```
import pandas as pd
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt
import seaborn as sns
import datetime
import re
from google.colab import files

# Upload the file
uploaded = files.upload()

# Assuming the file is named 'used_car_dataset.csv'
df = pd.read_csv('used_car_dataset.csv')

# Descriptive statistics with a gradient background
df.describe().T.style.background_gradient(cmap="viridis")

# Create a copy of the dataframe
df1 = df.copy()

# Extract the car brand name
df1['car_name'] = df['car_name'].apply(lambda x: x.split(' ')[0])

# Drop the 'city' column
df1.drop(['city'], axis=1, inplace=True)

# Function to convert the price to a float
def convert(x):
    if ',' in x:
        s = x.split(' ')[1].split(',')
        return float(s[0] + s[1])
    else:
        value = float(x.split(' ')[1])
        return value * 100000

# Apply the conversion function to the price column
df2 = df1.copy()
df2['car_price_in_rupees'] = df['car_price_in_rupees'].apply(convert)

# Display the first few rows of the new dataframe
df2.head()
```

Choose Files used_car_dataset.csv

- **used_car_dataset.csv**(text/csv) - 165338 bytes, last modified: 7/14/2024 - 100% done

```
Saving used_car_dataset.csv to used_car_dataset.csv
```

	car_name	car_price_in_rupees	kms_driven	fuel_type	year_of_manufacture
0	Hyundai	445000.0	22,402 km	Petrol	2016
1	Maruti	293000.0	10,344 km	Petrol	2019
2	Tata	2249000.0	12,999 km	Diesel	2021
3	Maruti	695000.0	45,000 km	Petrol	2016
4	Jeep	1200000.0	11,193 km	Petrol	2019

Next steps: Generate code with df2 View recommended plots

```
df3 = df2.copy()
df3['kms_driven'] = df2['kms_driven'].apply(lambda x : x.split(' ')[0])
df3.head()
```

	car_name	car_price_in_rupees	kms_driven	fuel_type	year_of_manufacture
0	Hyundai	445000.0	22,402	Petrol	2016
1	Maruti	293000.0	10,344	Petrol	2019
2	Tata	2249000.0	12,999	Diesel	2021
3	Maruti	695000.0	45,000	Petrol	2016
4	Jeep	1200000.0	11,193	Petrol	2019

Next steps: Generate code with df3 View recommended plots

```
df4 = df3.copy()
df4['kms_driven'] = df3['kms_driven'][df3['kms_driven'].str.len() > 4]
def removeComma(x):
    if ',' in x :
        s = x.split(',')
        return float(s[0] + s[1])
df4 = df3.copy()
df4.kms_driven = df4.kms_driven.dropna()
df4.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2105 entries, 0 to 2104
Data columns (total 5 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   car_name             2105 non-null   object
 1   car_price_in_rupees  2105 non-null   float64
 2   kms_driven           2105 non-null   object
 3   fuel_type            2105 non-null   object
 4   year_of_manufacture  2105 non-null   int64
dtypes: float64(1), int64(1), object(3)
memory usage: 82.4+ KB
```

```
df5 = df4.copy()
df5['kms_driven'] = df4['kms_driven'].apply(removeComma)
df5.head()
```

	car_name	car_price_in_rupees	kms_driven	fuel_type	year_of_manufacture
0	Hyundai	445000.0	22402.0	Petrol	2016
1	Maruti	293000.0	10344.0	Petrol	2019
2	Tata	2249000.0	12999.0	Diesel	2021
3	Maruti	695000.0	45000.0	Petrol	2016
4	Jeep	1200000.0	11193.0	Petrol	2019

Next steps: Generate code with df5 View recommended plots

```
filtered_df = df5[df5['car_name'].apply(lambda x: df5['car_name'].value_counts().get(x, 0) > 20
filtered_df.head()
```

	car_name	car_price_in_rupees	kms_driven	fuel_type	year_of_manufacture
0	Hyundai	445000.0	22402.0	Petrol	2016
1	Maruti	293000.0	10344.0	Petrol	2019
2	Tata	2249000.0	12999.0	Diesel	2021
3	Maruti	695000.0	45000.0	Petrol	2016
4	Jeep	1200000.0	11193.0	Petrol	2019

Next steps: Generate code with `filtered_df` View recommended plots

```
df_6 = filtered_df[filtered_df.car_price_in_rupees > 100000]
df_6.describe()
```

	car_price_in_rupees	kms_driven	year_of_manufacture
count	2.009000e+03	2001.00000	2009.000000
mean	1.050281e+06	41454.52024	2017.052265
std	1.088725e+06	23882.72005	2.798647
min	1.100000e+05	100.00000	2004.000000
25%	4.750000e+05	22498.00000	2015.000000
50%	6.900000e+05	40547.00000	2017.000000
75%	1.105000e+06	58549.00000	2019.000000
max	9.500000e+06	99941.00000	2022.000000

```
df7 = df_6[df_6.kms_driven > 1000]
df7.describe()
```

	car_price_in_rupees	kms_driven	year_of_manufacture
count	1.924000e+03	1924.000000	1924.000000
mean	1.046510e+06	43108.163202	2017.159563
std	1.086915e+06	22850.029828	2.693573
min	1.100000e+05	1064.000000	2006.000000
25%	4.750000e+05	24537.500000	2015.000000
50%	6.900000e+05	41442.000000	2017.000000
75%	1.093500e+06	59729.500000	2019.000000
max	9.500000e+06	99941.000000	2022.000000

```
df8 = df7[df7['fuel_type'].apply(lambda x: df7['fuel_type'].value_counts().get(x, 0) > 500)]
df8.fuel_type.unique()
```

```
array(['Petrol', 'Diesel'], dtype=object)
```

```
dummies = pd.get_dummies(df8.car_name)
df9 = pd.concat([df8, dummies],axis=1)
dummies_2 = pd.get_dummies(df9.fuel_type)
df10 = pd.concat([df9, dummies_2],axis=1)
df10.head()
```

	car_name	car_price_in_rupees	kms_driven	fuel_type	year_of_manufacture	A
0	Hyundai	445000.0	22402.0	Petrol	2016	F
1	Maruti	293000.0	10344.0	Petrol	2019	F
2	Tata	2249000.0	12999.0	Diesel	2021	F
3	Maruti	695000.0	45000.0	Petrol	2016	F
4	Jeep	1200000.0	11193.0	Petrol	2019	F

5 rows × 23 columns

price_ranges = [0, 500000, 1000000, 1500000, np.inf] price_labels = ['Low', 'Medium', 'High', 'Very High'] df10['price_category'] = pd.cut(df10['car_price_in_rupees'], bins=price_ranges, labels=price_labels) df10.head()

```
X = df10.drop('price_category', axis=1)
X = pd.get_dummies(X, columns=['car_name', 'fuel_type'], drop_first=True)  # One-hot encoding
y = df10['price_category']
X.head()
```

	car_price_in_rupees	kms_driven	year_of_manufacture	Audi	BMW	Ford	Hond
0	445000.0	22402.0	2016	False	False	False	Fals
1	293000.0	10344.0	2019	False	False	False	Fals
2	2249000.0	12999.0	2021	False	False	False	Fals
3	695000.0	45000.0	2016	False	False	False	Fals
4	1200000.0	11193.0	2019	False	False	False	Fals

5 rows × 37 columns

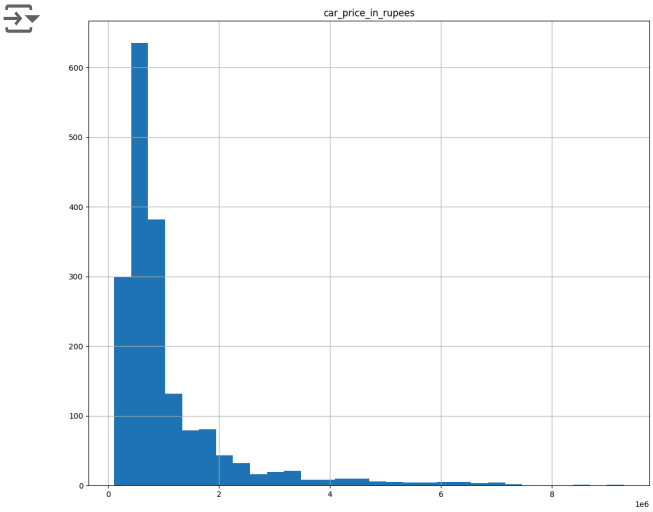
```
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.naive_bayes import MultinomialNB
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import accuracy_score
split_ratios = [(0.7, 0.3), (0.6, 0.4), (0.5, 0.5), (0.8, 0.2)]
results = []
for train_ratio, test_ratio in split_ratios:
    X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=test_ratio, random_state=
    result = {
        'Train Ratio': train_ratio,
        'Test Ratio': test_ratio
    }
    nb_classifier = MultinomialNB()
    nb_classifier.fit(X_train, y_train)
    nb_predictions = nb_classifier.predict(X_test)
    nb_accuracy = accuracy_score(y_test, nb_predictions)
    svm_classifier = SVC()
```

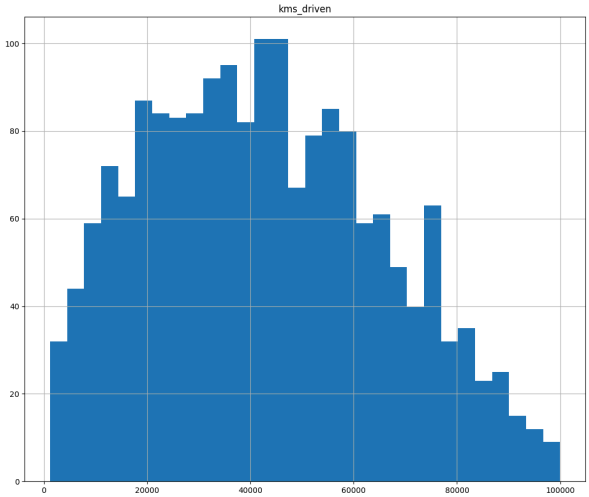
```
        svm_classifier.fit(X_train, y_train)
        svm_predictions = svm_classifier.predict(X_test)
        svm_accuracy = accuracy_score(y_test, svm_predictions)
        simple_knn_classifier = KNeighborsClassifier()
        simple_knn_classifier.fit(X_train, y_train)
        simple_knn_predictions = simple_knn_classifier.predict(X_test)
        simple_knn_accuracy = accuracy_score(y_test, simple_knn_predictions)
        weighted_knn_classifier = KNeighborsClassifier(weights='distance')
        weighted_knn_classifier.fit(X_train, y_train)
        weighted_knn_predictions = weighted_knn_classifier.predict(X_test)
        weighted_knn_accuracy = accuracy_score(y_test, weighted_knn_predictions)
        nb_accuracy = accuracy_score(y_test, nb_predictions)
        svm_accuracy = accuracy_score(y_test, svm_predictions)
        simple_knn_accuracy = accuracy_score(y_test, simple_knn_predictions)
        weighted_knn_accuracy = accuracy_score(y_test, weighted_knn_predictions)
        results.append({
            'Train Ratio': train_ratio,
            'Test Ratio': test_ratio,
            'Naive Bayes Accuracy': nb_accuracy,
            'SVM Accuracy': svm_accuracy,
            'Simple KNN Accuracy': simple_knn_accuracy,
            'Weighted KNN Accuracy': weighted_knn_accuracy
        })
    results_df = pd.DataFrame(results)
    print(results_df)
    results_df_sorted = results_df.sort_values(by='Simple KNN Accuracy', ascending=False)
    best_combination = results_df_sorted.iloc[0]
    print("Best Combination:")
    print(best_combination)
```

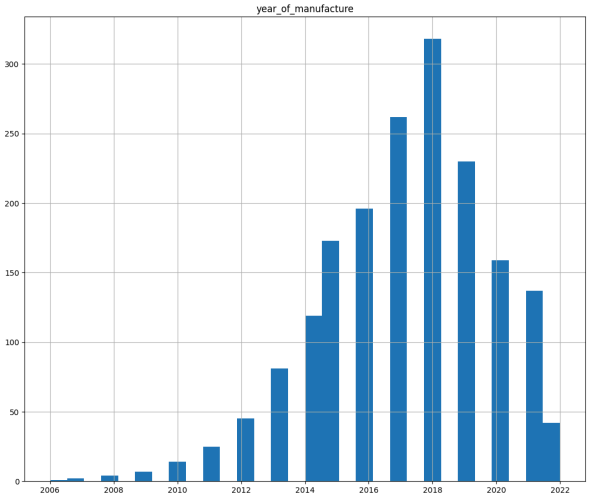
```
    Train Ratio  Test Ratio  Naive Bayes Accuracy  SVM Accuracy  \
0          0.7         0.3              0.546789      0.970642
1          0.6         0.4              0.556474      0.965565
2          0.5         0.5              0.561674      0.984581
3          0.8         0.2              0.550964      0.977961

   Simple KNN Accuracy  Weighted KNN Accuracy
0             0.996330               0.998165
1             0.995868               0.997245
2             0.994493               0.995595
3             0.997245               1.000000
Best Combination:
Train Ratio              0.800000
Test Ratio               0.200000
Naive Bayes Accuracy     0.550964
SVM Accuracy             0.977961
Simple KNN Accuracy      0.997245
Weighted KNN Accuracy    1.000000
Name: 3, dtype: float64
```

```
    df10.hist(figsize = (30, 25), bins = 30, legend = False)
    plt.show()
    df10.info()
```








```
<class 'pandas.core.frame.DataFrame'>
Index: 1815 entries, 0 to 2104
Data columns (total 24 columns):
 #   Column               Non-Null Count  Dtype   
---  ------               --------------  -----   
 0   car_name             1815 non-null   object  
 1   car_price_in_rupees  1815 non-null   float64 
 2   kms_driven           1815 non-null   float64 
 3   fuel_type            1815 non-null   object  
 4   year_of_manufacture  1815 non-null   int64   
 5   Audi                 1815 non-null   bool    
 6   BMW                  1815 non-null   bool    
 7   Ford                 1815 non-null   bool    
 8   Honda                1815 non-null   bool    
 9   Hyundai              1815 non-null   bool    
 10  Jeep                 1815 non-null   bool    
 11  Kia                  1815 non-null   bool    
 12  MG                   1815 non-null   bool    
 13  Mahindra             1815 non-null   bool    
 14  Maruti               1815 non-null   bool    
 15  Mercedes-Benz        1815 non-null   bool    
 16  Renault              1815 non-null   bool    
 17  Skoda                1815 non-null   bool    
 18  Tata                 1815 non-null   bool    
 19  Toyota               1815 non-null   bool    
 20  Volkswagen           1815 non-null   bool    
 21  Diesel               1815 non-null   bool    
 22  Petrol               1815 non-null   bool    
 23  price_category       1815 non-null   category
dtypes: bool(18), category(1), float64(2), int64(1), object(2)
memory usage: 119.0+ KB
```