Capstone Project

Mobile Price Range Prediction

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Content

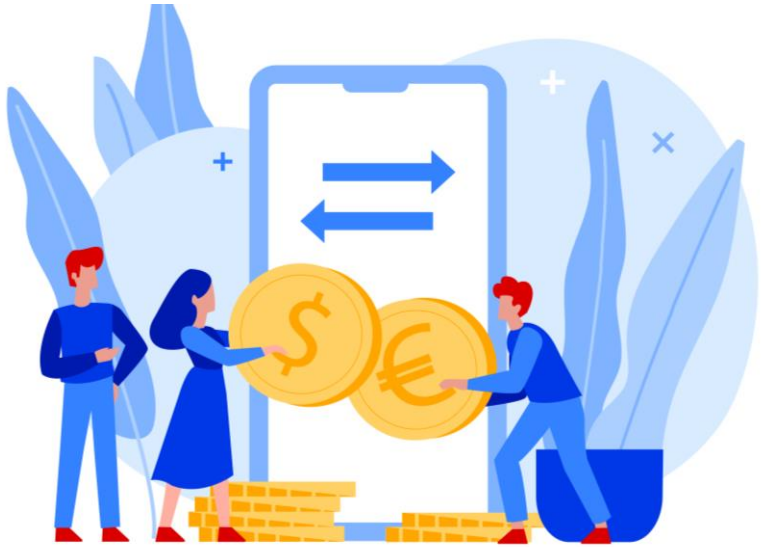
- Summary of Data
- Exploratory Data Analysis
- Feature Engineering
- Machine Learning Models
- Conclusion
- Challenges

Summary of Data

About Data - The dataset is based on sales data of mobile phones and factors which drive the prices

Size of Data

Rows - 2000
Columns - 21

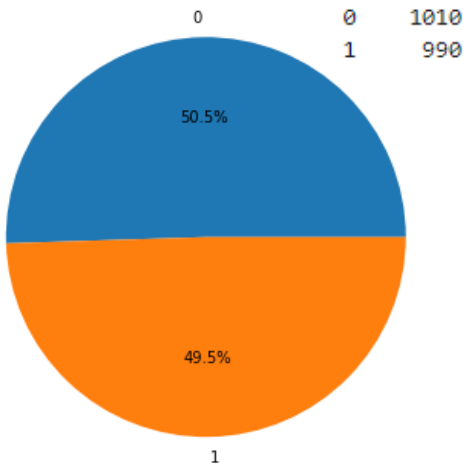


Source: https://www.freepik.com/

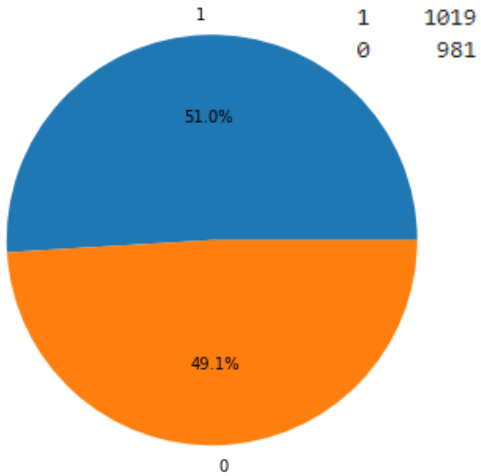
Exploratory Data Analysis

Univariate Analysis

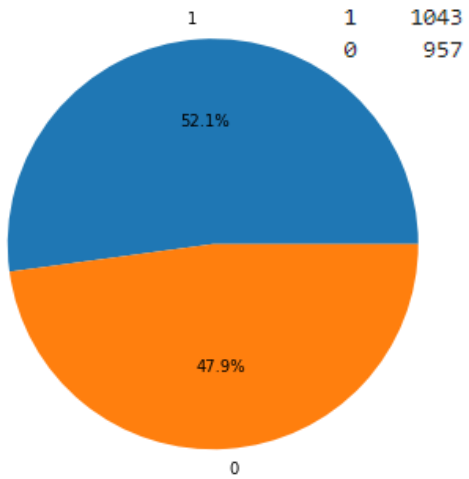
Blue



Dual sim



4G

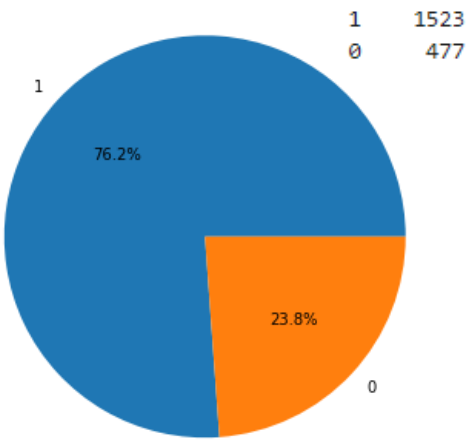


In all the above graphs, the values is almost equal. So we can say that Bluetooth, Dual sim , 4G is distributed almost equal in our data set

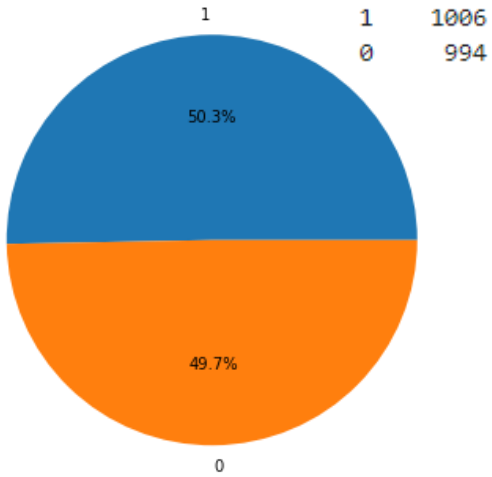
Exploratory Data Analysis

Univariate Analysis

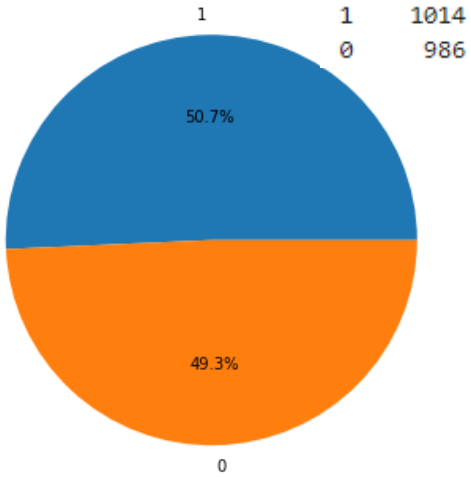
3G



Touch screen



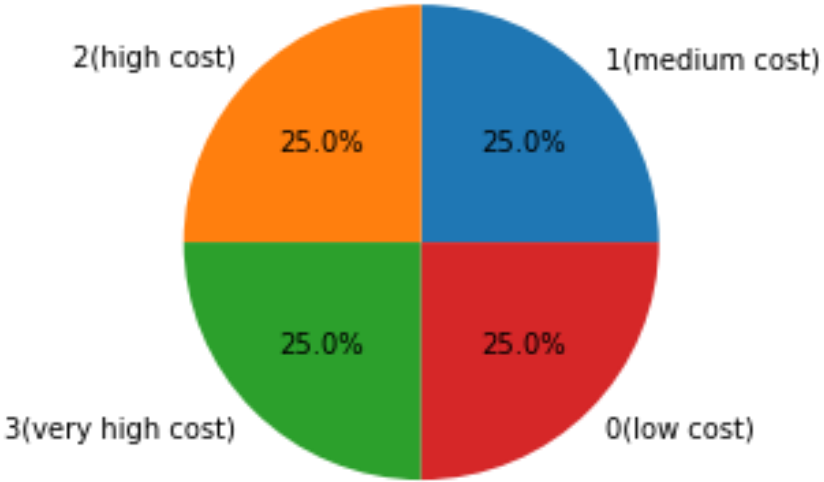
wifi



Touch screen & WIFI is distributed in almost equal values in our dataset whereas 76% mobile phone has 3G technology and 24% does not have 3G. We can assume that the remaining 24% who don't have 3G may have 2G

Exploratory Data Analysis

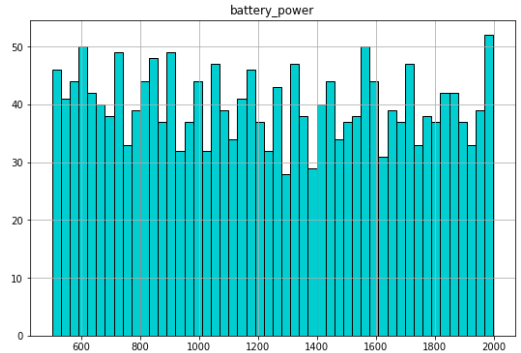
Univariate Analysis

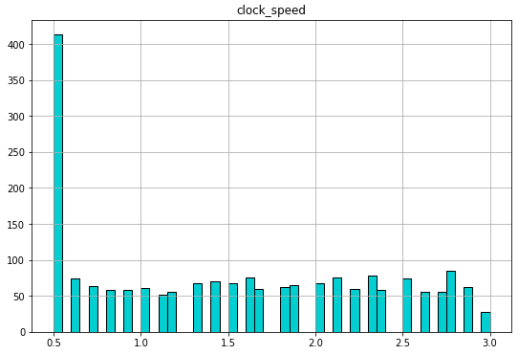


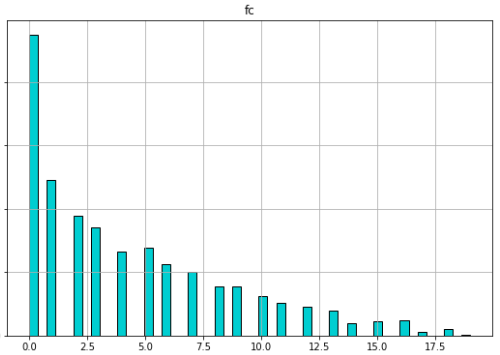
As seen in graph, our target variables i.e. price range is distributed equally. It means in our data, price range column as equal number of values (0,1,2 & 3)

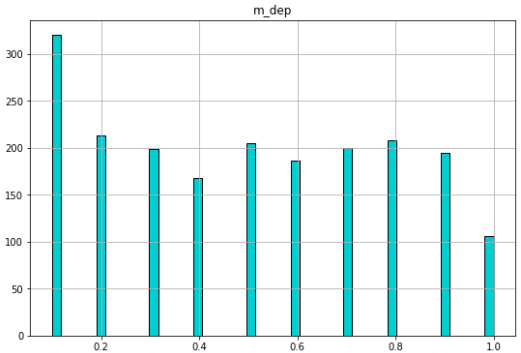
Exploratory Data Analysis

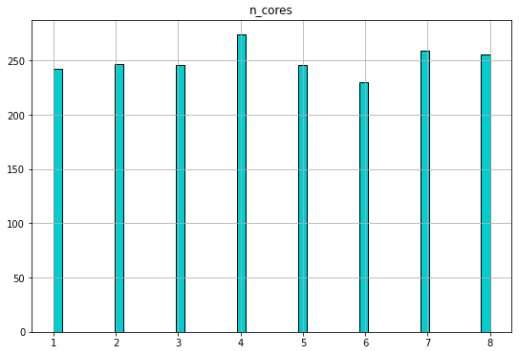
Univariate Analysis

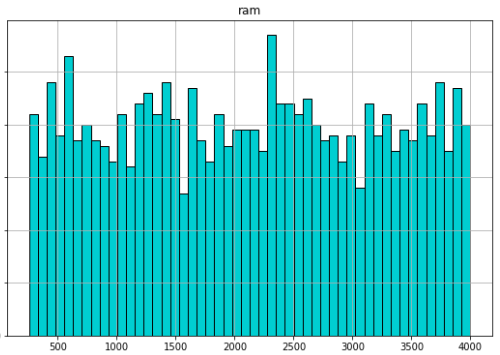








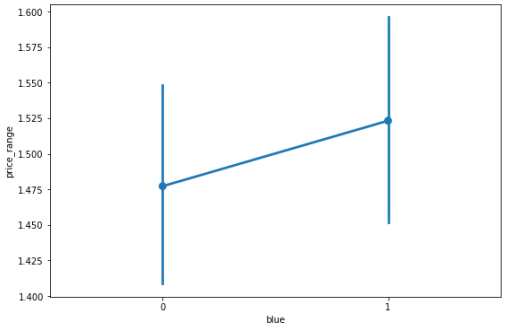


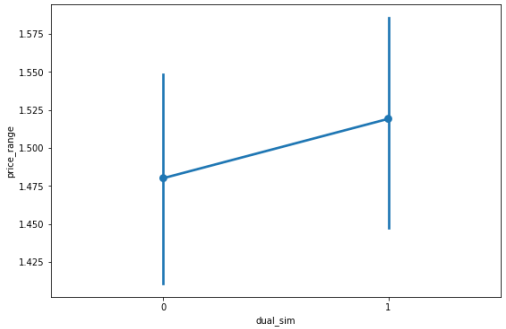


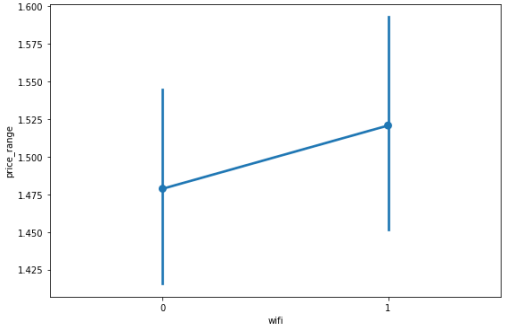
Exploratory Data Analysis

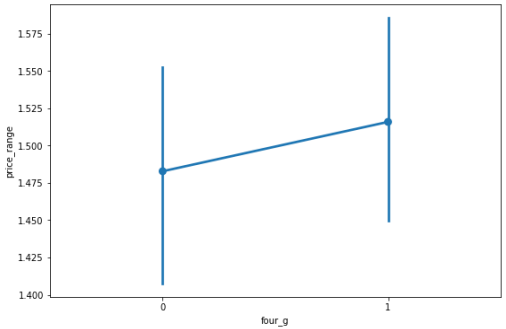
Bivariate Analysis

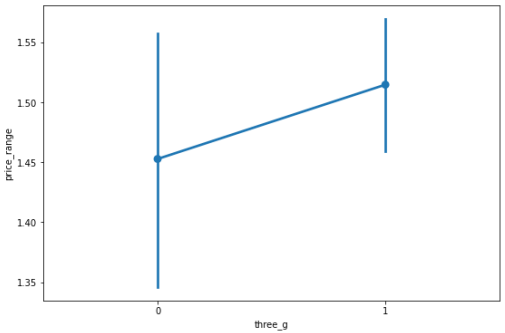
Let’s visualize all the features with our target feature price range









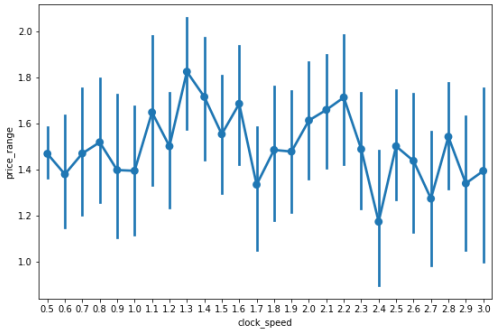


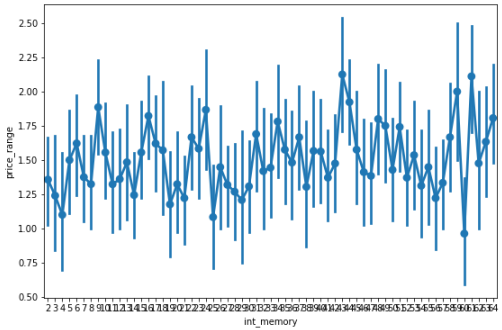
All these 5 graphs are almost same like price range is directly proportional to these features

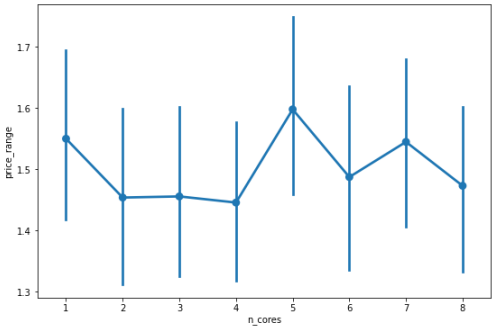
Exploratory Data Analysis

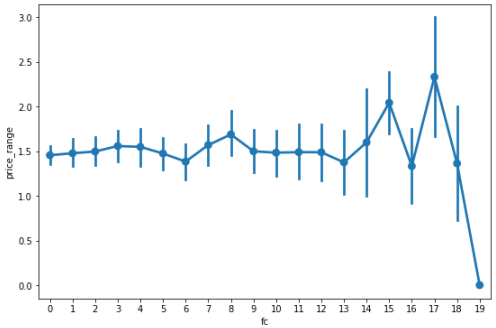
Bivariate Analysis

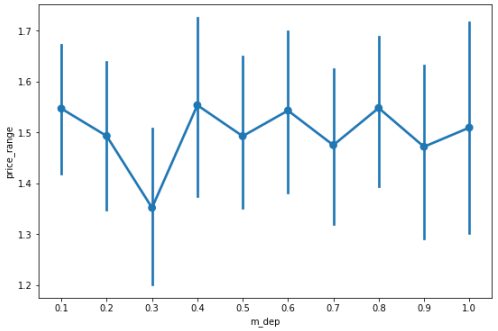
Here the price range is not changing vastly

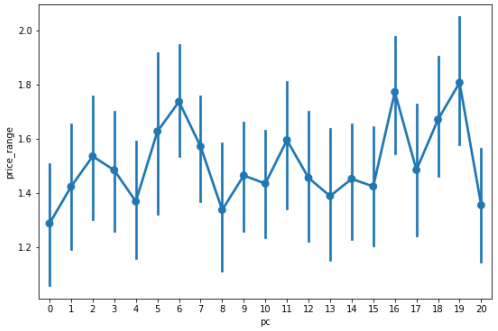






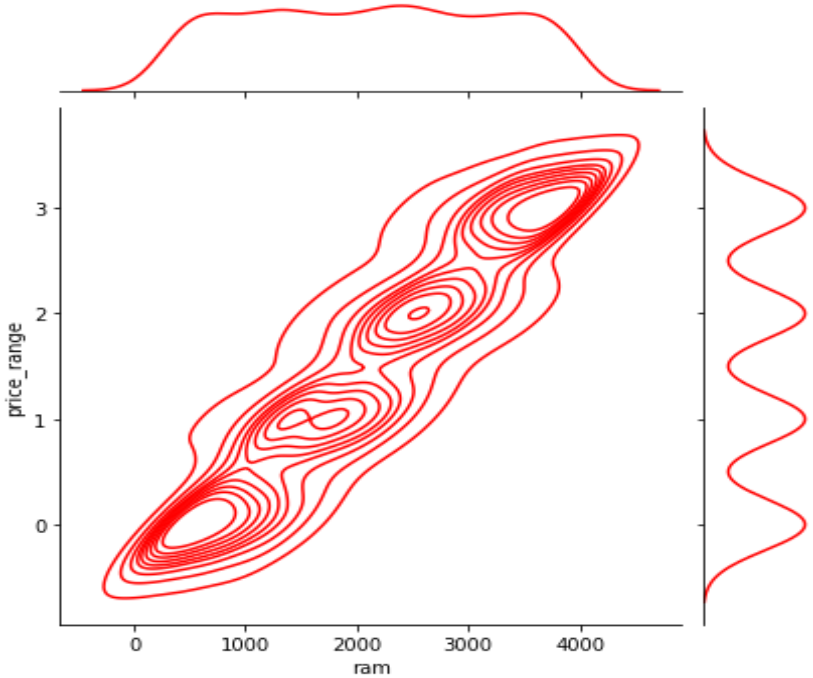






Exploratory Data Analysis

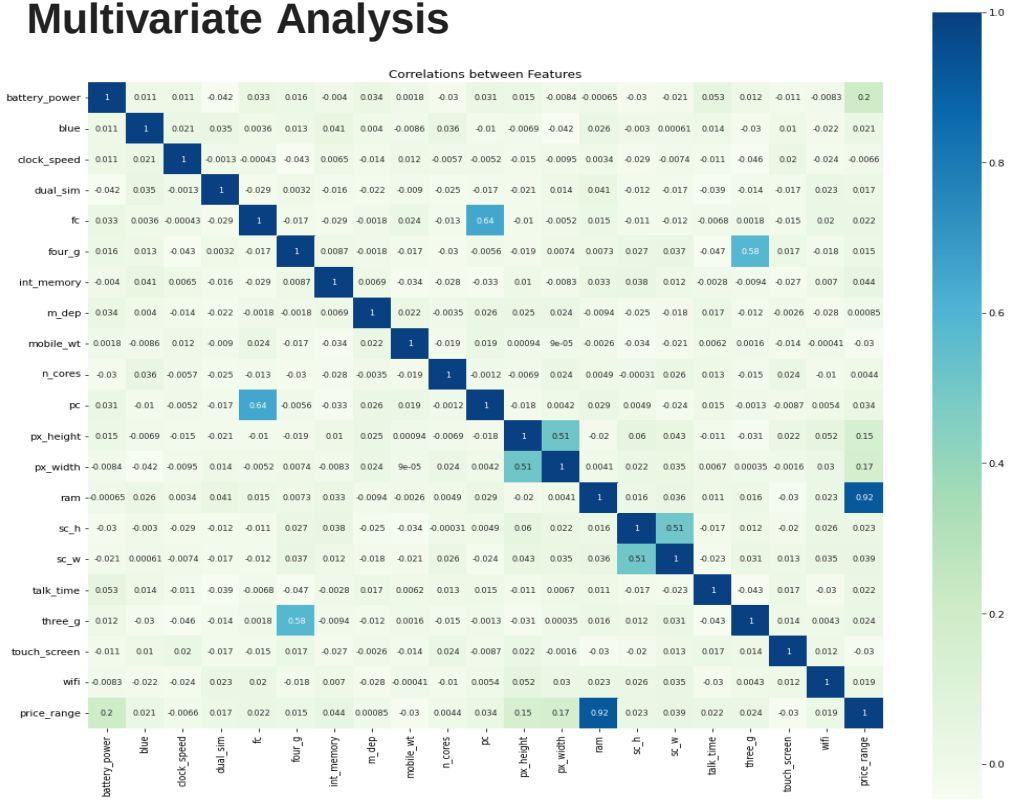
Bivariate Analysis



The line trend is increasing order. When ram is increasing the price range is also increasing. We can say that both are directly related to each other

Exploratory Data Analysis

Multivariate Analysis



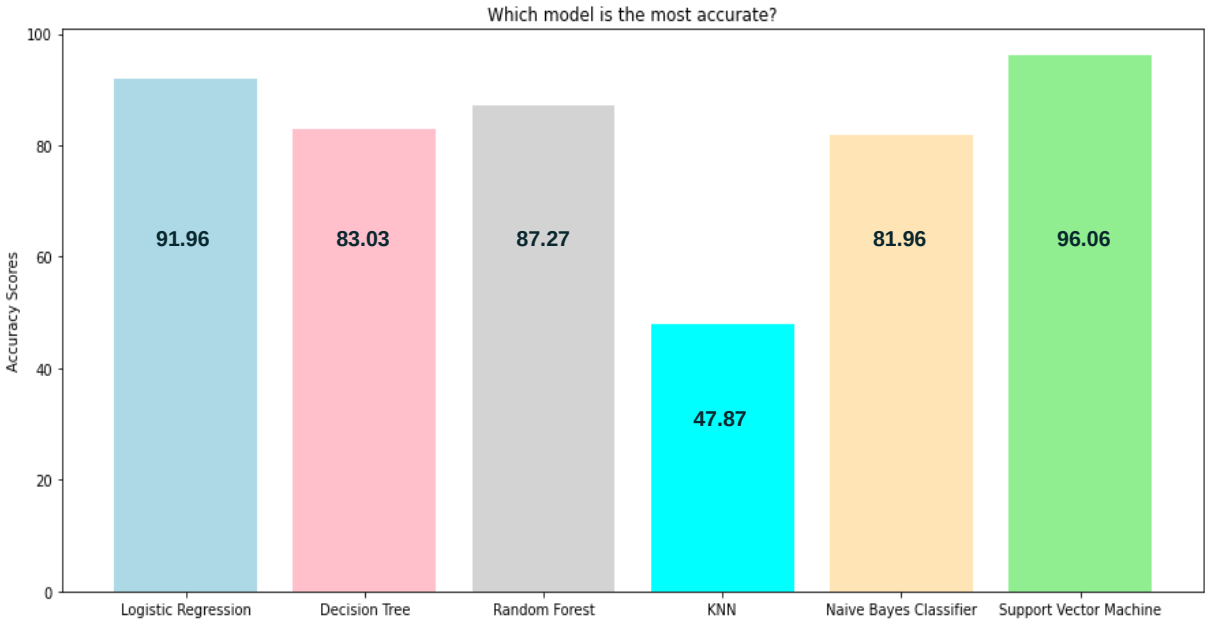
We can see the highest correlation between ram and price range. The two other correlations are between 3G and 4G, pc & fc

Machine Learning Models

Applied 6 classifications models

1. Logistic Regression
2. Decision Tree Classifier
3. Random Forest Classifier
4. K-Nearest Neighbours (KNN)
5. Naive Bayes Classifier
6. Support Vector Machines

Machine Learning Models



As we can see support vector machine model is best for our dataset with 96% of accuracy

Support Vector Machines (SVM)

Applied Grid Search to find out the best hyperparameter

Result of test dataset

	precision	recall	f1-score	support
0	0.97	0.99	0.98	166
1	0.94	0.93	0.94	147
2	0.95	0.94	0.94	165
3	0.98	0.98	0.98	182
accuracy			0.96	660
macro avg	0.96	0.96	0.96	660
weighted avg	0.96	0.96	0.96	660

Result of train dataset

	precision	recall	f1-score	support
0	0.99	0.99	0.99	334
1	0.97	0.98	0.97	353
2	0.98	0.97	0.97	335
3	0.99	0.98	0.99	318
accuracy			0.98	1340
macro avg	0.98	0.98	0.98	1340
weighted avg	0.98	0.98	0.98	1340

Test and train, in both we are getting almost similar result and SVM has highest accuracy

Conclusion

- All the important libraries was imported
- Data set was imported and understood all the features
- Exploratory Data Analysis was done to investigate dataset patterns and outliers
- From EDA, we got to know that there is zero null values
- Visualizes each feature in Univariate analysis.
- In Bivariate analysis, compared target feature (price_range) with all the features and got to know that RAM is directly proportional to price range. As RAM increases, price range also increases
- Also formed multivariate graphs. In correlation of every columns with each other, we can say that RAM is highly corelated to each other
- So our data is linear

Conclusion

- Applied different classification models like 'Logistic Regression', 'Decision Tree', 'Random Forest', 'KNN', 'Naive Bayes Classifier' and 'Support Vector Machine'
- The accuracy score of Logistic Regression is 91.96%
- The accuracy score of Decision Tree is 83.03%
- The accuracy score of Random Forest is 87.27%
- The accuracy score of K-Nearest Neighbours (KNN) is 47.87%
- The accuracy score of Naive Bayes Classifier is 81.96%
- The accuracy score of Support Vector Machine is 96.06%
- **We conclude that SVM (Support Vector Machine) is best model for our dataset (with the highest accuracy score = 96%)**

Challenges

- The most difficult thing I faced in this project is to choose the hyperparameter
- Also got afraid of if I am not missing any other classification technique which can give me more better accuracy
- Some of by coding was taking a lot of time to run so with the help of few websites I has revised my code to get implement faster

Thank You!