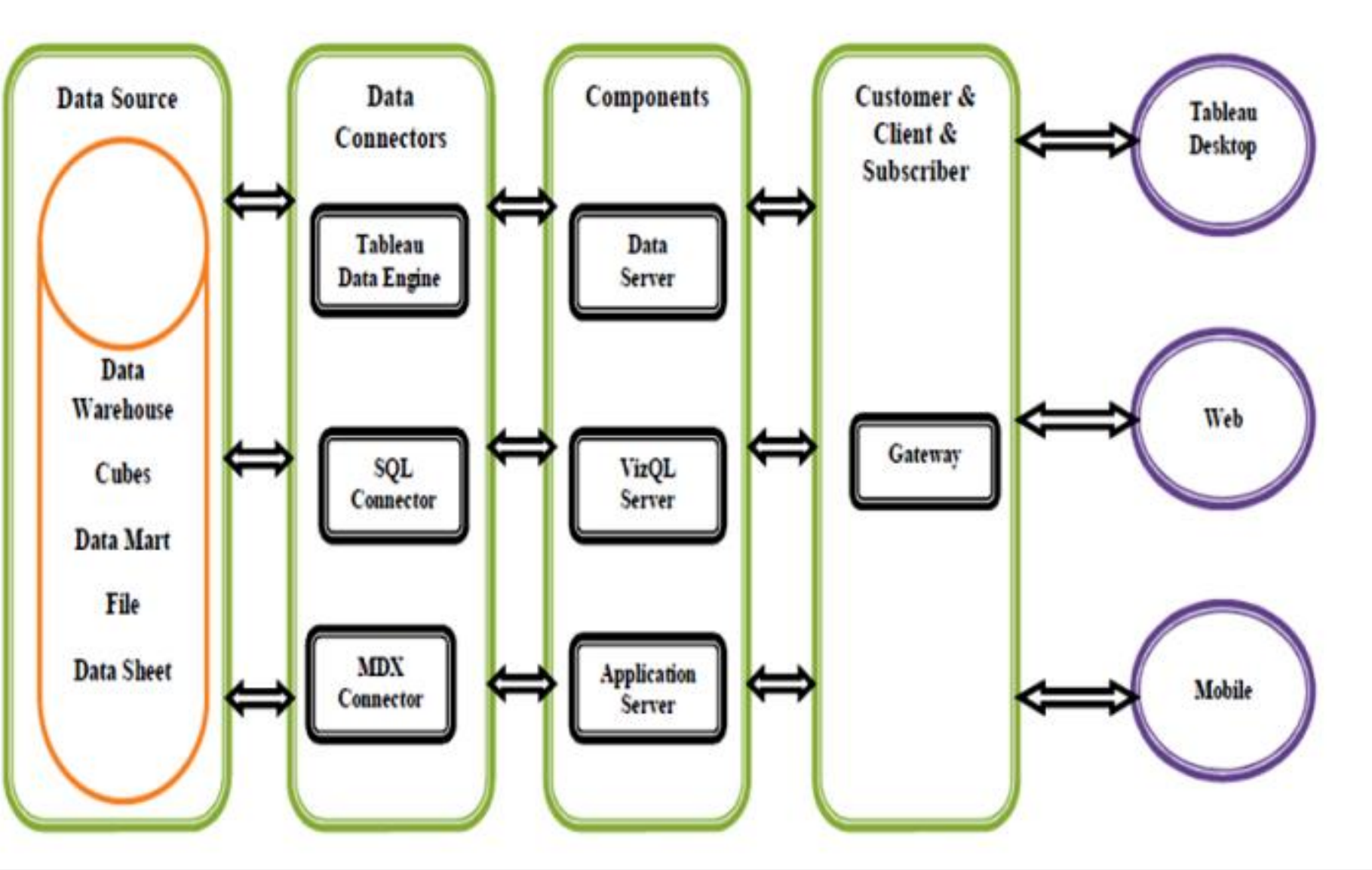
Pandas: A Python library for data manipulation and analysis.

NumPy: A Python library for numerical computing

HARDWARE REQUIREMENTS :-

- Basic Normal Laptop
- Good Stable Internet Connection

IMPLEMENTATION



TOOLS TO BE USED

1. **Data Processing and Storage:**
    1. **Python:** Programming language for data processing, cleaning, and analysis. Libraries like Pandas and NumPy will be useful.
    2. **SQL:** Structured Query Language for managing and querying relational databases.
    3. **MySQL :** Popular relational database management systems for storing the collected and processed data.
2. **Data Analysis:**
    1. **Pandas:** A Python library for data manipulation and analysis.
    2. **NumPy:** A Python library for numerical computing.
3. **Data Visualization:**
    1. **Tableau:** A powerful data visualization tool to create interactive dashboards and visualizations.
    2. **Matplotlib:** A Python plotting library for creating static, animated, and interactive visualizations.
    3. **Seaborn:** A Python visualization library based on Matplotlib, providing a high-level interface for drawing attractive statistical graphics.

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    1. Mordor Intelligence. (2023). "Laptop Market - Growth, Trends, COVID-19 Impact, and Forecasts (2021 - 2026)." Available at: Mordor Intelligence
    2. GrandView Research. (2022). "Laptop Market Size, Share & Trends Analysis Report By Product (Traditional, 2-in-1), By Screen Size, By Price Range, By End-use, By Region, And Segment Forecasts, 2023 - 2030." Available at: Grand View Research
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    2. Flipkart. (2021-2024). Customer reviews and ratings for various laptop models. Available at: Flipkart
3. **Benchmarking and Performance Analysis:**
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4. **Data Analytics and Visualization Tools:**
    1. Microsoft SQL Server Documentation. Available at: Microsoft SQL Server
    2. Tableau Documentation. Available at: Tableau.

5 Data analytics and visualization using Tableau utilitarian for COVID-19 (Coronavirus):

1. Base paper available https://doi.org/10.30574/gjeta.2020.3.2.0029.

OUTCOMES - FLIPKART DATASET

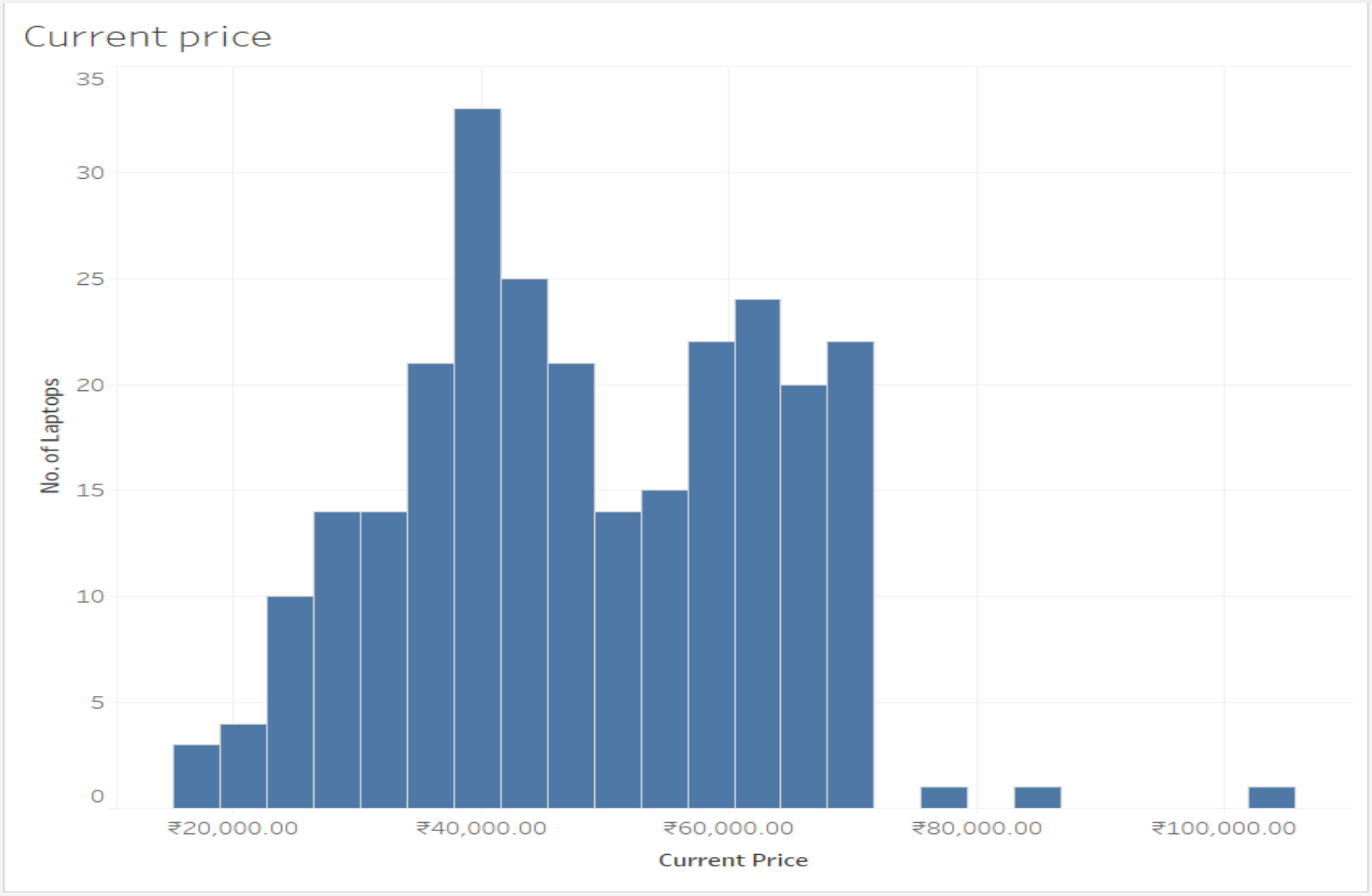


Figure 1:Current Price vs No.of Laptops

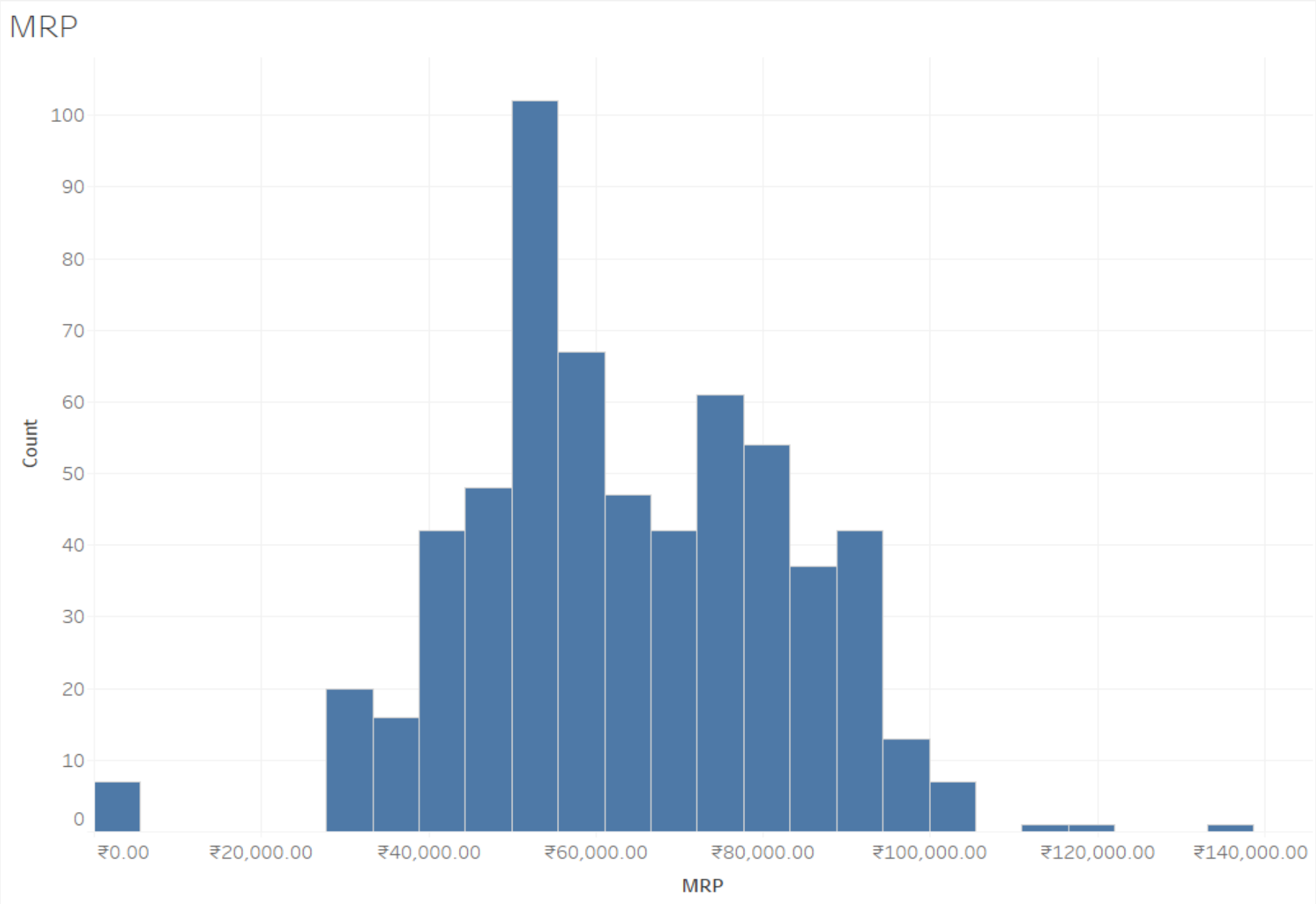


Figure 2: MRP vs Count of Laptops

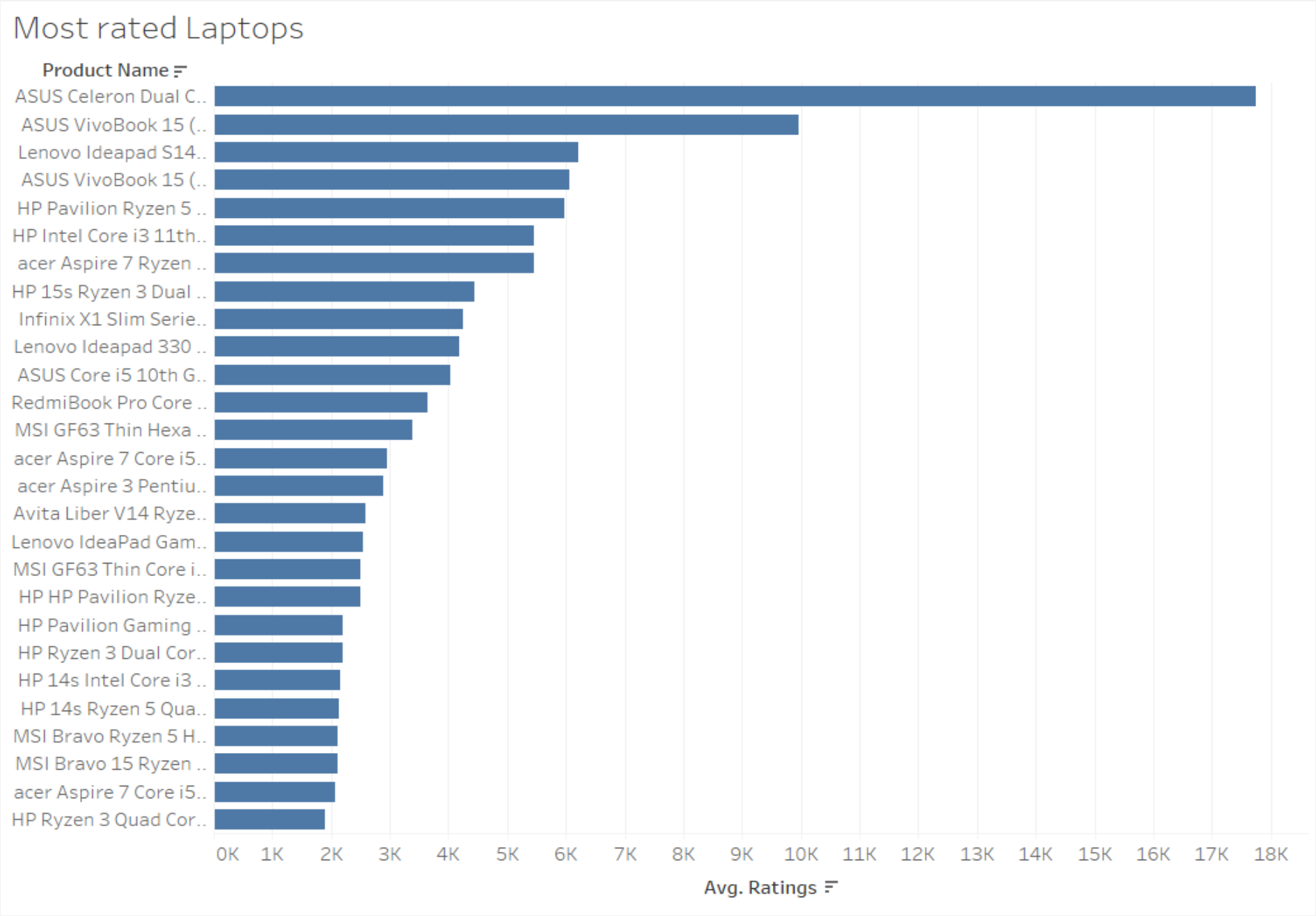


Figure 3: Average Ratings vs Product Names

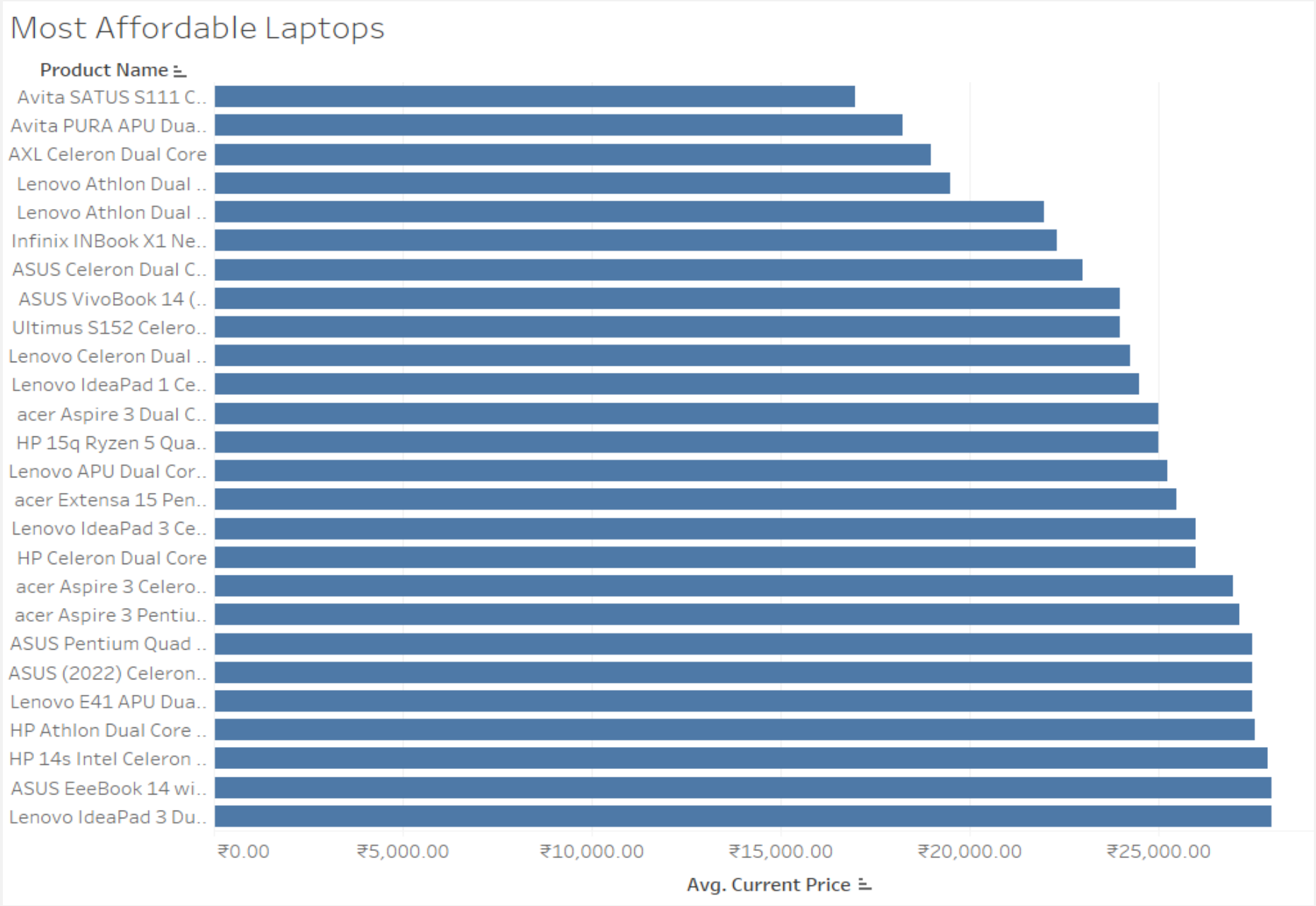


Figure 4: Most Affordable Laptops

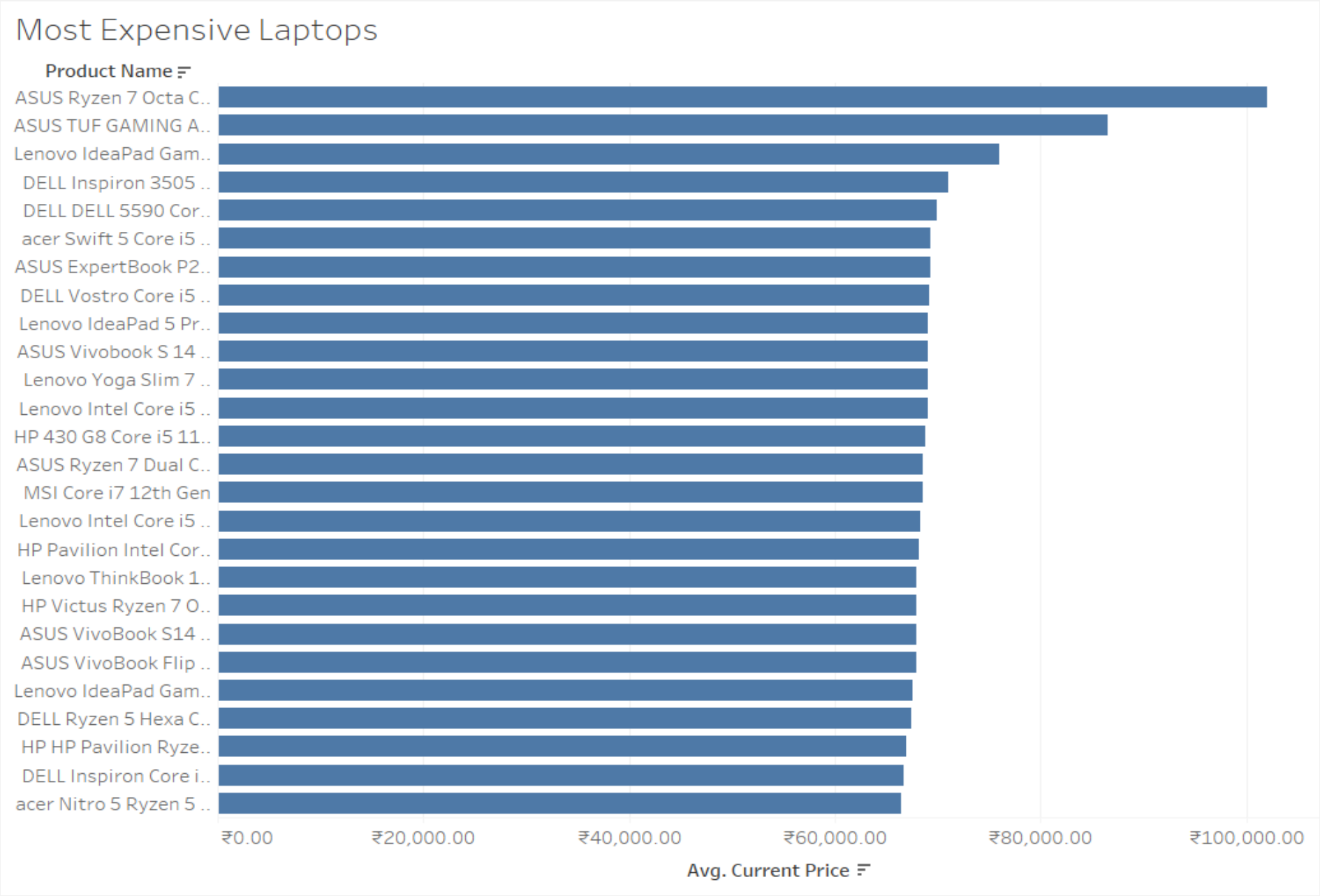


Figure 5: Most Expensive Laptops

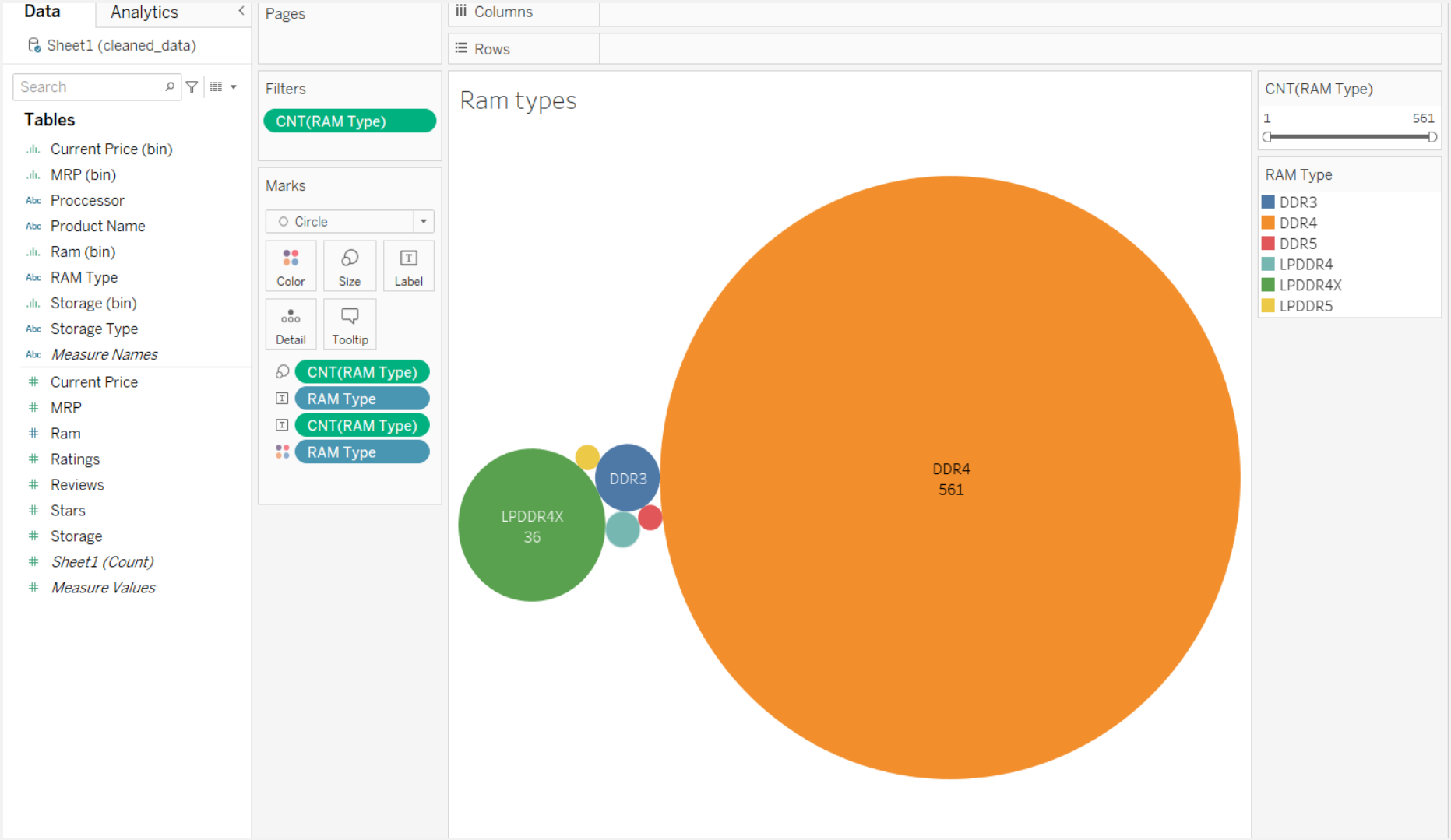


Figure 6: PIE CHART OF RAM TYPES

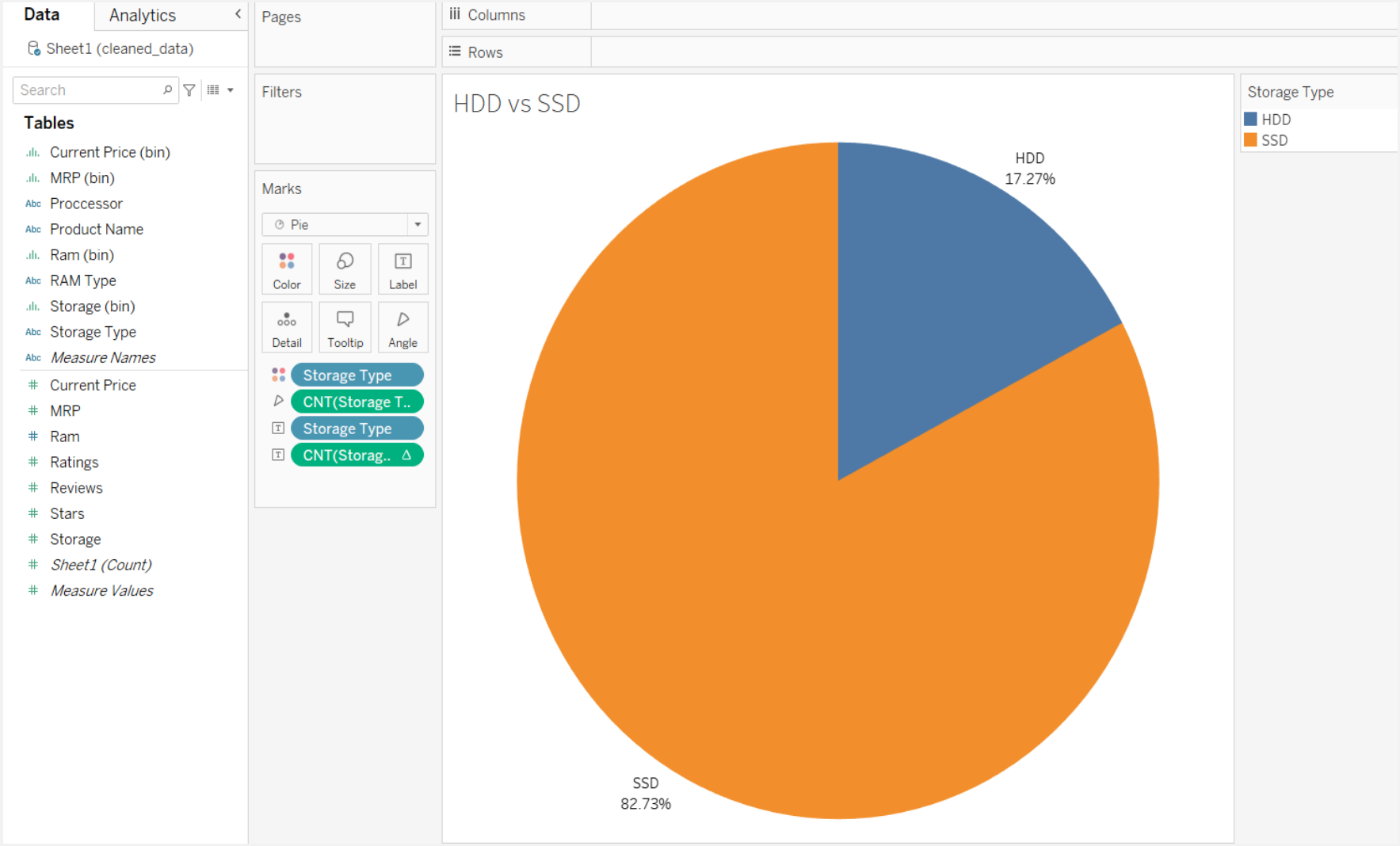


Figure 7: Pie Chart of HDD vs SSD

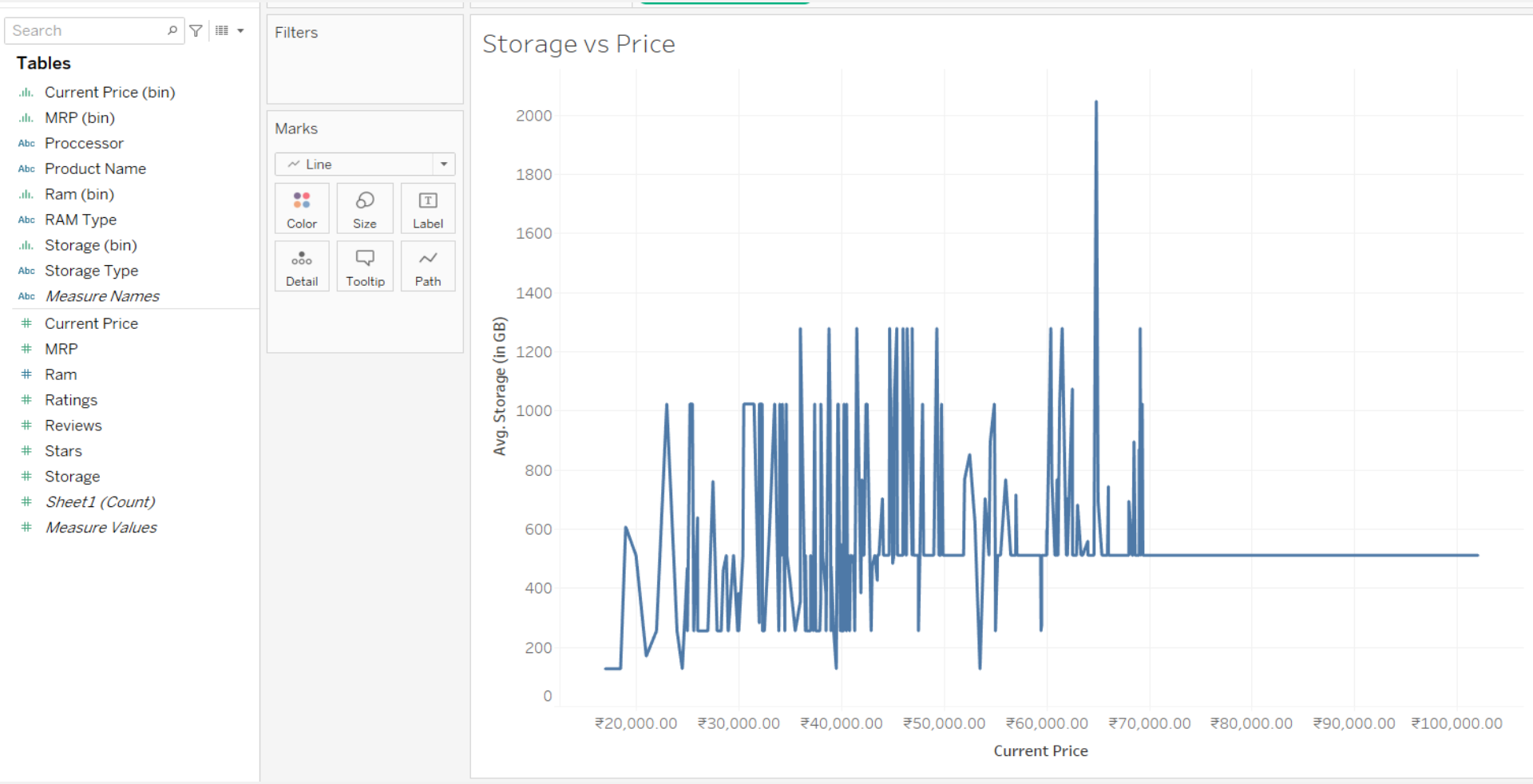


Figure 8: Gantt View of Current Price vs Average Storage(in GB)

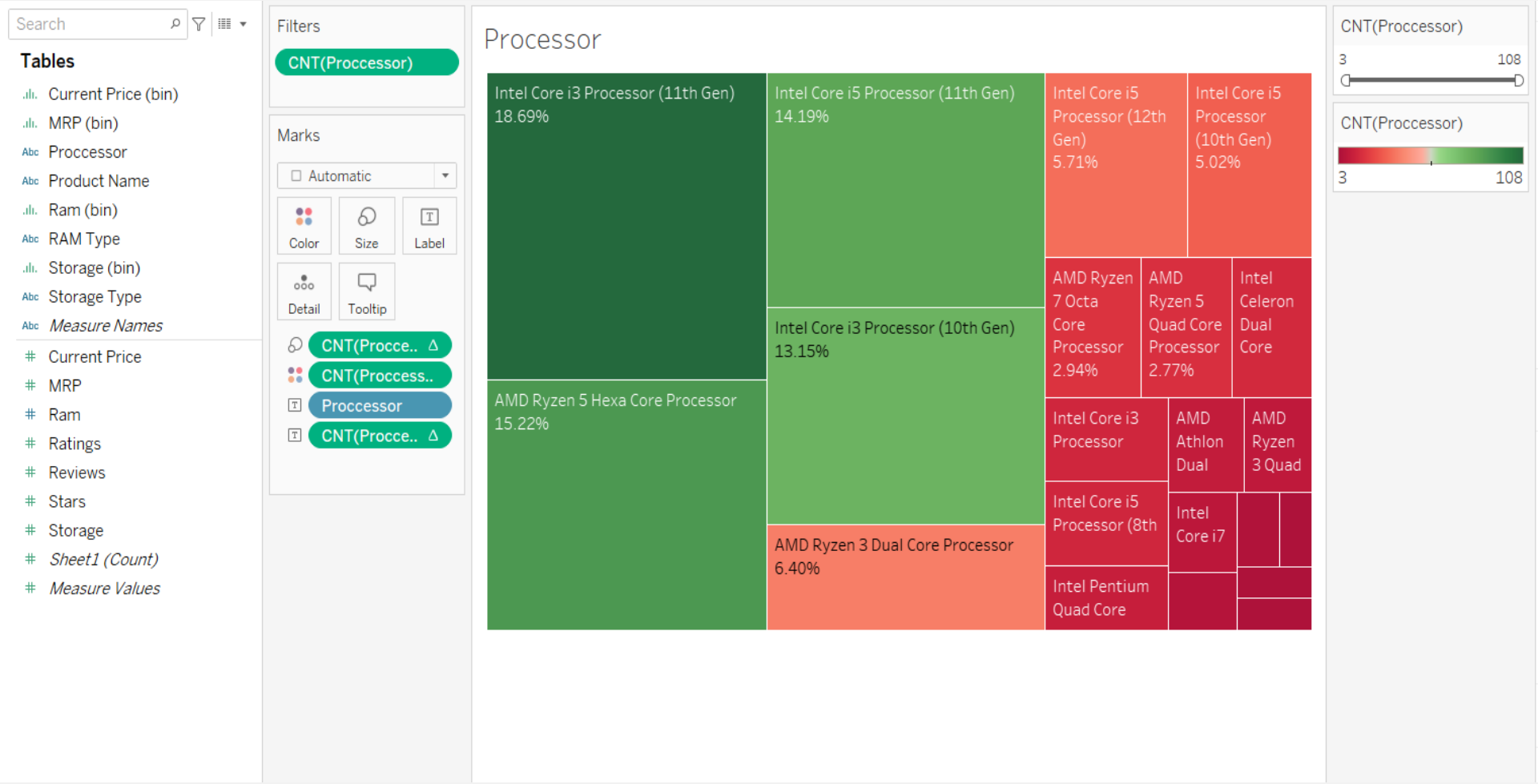
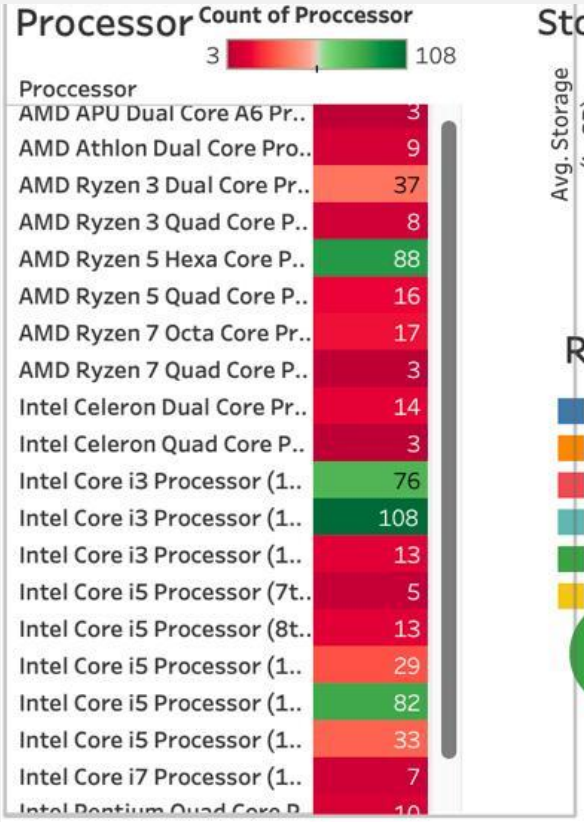
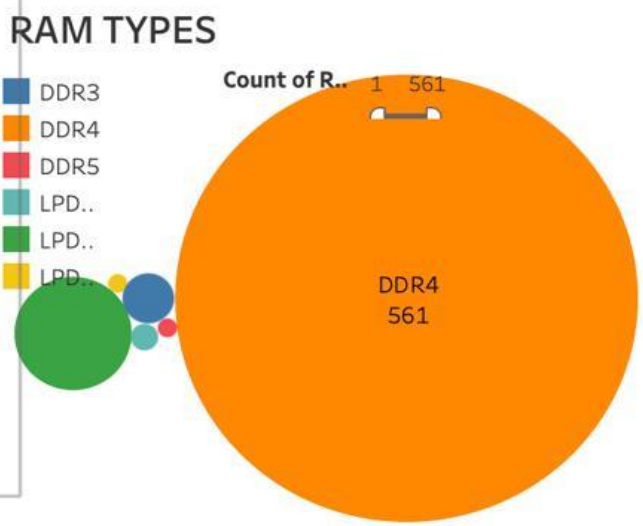
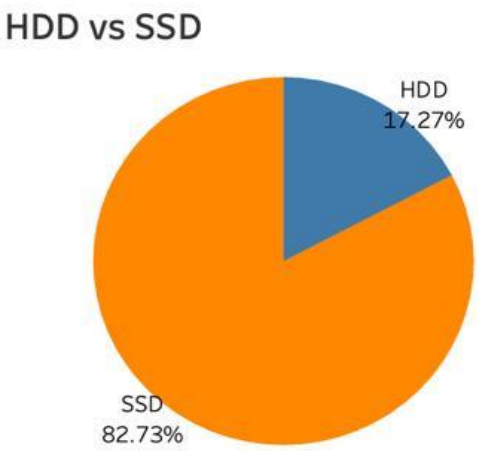


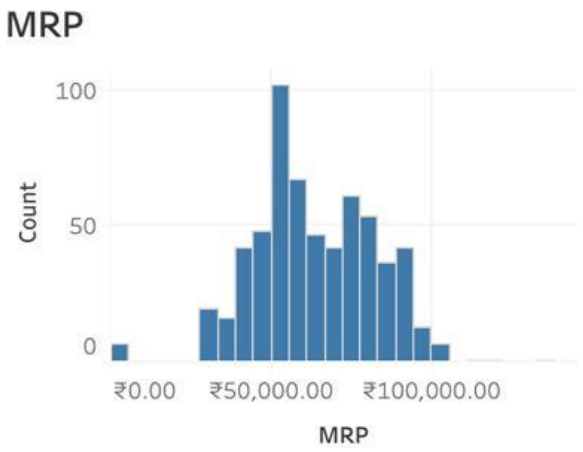
Figure 9: Scatter Plot of Processors of Laptops

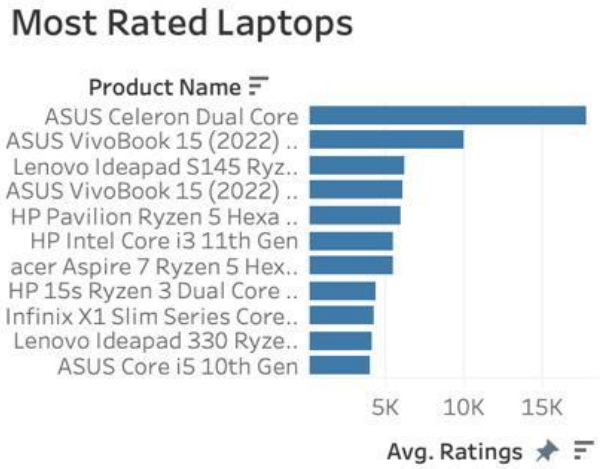
FLIPKART DASHBOARDS











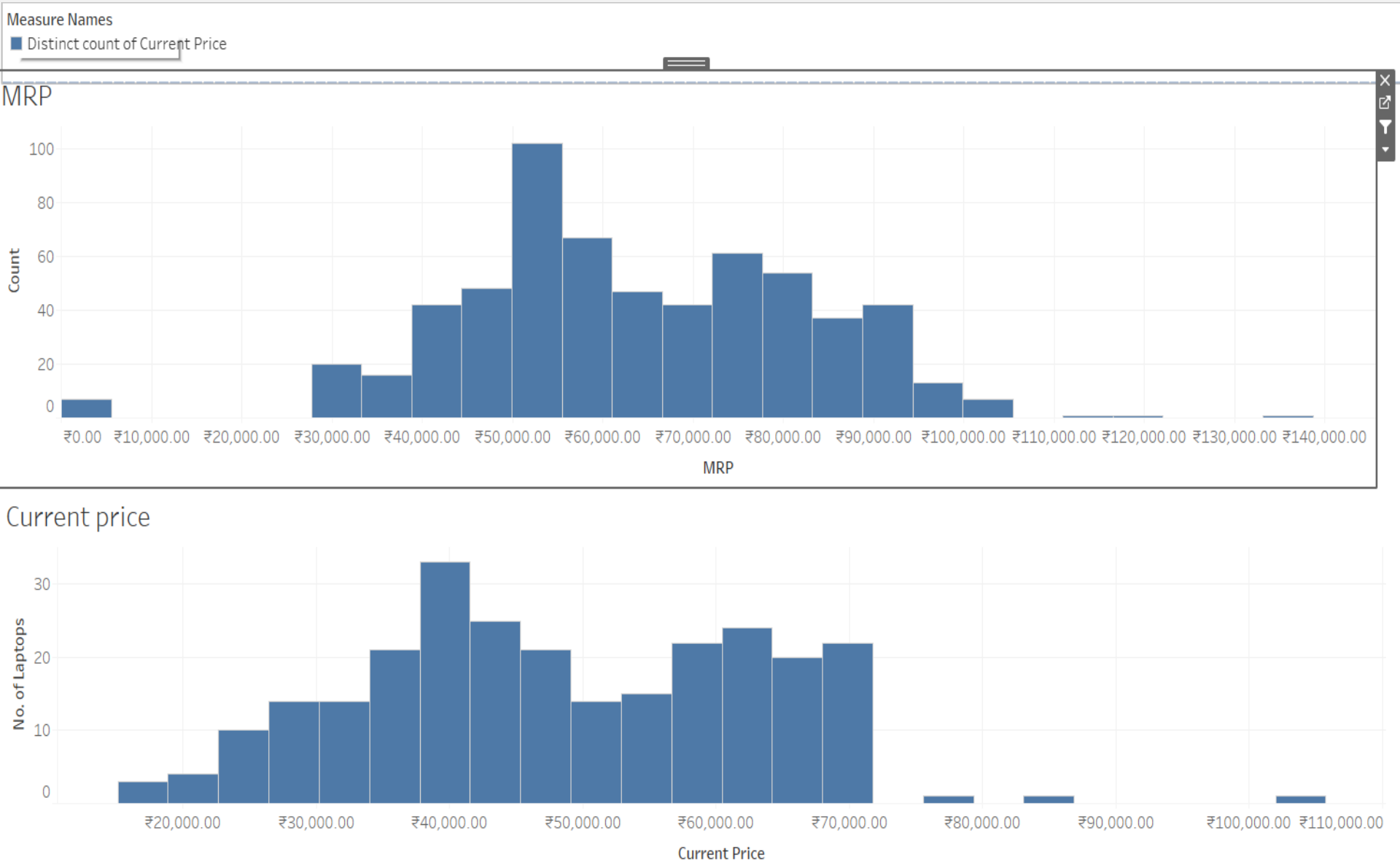


Figure 10: DISTINCT COUNT OF LAPTOPS IN CURRENT PRICE

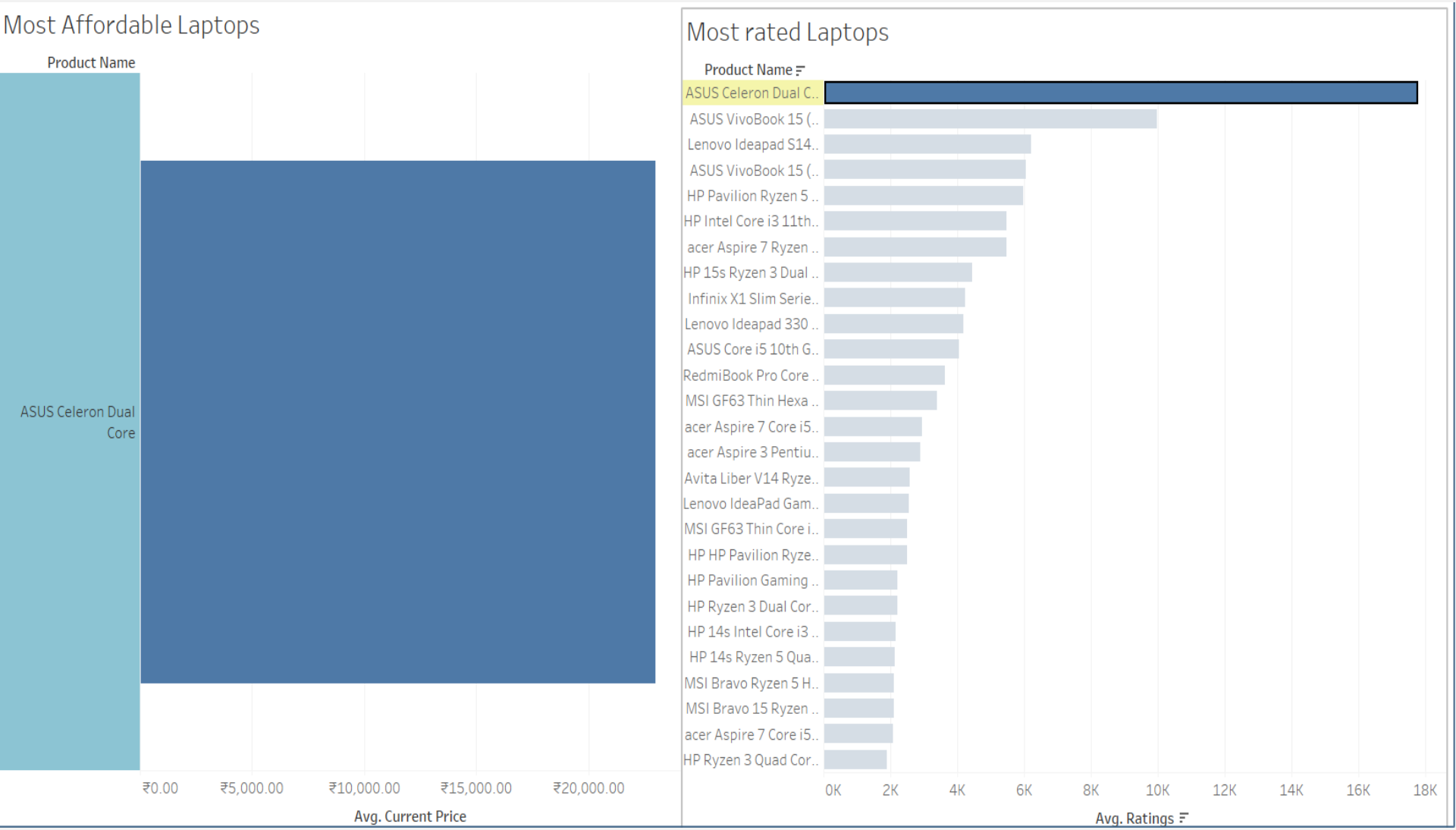


Figure 11

MOST RATED AFFORDABLE LAPTOP – ASUS CELERON DUAL CORE

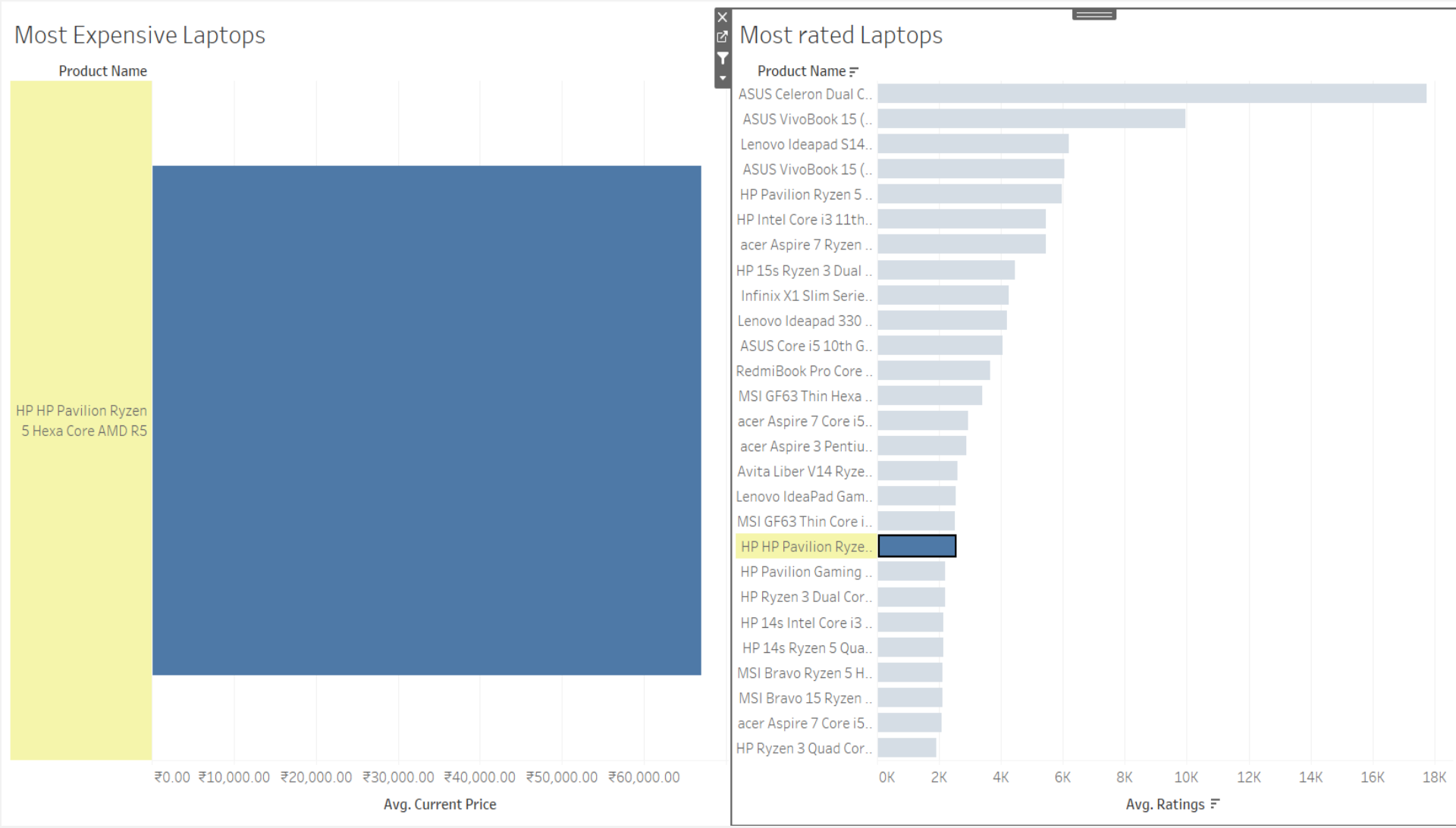


Figure 12
MOST RATED EXPENSIVE LAPTOP
HP PAVILLION RYZEN 5 HEXA CORE AMD RYZEN 5

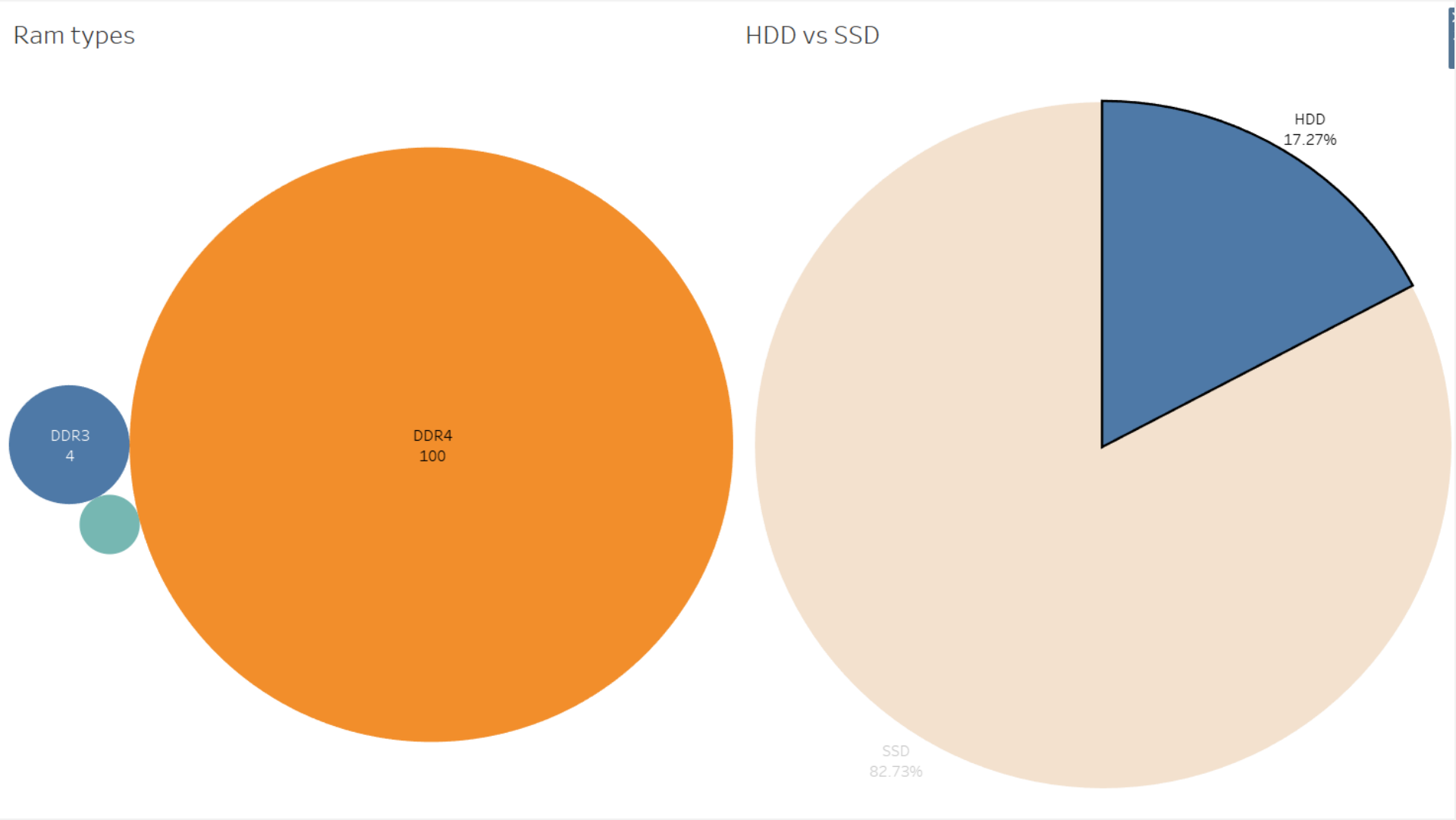
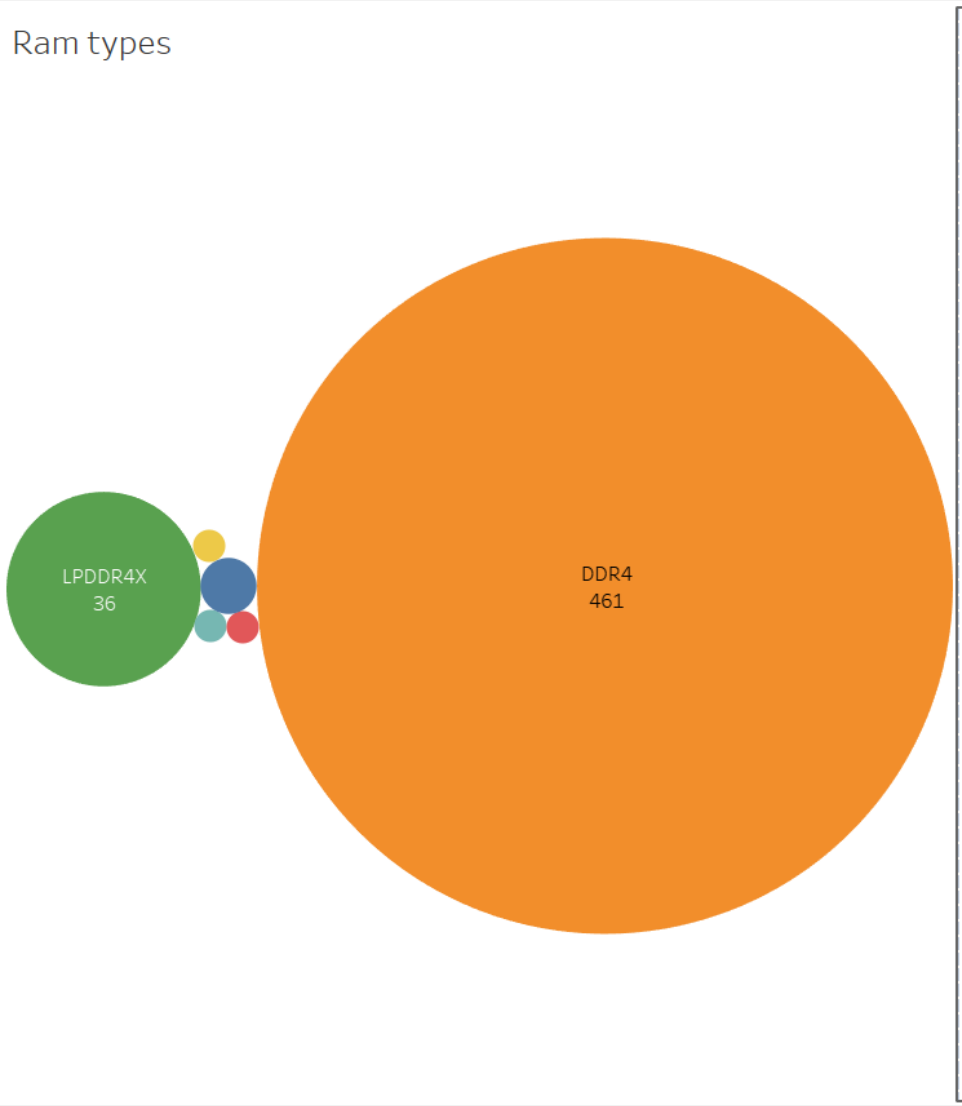


Figure-13
RAM TYPES OF HDD – DDR4(100) AND DDR3(4)



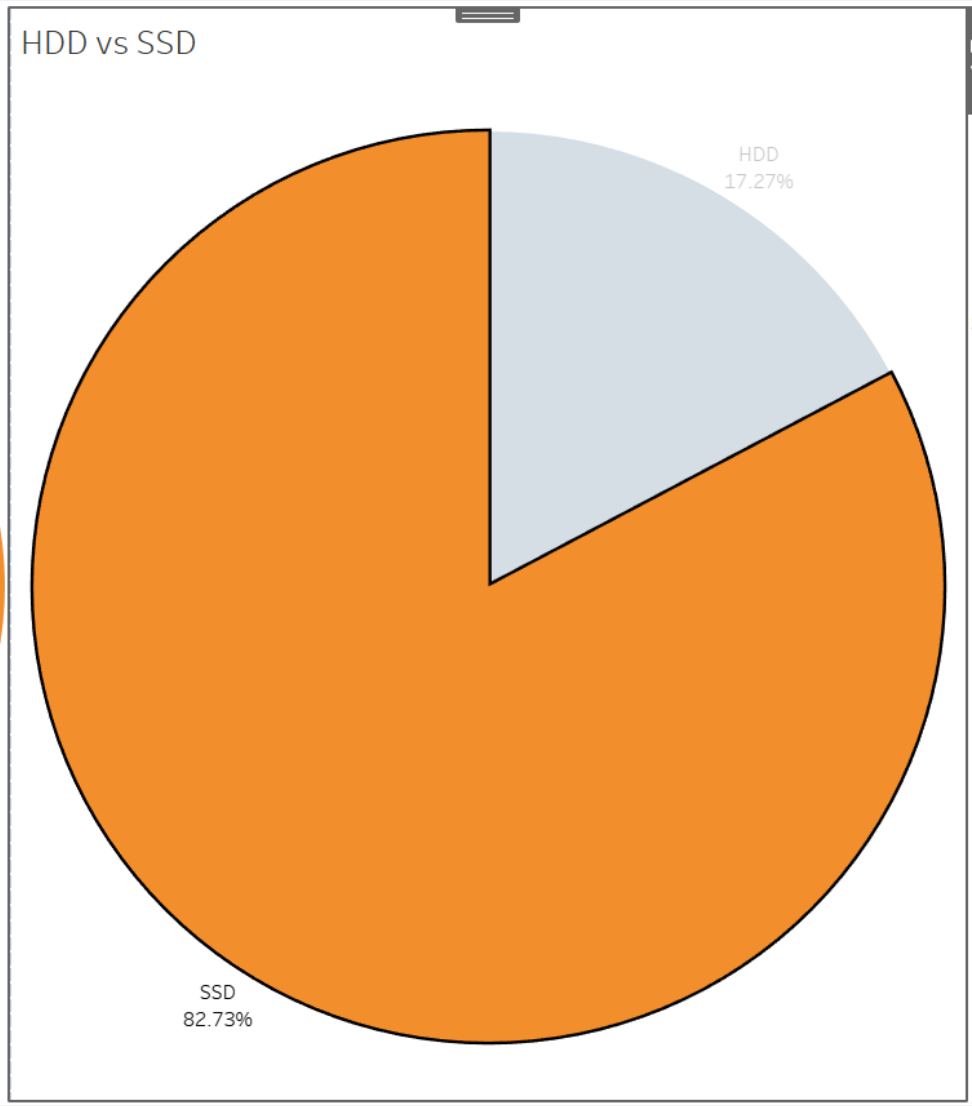


Figure - 14

RAM TYPES OF SSD – DDR4(461) AND LPDDR4X(36)

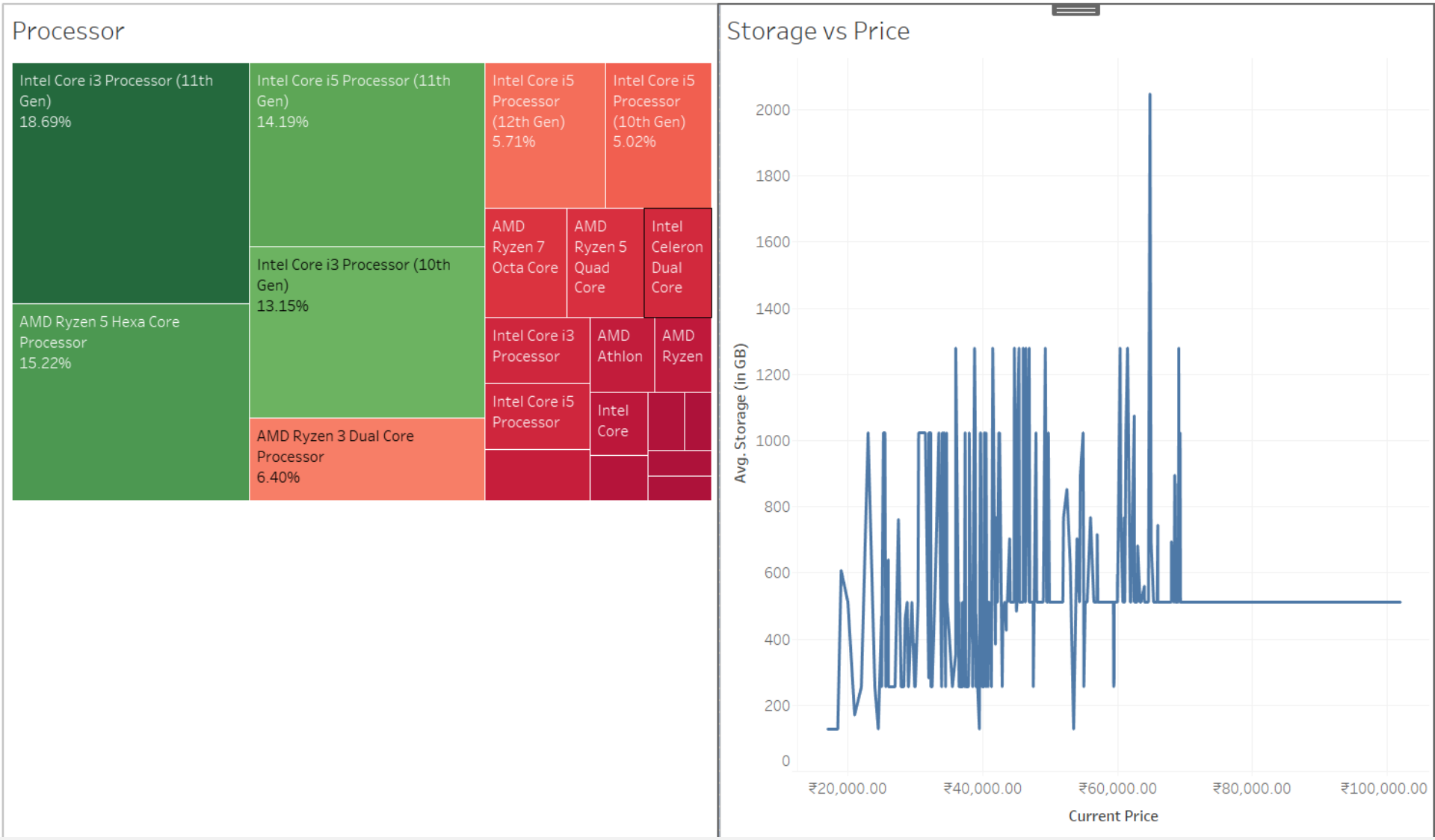


Figure 15
PROCESSOR VS STORAGE VS PRICE

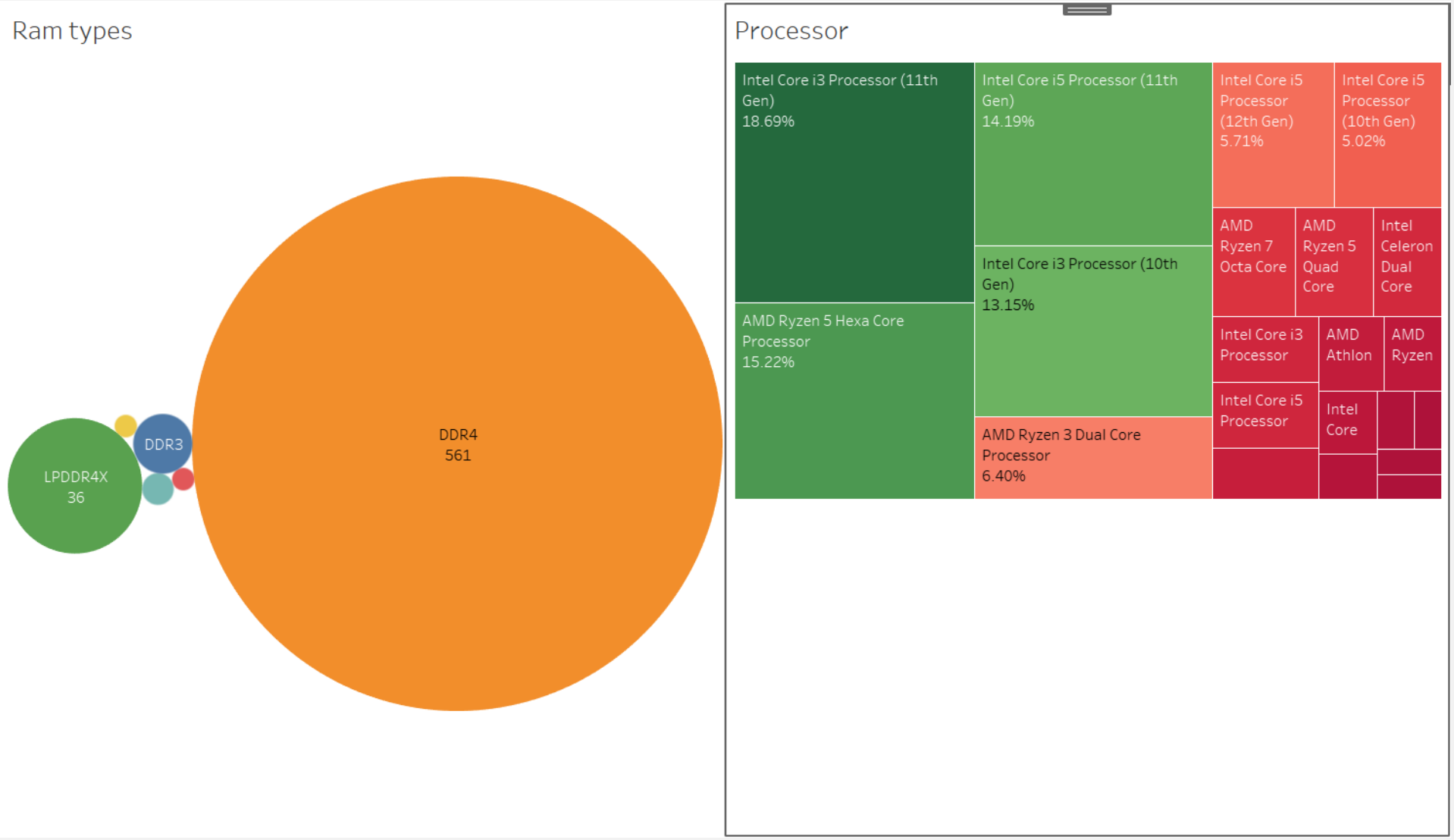


Figure 16

RAM TYPES USED IN DIFFERENT PROCESSOR

OUTCOME - AMAZON DATASET

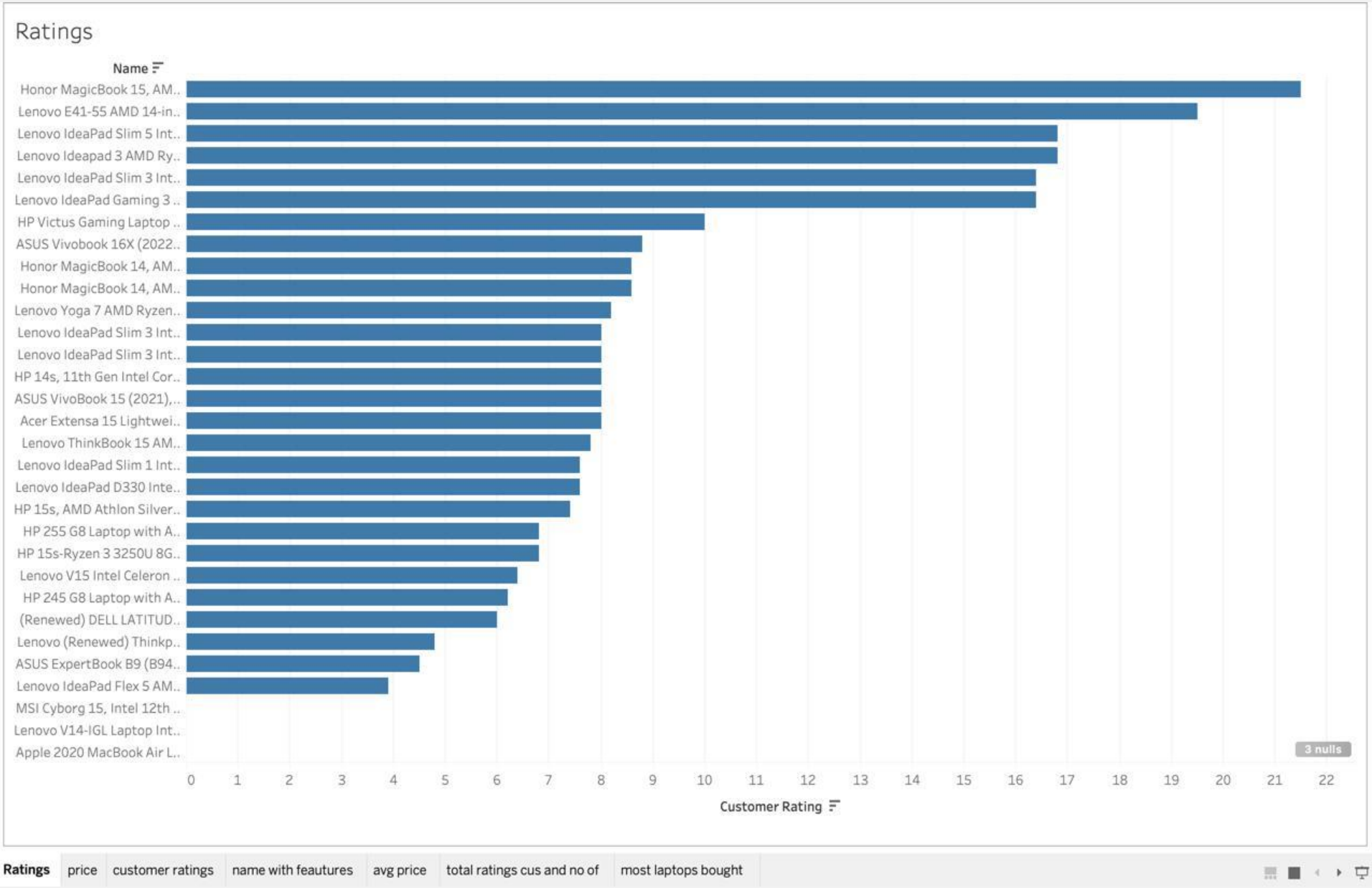


Figure 17 - CUSTOMER RATING VS LAPTOPS

Figure 18 – Laptop vs Price

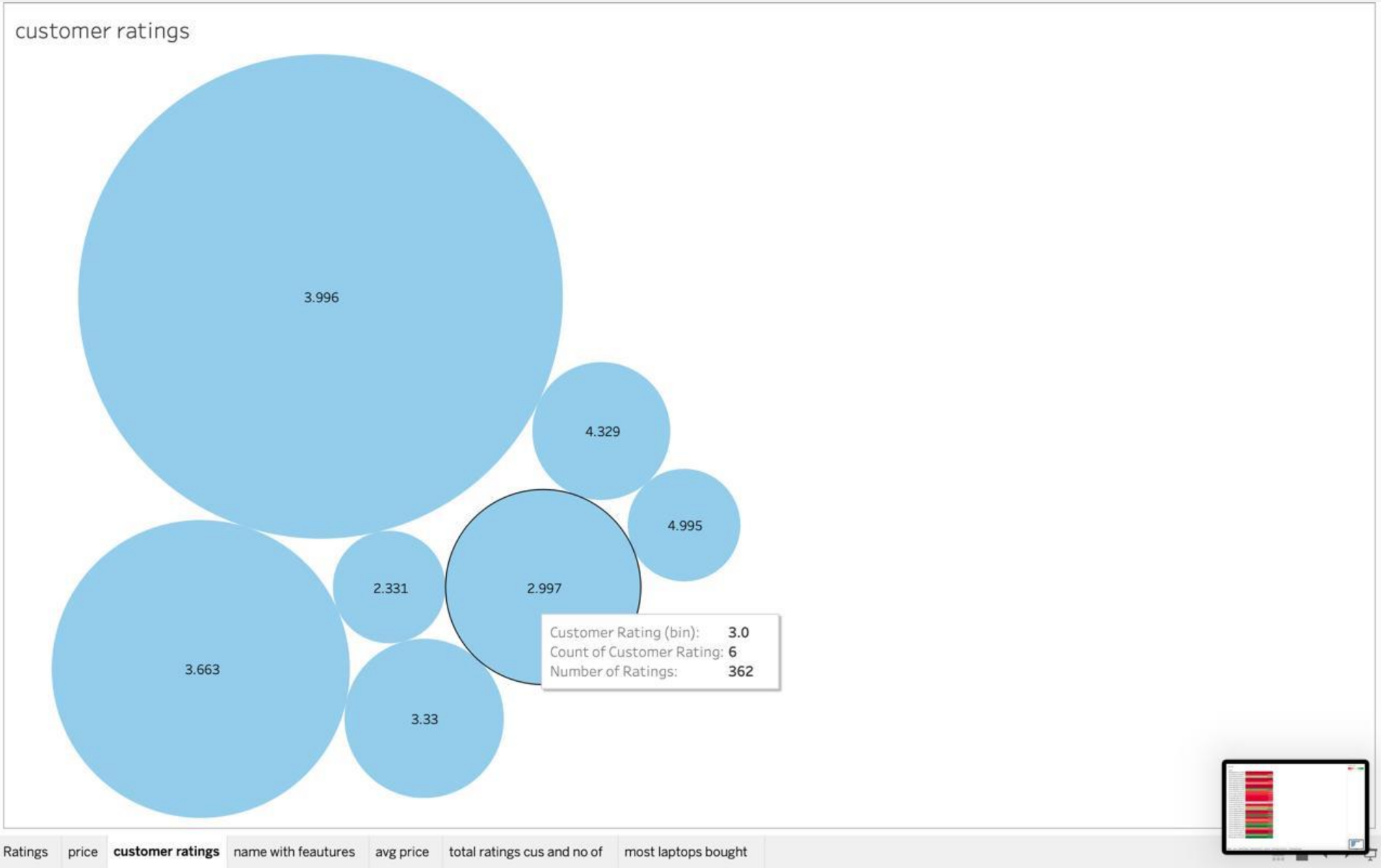


Figure 19 - Customer Ratings

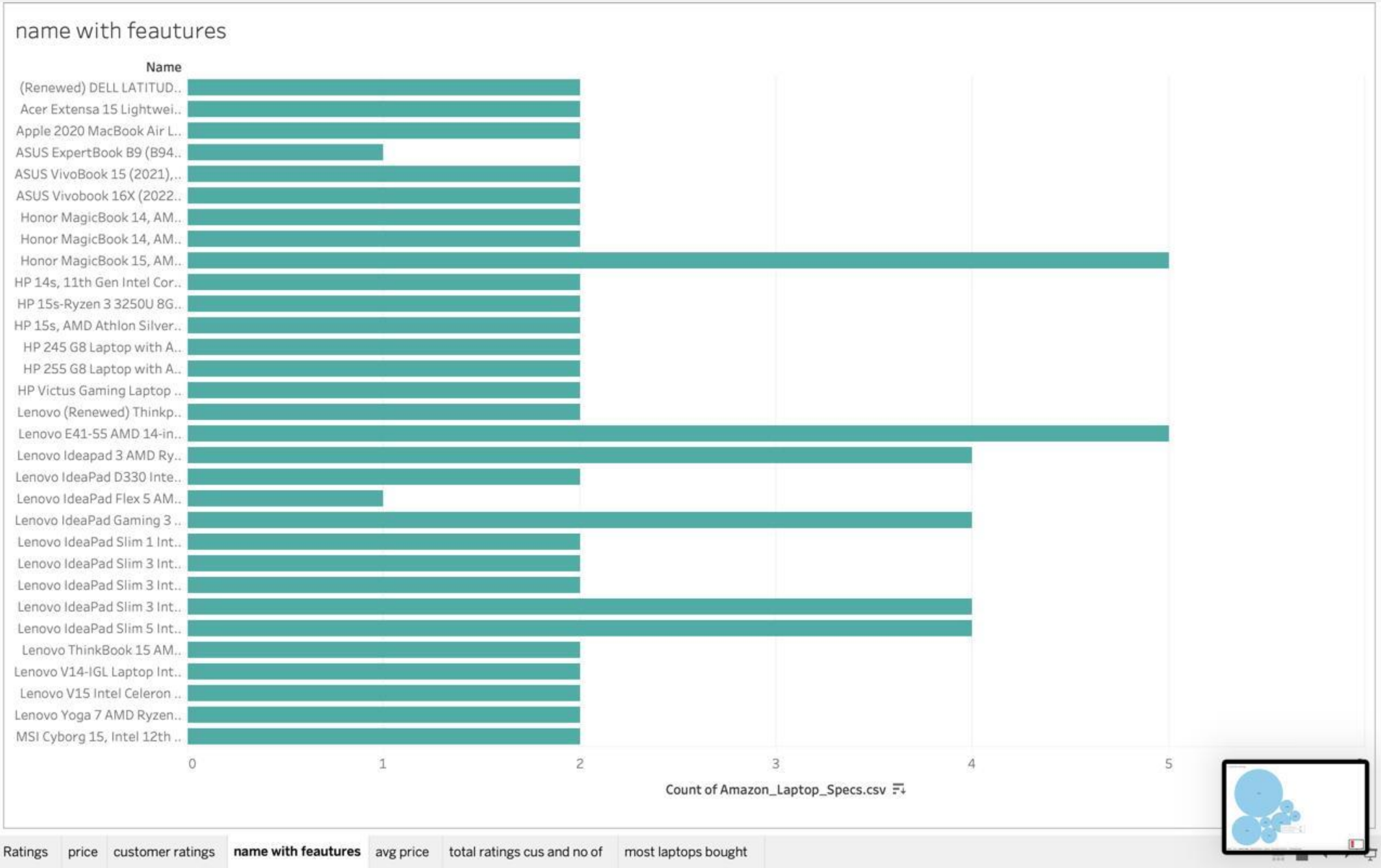


Figure 20 – Name vs Count of Laptops

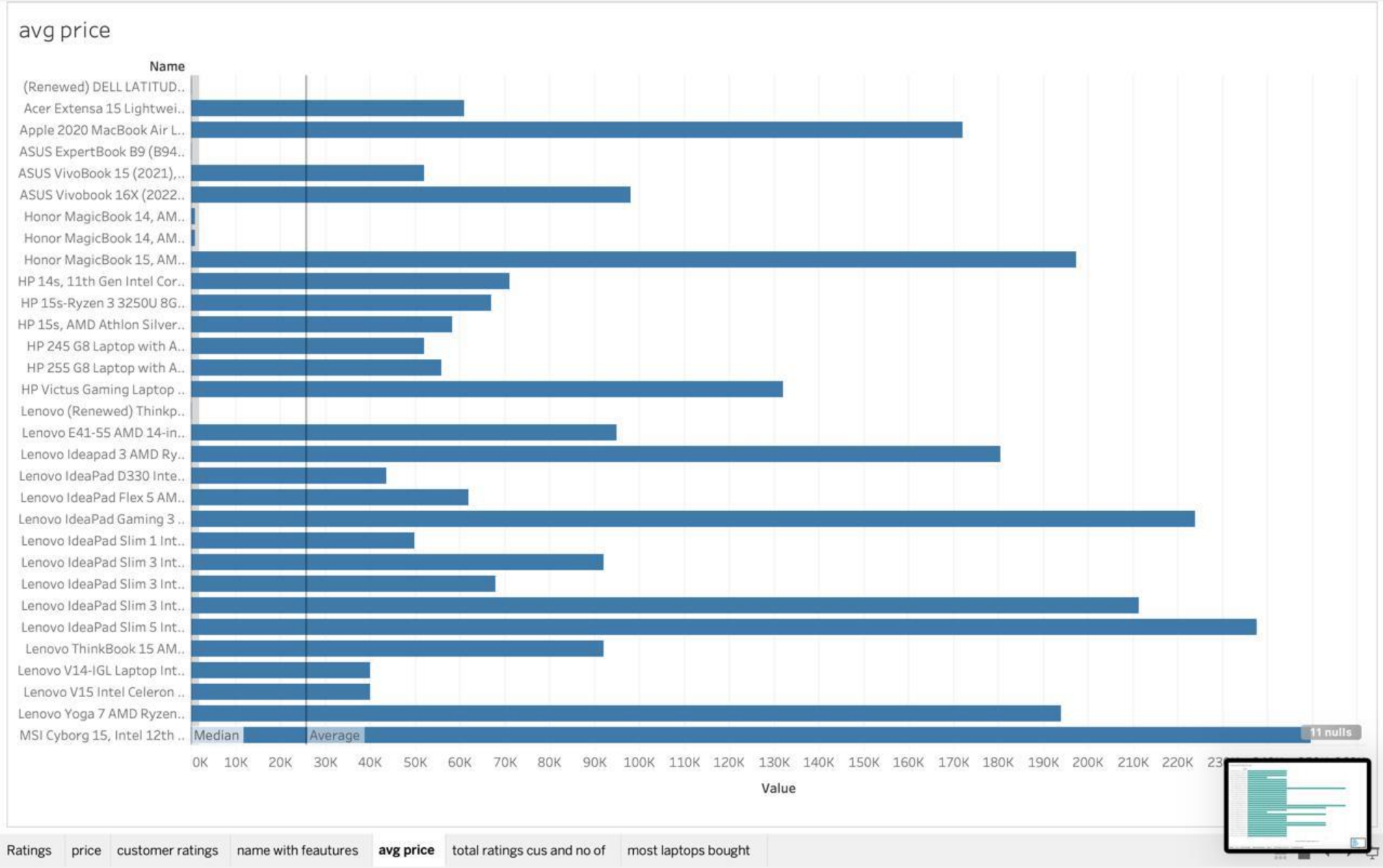


Figure 21 – Name vs Value of Laptops

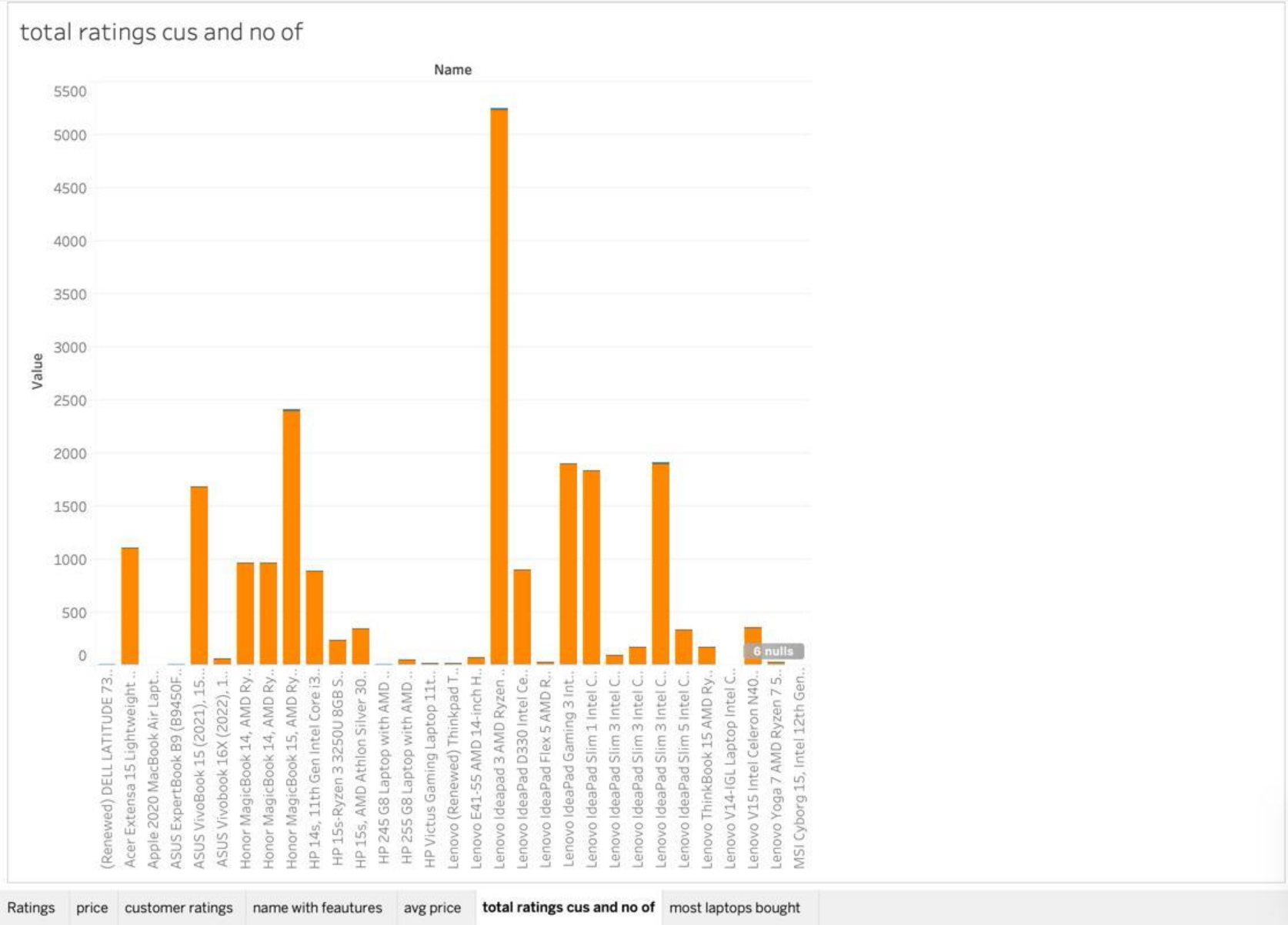


Figure 22- Customer Ratings vs Laptops

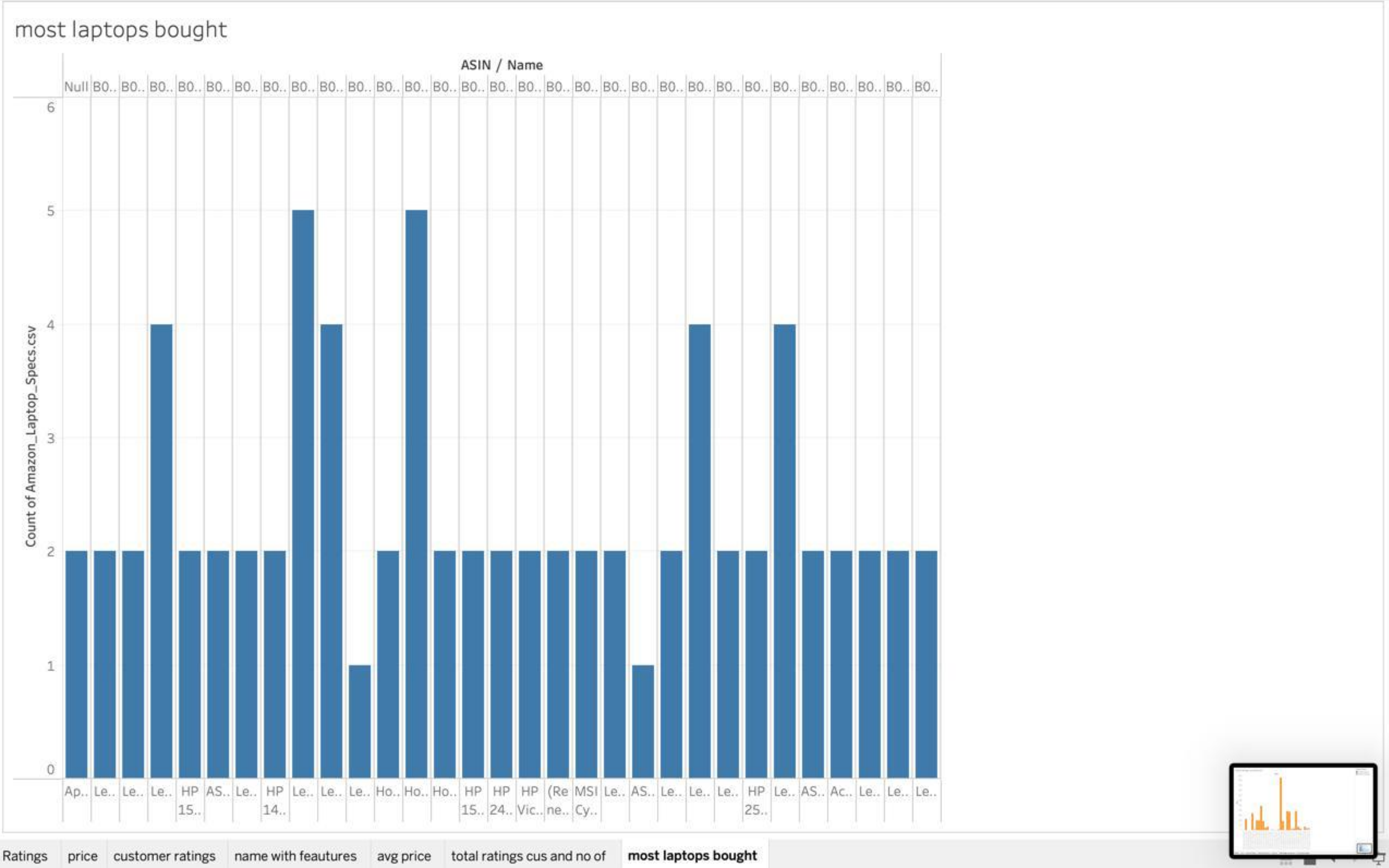


Figure 23 – Most Bought Laptops

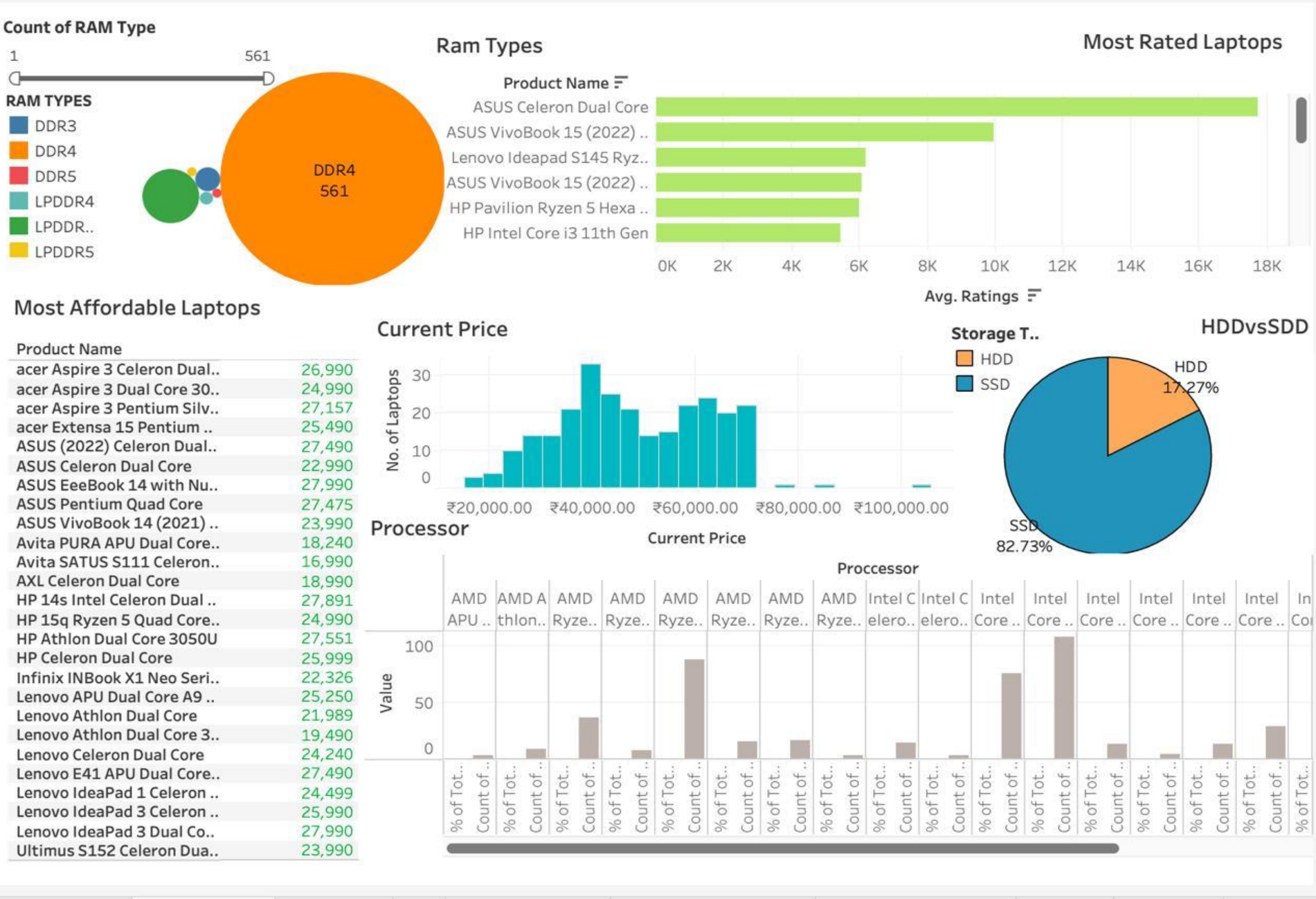


Figure 24 – Amazon Dataset Dashboard

Data Analysis and Visualisation of Budget Laptops

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Abstract— This paper uses Tableau and Python tools to give a thorough analysis and visualization of cheap computers that are accessible on Flipkart and Amazon. Data is carefully processed after being pulled from both sites to guarantee consistency. Comparative study is done on important factors like cost, features, and client opinions. Data is cleaned, processed, and first visualizations are created using Python tools like Pandas, Matplotlib, and Seaborn, which give a clear picture of the key trends. Tableau is used to create interactive dashboards that make it easier for users to study the data. The study provides consumers with useful information by outlining the benefits and drawbacks of each platform when buying laptops on a limited budget. This initiative helps users make educated decisions by providing data-driven insights and interactive representations when evaluating laptops available on Flipkart and Amazon, eventually acting as a helpful guide for consumers looking for reasonably priced laptop options in the crowded online marketplace

First, the project scrapes pertinent laptop data from both marketplaces, emphasizing characteristics, pricing, and user reviews. Accurate comparisons depend on the two systems' data being consistent. Pandas, Matplotlib, and Seaborn are a few of the Python libraries used in the analysis for data processing, cleaning, and preliminary visualizations. These tools assist in identifying patterns and trends in the price and feature sets of laptops across the two e-commerce platforms.

Interactive dashboards are made with Tableau to improve the user experience. With the help of these dynamically explorable and interactive data visualizations, users can quickly compare laptops based on a variety of characteristics. Finally, by providing insightful information about the advantages and disadvantages of both platforms, this research enables cost-conscious shoppers to make more informed choices when purchasing laptops online.

II. Objectives of the Project

Keywords: Flipkart, Amazon, Python, Tableau, E-commerce, and Data Analysis

I. INTRODUCTION

Due to the explosive rise of e-commerce, sites like Flipkart and Amazon are now popular choices for shoppers looking for a wide range of goods, including inexpensive computers. But with so many possibilities, it can be difficult for buyers to make wise selections, particularly when taking into account crucial elements like cost, functionality, and user ratings. In order to solve this problem, our research offers a thorough evaluation and comparison of the inexpensive laptops that are offered by Flipkart and Amazon.

3.Comparative Evaluation

Comparing Flipkart vs Amazon according to important criteria like price, laptop functionality, and user reviews is an important goal. The intention is to draw attention to any distinctions between the platforms that can affect the decisions made by customers, particularly those who are searching for affordable solutions.

4.**Tableau Interactive Visualizations**

Making interactive Tableau dashboards to show the results in an approachable manner is the ultimate goal. By comparing the salient features of laptops on rival e-commerce platforms, customers will be able to quickly make better educated judgments by exploring different elements of the data dynamically using these visualizations.

1.Gathering and Maintaining Data:

The main goal is to steal information on inexpensive laptops from Amazon and Flipkart. This involves retrieving information such as cost, features, and feedback from customers. A meaningful comparison depends on maintaining consistency in the style and structure of the data, since the metrics and presentation of data from other platforms may differ.

2.Python-Based Data Analysis

Processing the data with Python packages like Matplotlib, Seaborn, and Pandas is another objective. In order to find trends and patterns in the features, price, and user reviews on both platforms, this entails sorting, cleansing, and conducting exploratory data analysis.

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2. Existing System

These days, there is an enormous selection of things available on e-commerce sites like Flipkart and Amazon, including inexpensive computers. Product details, costs, and customer reviews are available on both sites; nevertheless, the information is frequently dispersed and difficult to compare. To make selections about what to buy, consumers usually have to go back and forth between different sites, carefully weighing features, costs, and reviews. Furthermore, the information displayed on these platforms may not be comprehensive in its insights into pricing patterns over time, functionality, or customer happiness, or it may be formatted inconsistently. Customers thus have a hard time locating the

5.Analysis of Customer Reviews' Sentiment
This goal goes beyond just comparing ratings; it also attempts to analyze customer reviews for both platforms using Natural Language Processing (NLP) methods. The initiative offers deeper insights into consumer happiness and dissatisfaction by analyzing the feelings stated in evaluations, such as favorable or negative feedback on particular attributes like battery life or performance.

6.Time-Series Trend Analysis
Examining pricing patterns and customer satisfaction over time is another goal. The software can spot possible sales patterns, seasonal discounts, or even point out product improvements or quality declines over time on both Flipkart and Amazon by looking at how laptop prices change and how consumer feedback changes.

7.Recommendations Specific to Each Platform
The ultimate goal is to offer recommendations tailored to individual platforms. The initiative will determine whether platform provides better deals for specific sorts of low-cost laptops based on the comparison analysis. Users can use this to determine whether Flipkart or Amazon is a better fit for their needs based on criteria like price, customer satisfaction, or certain product attributes.

solutions that offer the most value for their money based on trustworthy information.

The Project's Goal
By automating the process of obtaining, purifying, and evaluating data from Flipkart and Amazon, the project seeks to close this gap. The primary goals are to present a thorough analysis of low-cost laptops based on cost, features, and user reviews. Python modules like Matplotlib, Seaborn, and Pandas are used to process and visualize the data in a format that is simple to understand. The project also makes use of Tableau to generate dynamic interactive dashboards that let users examine and contrast important data points. By solving existing system limitations, the addition of pricing patterns and sentiment analysis gives consumers greater insights than just cost and specifications.

Project's Scope
This project's scope goes beyond a straightforward data comparison. Through the integration of in-depth analysis on a range of aspects, such as pricing changes, customer sentiment, and platform-specific strengths, it offers consumers a comprehensive tool to make informed selections. Although the initiative focuses on low-cost laptops, additional product categories might be easily analyzed using the same methods. Moreover, Tableau's interactive dashboards enable users to customize their analysis according to their preferences, making it

an accessible tool for individuals with diverse technical proficiency. Long-term plans for this project include adding support for additional e-commerce platforms and predicting pricing patterns with predictive analytics, which will improve the ability of consumers to make decisions.

3.Proposed System:

The goal of the suggested technique is to offer a thorough method for evaluating and contrasting inexpensive laptops offered by Flipkart and Amazon. To provide in-depth insights into crucial elements like cost, features, and user evaluations, it automates data extraction, processing, and visualization. The system consists of four main parts: Tableau interactive dashboards, Python-based exploratory data analysis (EDA), data cleaning and processing, and data scraping. The solution guarantees a solid basis for analysis by utilizing Python packages such as Seaborn for initial visualizations and Pandas for data manipulation. The user experience is further improved by the dynamic data exploration made possible by the interactive Tableau dashboards. Time-series analysis monitors price patterns over time, while Natural Language Processing (NLP) is utilized for sentiment analysis of customer feedback.

The proposed system's data scraping algorithm:

1.Enter the URLs of the Flipkart and Amazon listings for inexpensive laptops.
Procedure: Utilize the BeautifulSoup or Selenium packages in Python to retrieve information on laptop features, cost, and user feedback.
Output: For both platforms, raw data in JSON/CSV format.
Data Preparation and Cleaning:

2.Data scraped for input.
Process: Deal with outliers and missing values. Standardize data formats (like specs for laptops and currencies).
Use Pandas to combine data from the two platforms into a single structure.
Output: Data that is organized and ready for analysis.

3.Analyzing exploratory data (EDA):

Clean data was entered.
Method: To make visualizations like as box plots, histograms, and bar charts, use Matplotlib and Seaborn.
Examine features, cost, and customer feedback.
Output: The first visual perceptions of distributions, trends, and comparisons.

Block Schematic

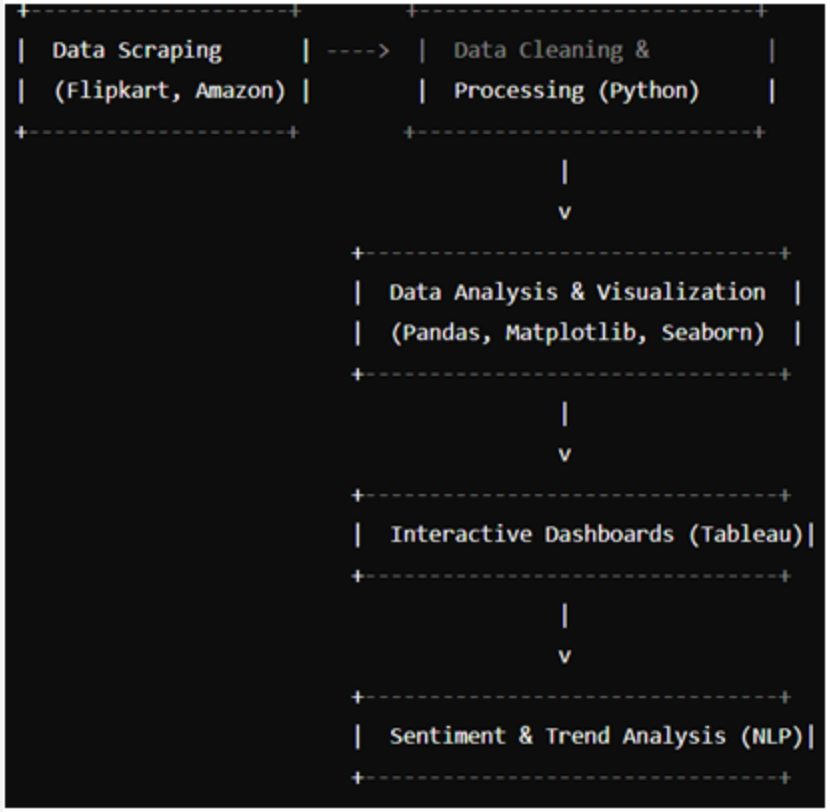

Tableau Interactive Dashboards:

4.Data processing and visualizations are the input.

Procedure: Load data into Tableau and build interactive dashboards with rating, specification, and price range filters.
Result: Interactive visuals that allow users to engage and gain deeper understanding

5.Analysis of sentiment and trends:

User evaluations as input.
Procedure: Perform sentiment analysis using natural language processing (NLP) methods using Python's TextBlob or VADER packages.
Use time-series analysis to monitor patterns in customer reviews and pricing over time.
Output: Trend charts and sentiment scores that shed light on price changes and user satisfaction.

5. Tableau Workspaces

• Goal: Develop interactive dashboards that graphically convey important insights.

• Elements:

o Filterable Charts: Allow customers to narrow their search results based on brand, price range, and additional laptop specs.

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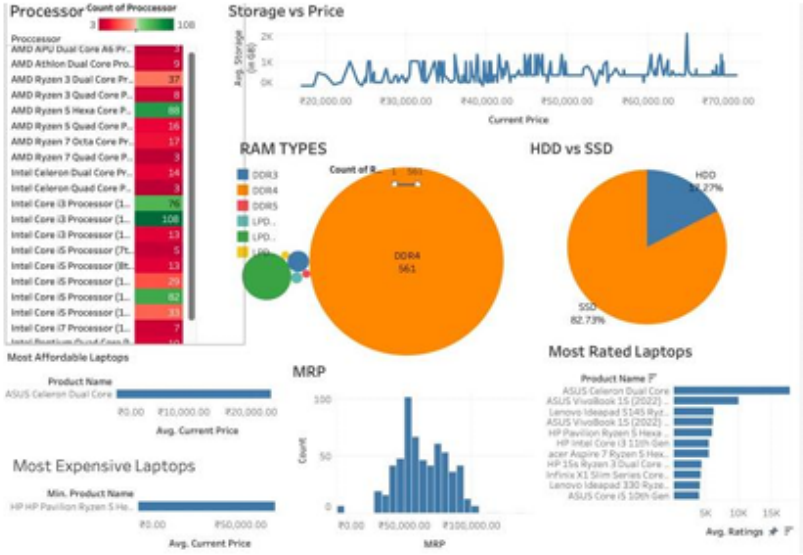
- Customer Sentiment Analysis: This dashboard displays the general opinion of users regarding laptops across both platforms by compiling reviews and ratings from customers.

FLIPKART DASHBOARD

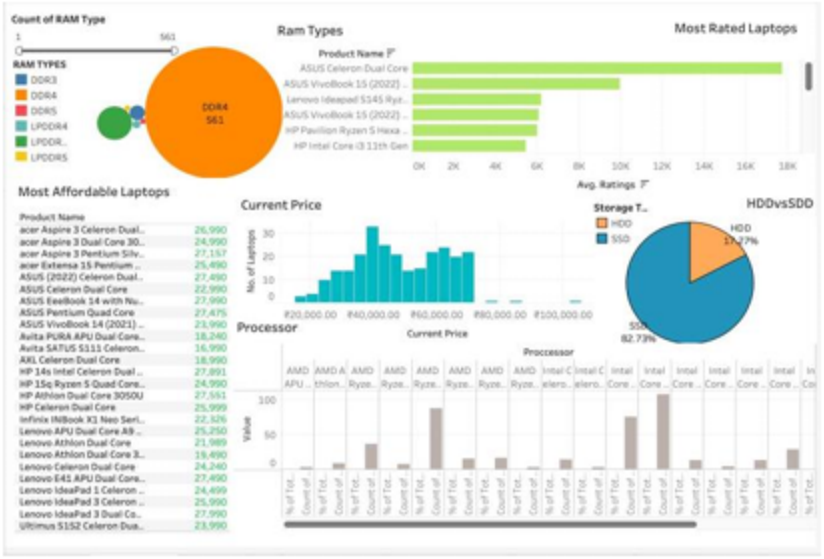


approach. The technology makes it easier and more organized to compare important elements like cost, features, and user evaluations by automating the data gathering, cleaning, and analysis procedures. Python libraries that provide efficient data processing and visualization, providing lucid insights into trends and patterns, including Pandas, Matplotlib, and Seaborn. Additionally, by enabling users to assess customer happiness beyond star ratings, the incorporation of Natural Language Processing (NLP) for sentiment analysis deepens the analysis. Tableau dashboards that are interactive allow users to dynamically explore the data, making them a versatile tool for customers with different needs and preferences

In the end, this project shows the value of fusing data science methods with e-commerce analysis while also assisting customers in making knowledgeable judgments while buying inexpensive laptops. Compared to manual product comparisons, the system's capacity to compare platforms, evaluate sentiment, and track trends over time is a considerable gain. This framework has the potential to be expanded to other product categories and enhanced with predictive analytics, thereby creating a comprehensive online decision-support system.

5. Future Enhancements

AMAZON DASHBOARD



4. Conclusion

The difficulties that customers encounter while comparing inexpensive computers on Flipkart and Amazon are satisfactorily addressed by this

The project's main goal for the future is to expand its scope to include e-commerce platforms other than Flipkart and Amazon. Consumers would have access to a greater selection of low-cost laptops and other possibilities, improving the comparative analysis, if data from more online merchants were integrated. To ensure consistent data quality across several platforms, this would need modifying the data scraping procedures to suit diverse website structures and formats. Personalized recommendations based on customer preferences and past data might also be provided by integrating machine learning algorithms, allowing for a more customized shopping experience.

Using predictive analytics to project future pricing trends and user ratings is another possible improvement. The technology may forecast price decreases or rises by using historical data and

machine learning algorithms, assisting customers in choosing the ideal time to buy a laptop. Furthermore, adding user feedback methods to the dashboards may enable users to discuss their experiences with one another, fostering a community-driven element that would further enhance the data that is accessible for analysis. In addition to increasing user engagement, these improvements would provide customers with even more powerful tools to help them make wise judgments when making purchases in the ever-changing world of e-commerce.

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