ReCell
Used Phone Price Prediction

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Problem Statement and Solution Approach

Use Supervised Learning to make a model to help predict prices for used phones and increase profits while being competitive

1. Collect, clean, and analyze data on used/refurbished phones
2. Determine which phone attributes are correlated with used prices
3. Build a linear regression model and test its performance

Dataset Columns

1. brand_name: Name of manufacturing brand
2. os: OS on which the phone runs
3. screen_size: Size of the screen in cm
4. 4g: Whether 4G is available or not
5. 5g: Whether 5G is available or not
6. main_camera_mp: Resolution of the rear camera in megapixels
7. selfie_camera_mp: Resolution of the front camera in megapixels
8. int_memory: Amount of internal memory (ROM) in GB
9. ram: Amount of RAM in GB
10. battery: Energy capacity of the phone battery in mAh
11. weight: Weight of the phone in grams
12. release_year: Year when the phone model was released
13. days_used: Number of days the used/refurbished phone has been used
14. new_price: Price of a new phone of the same model in euros
15. used_price: Price of the used/refurbished phone in euros

- 3571 rows x 15 columns
- 203 rows with missing values

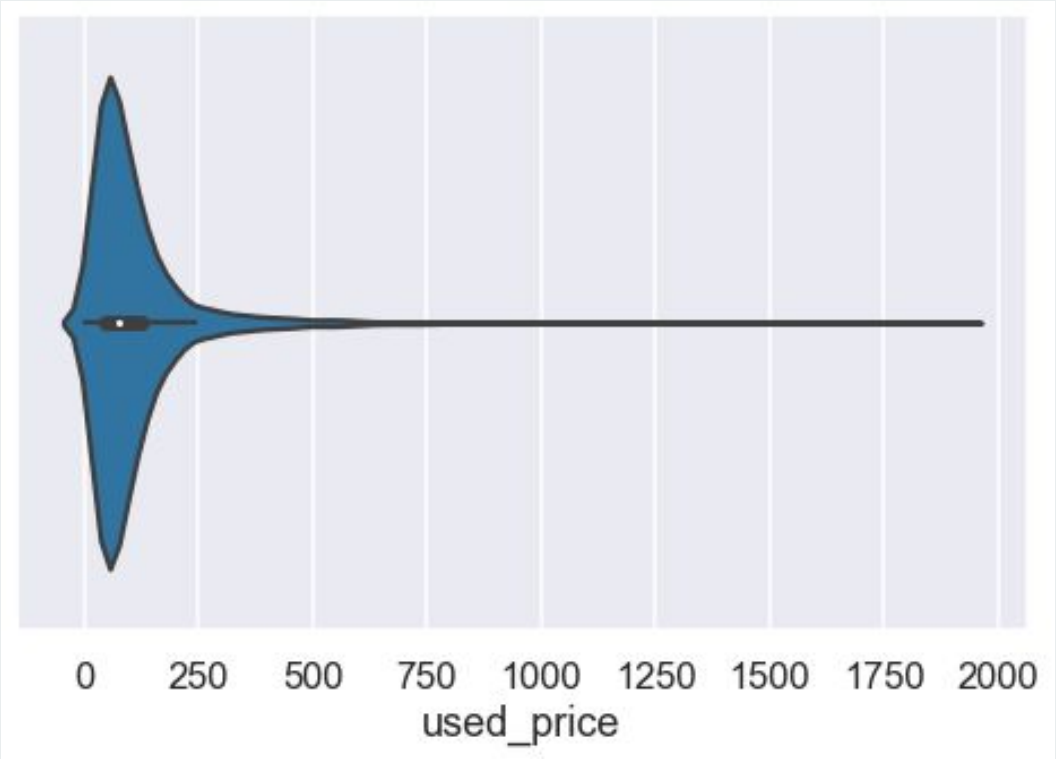
- We can research the phone models and replace the missing values by hand
- However, for the 180 missing main_camera_mp values, it might be smart to see what other variables affect camera resolution before replacing them with mean or median

- No duplicate values or misspellings
- There might be some outliers worth investigating
- 5g and 4g can be converted to 0s and 1s instead of yes/no

Other than nulls and a couple outliers, the data looks good with expected values

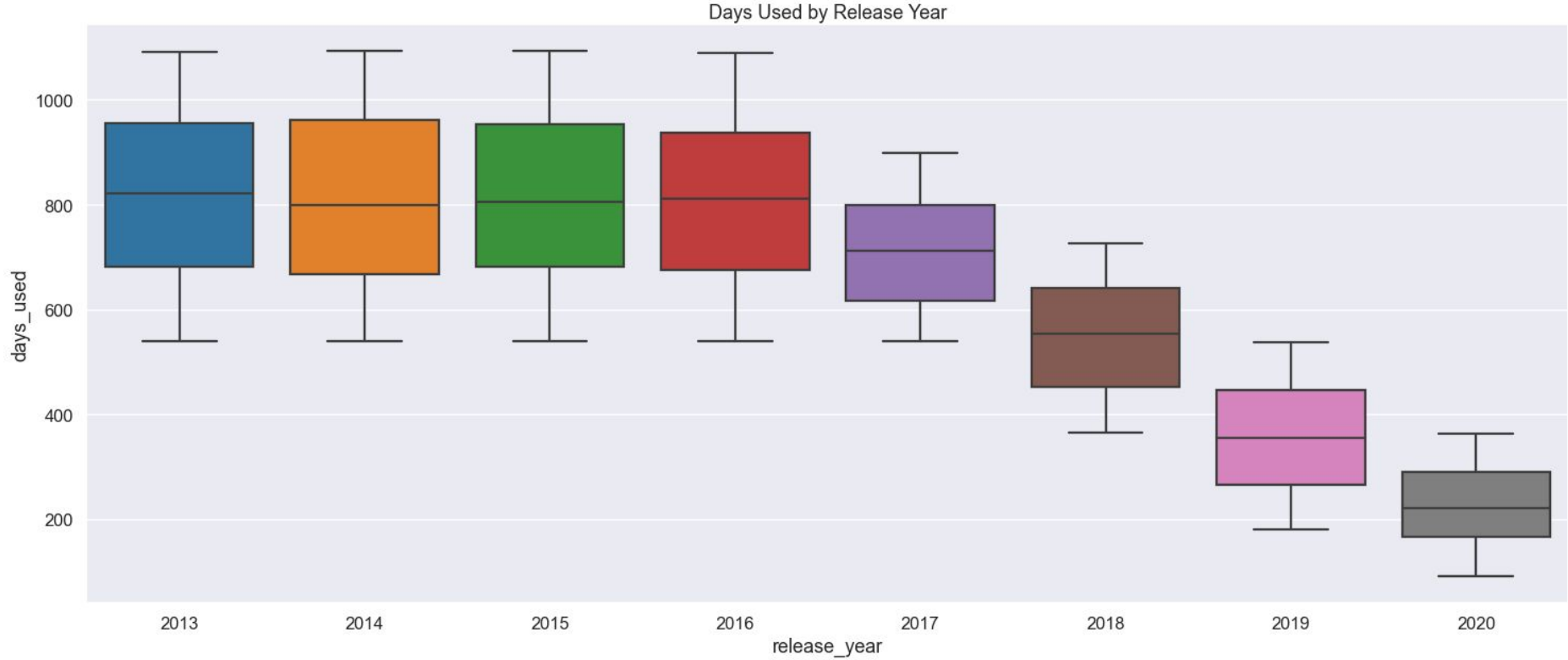
Exploratory Data Analysis

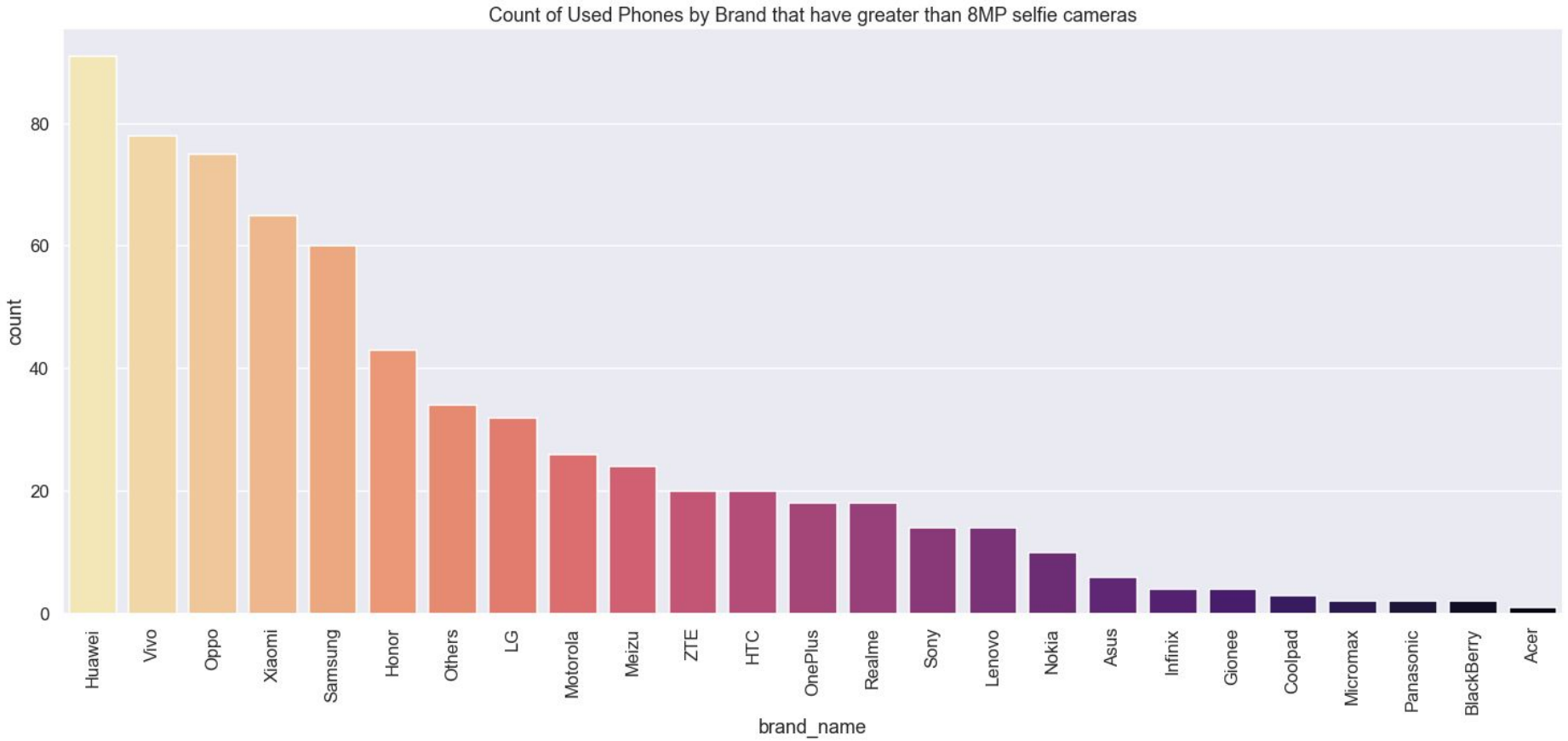
Univariate and Multivariate Plots Before Model Building



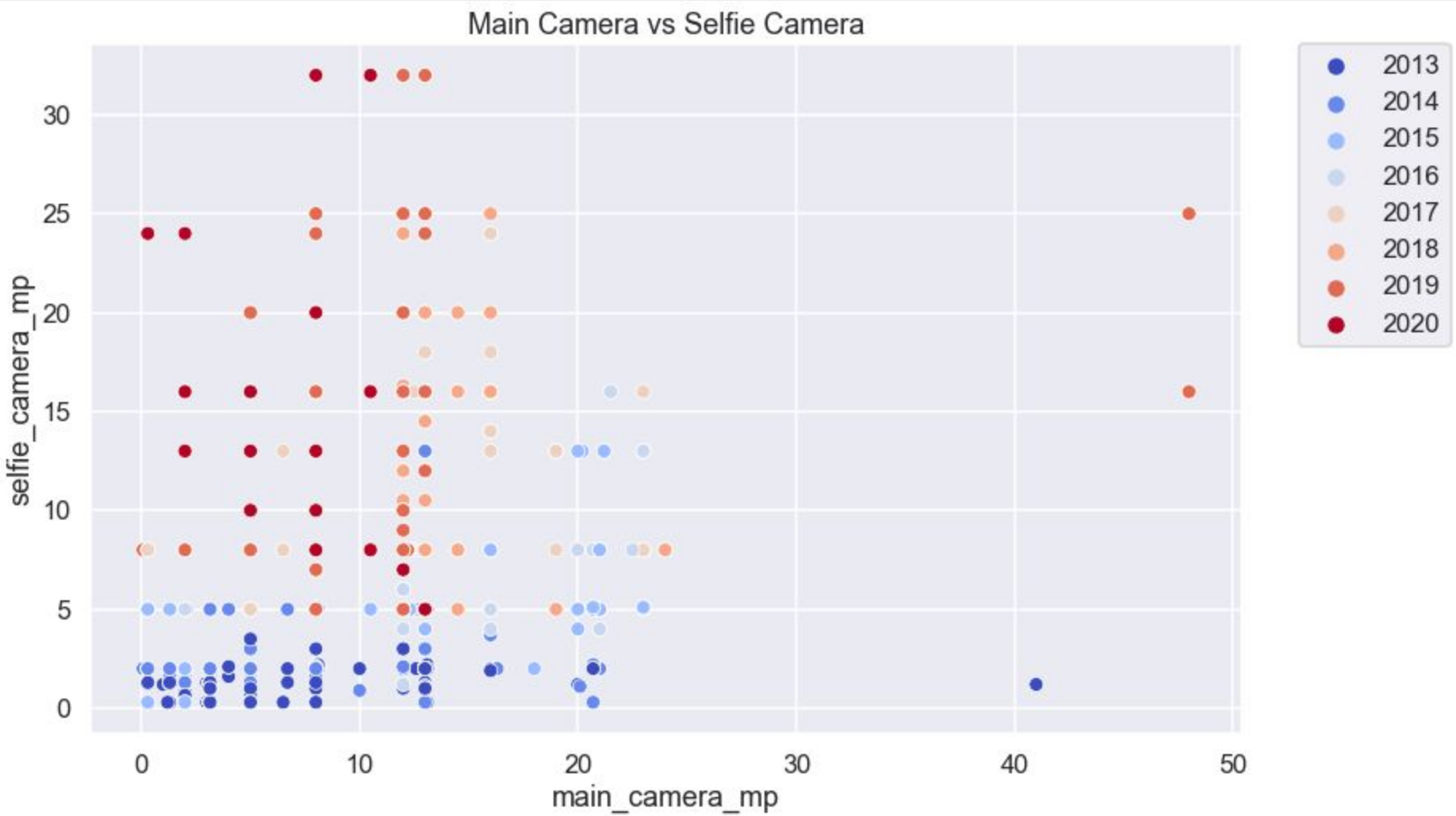
Violin Plot of Used Prices

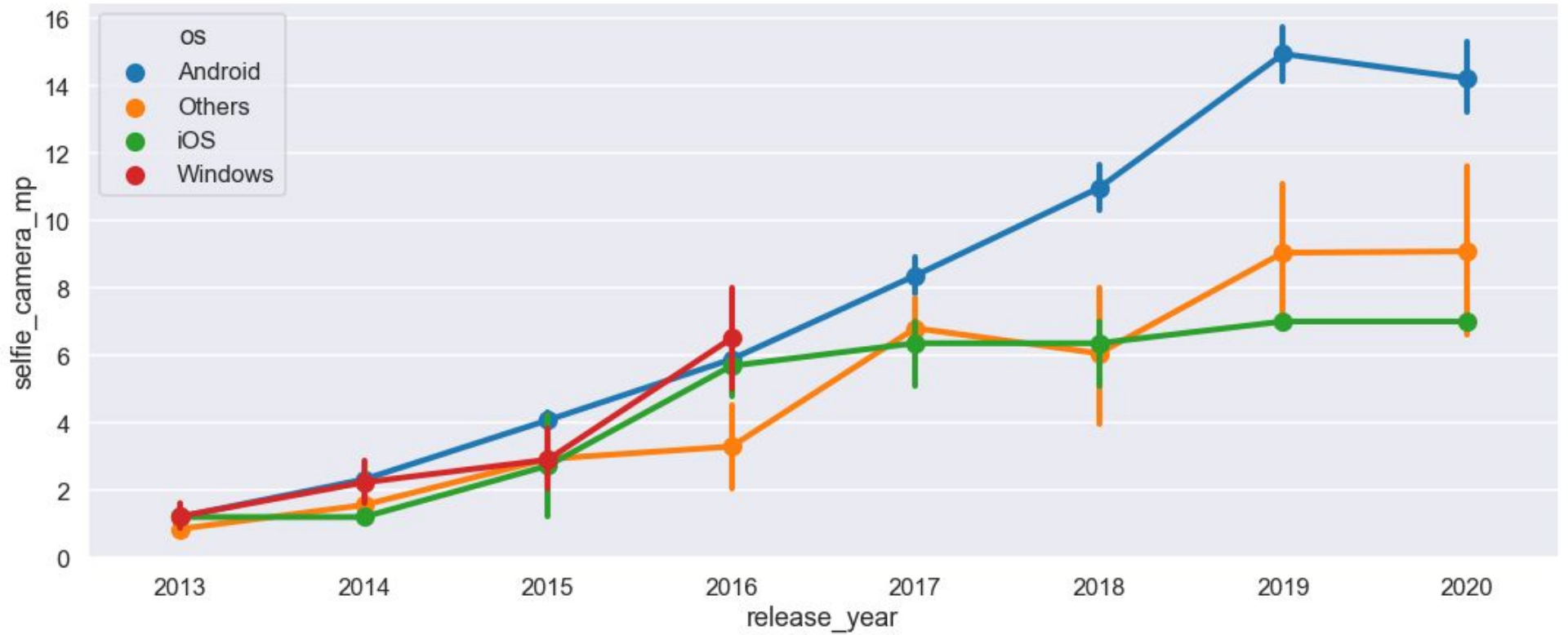
Most used phones are under 500 Euros and there appears to be some costing almost 2000 Euros

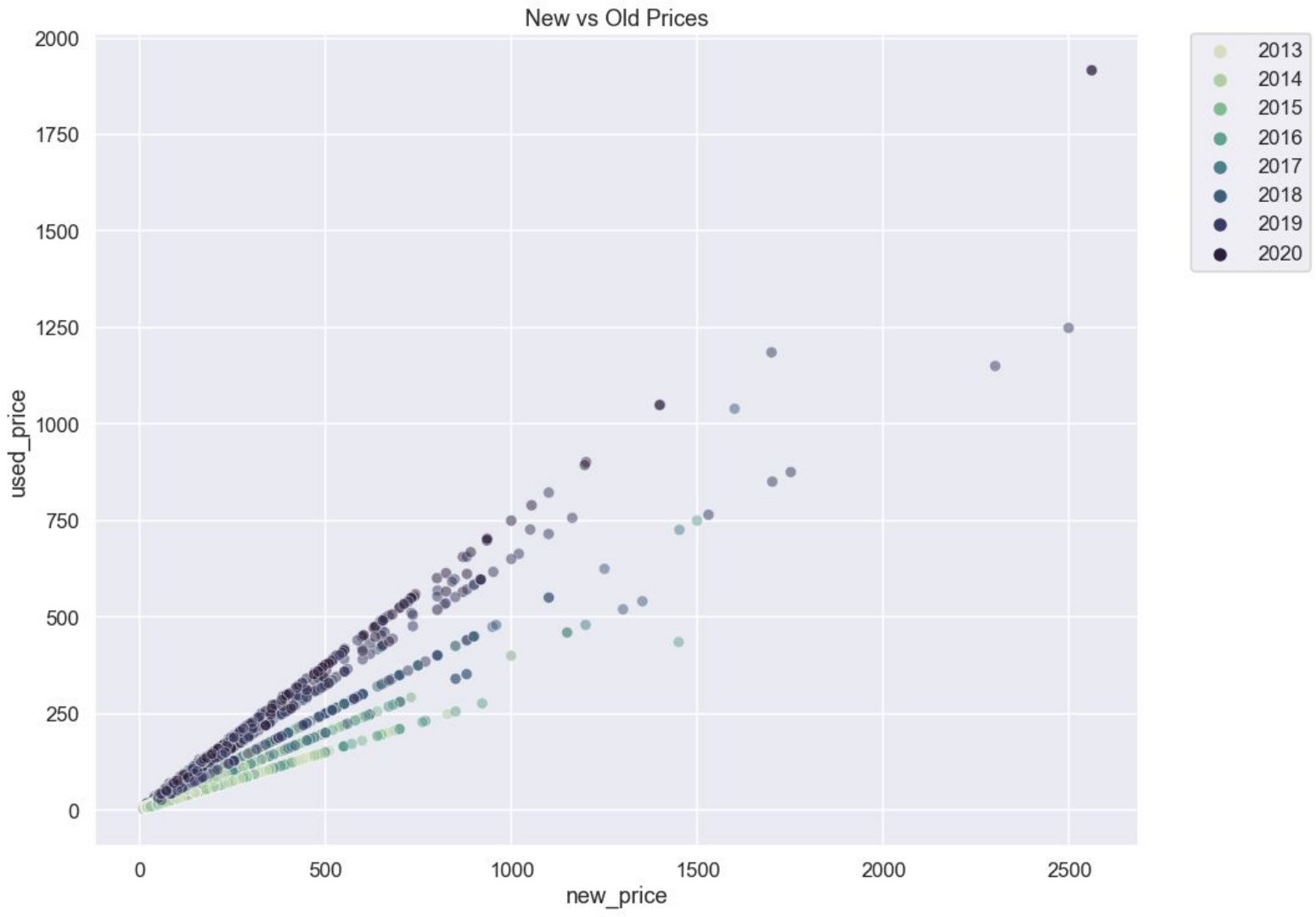

Days Used by Release Year
days_used
1000
800
600
400
200
2013
2014
2015
2016
2017
2018
2019
2020
release_year


Count of Used Phones by Brand that have greater than 8MP selfie cameras
count
0
20
40
60
80
Huawei
Vivo
Oppo
Xiaomi
Samsung
Honor
Others
LG
Motorola
Meizu
ZTE
HTC
OnePlus
Realme
Sony
Lenovo
Nokia
Asus
Infinix
Gionee
Coolpad
Micromax
Panasonic
BlackBerry
Acer
brand_name


Weight, Battery, Screen Size, and Release Year
battery
weight
0
2000
4000
6000
8000
10000
12000
0
200
400
600
800
release_year
2014
2015
2017
2018
2020
screen_size
8
16
24
32
40

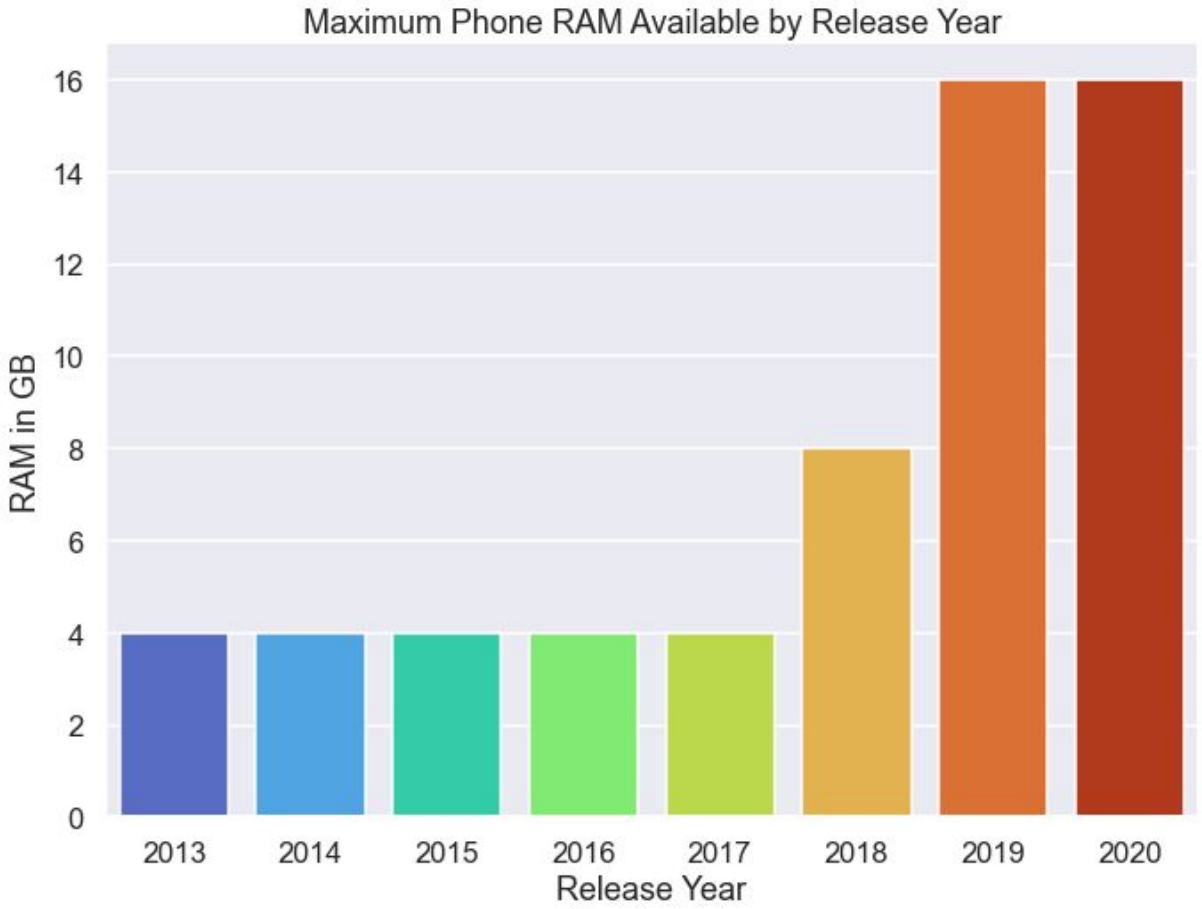

Main Camera vs Selfie Camera
selfie_camera_mp
main_camera_mp
0
5
10
15
20
25
30
0
10
20
30
40
50
2013
2014
2015
2016
2017
2018
2019
2020


os
Android
Others
iOS
Windows
selfie_camera_mp
0
2
4
6
8
10
12
14
16
2013
2014
2015
2016
2017
2018
2019
2020
release_year


New vs Old Prices
used_price
new_price
0
250
500
750
1000
1250
1500
1750
2000
0
500
1000
1500
2000
2500
2013
2014
2015
2016
2017
2018
2019
2020

Max RAM by Release Year

Customers on a budget can still find older phones with a decent amount of RAM.



Model Performance

The Linear Regression Model Captures 96% of the Testing Data

According to Adjusted R-Squared

Model Assumptions: PASSED

- Multicollinearity ✓
- Linearity and Independence ✓
- Normality ✓
- Homoscedasticity ✓

We found patterns of missingness and replaced many of the missing values by hand

We capped all the outliers that were more than 2 times the IQR away from the median

We dropped brand_name, os, weight, and battery

We checked Adj R-squared, VIF, RMSE, MAPE, and p-values during evaluation

Recommendations

Based on the dataset, the price-predicting model is effective.

- There are a lot of valuable used phones with varying specs for all kinds of customers and price ranges
- With such an effective model, we can buy and sell used phones for more profit
- The model will need to be rebuilt in 2022 when 3G networks are discontinued and old phone prices plummet

In conclusion, we can use this prediction model to more accurately predict prices for used phones to make better business decisions.

Thank You