Working or Real Project With Python

Cars Dataset

Here the data of different is given with their specifications

The data is available in csv file. We are going to analyze the dataset using python pandas dataframe

```
#let's start our analysis
import pandas as pd

#we are going to import csv file to notebook
car=pd.read_csv('file.csv')

#checking values
car
```

```
      Make                       Model    Type  Origin DriveTrain
MSRP  \
0    Acura                         MDX     SUV    Asia        All  $36,945

1    Acura             RSX Type S 2dr   Sedan    Asia      Front  $23,820

2    Acura                   TSX 4dr   Sedan    Asia      Front  $26,990

3    Acura                    TL 4dr   Sedan    Asia      Front  $33,195

4    Acura                 3.5 RL 4dr   Sedan    Asia      Front  $43,755

..     ...                        ...     ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr   Sedan  Europe      Front  $40,565

428  Volvo  C70 HPT convertible 2dr   Sedan  Europe      Front  $42,565

429  Volvo                S80 T6 4dr   Sedan  Europe      Front  $45,210

430  Volvo                     V40   Wagon  Europe      Front  $26,135

431  Volvo                    XC70   Wagon  Europe        All  $35,145


      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
0    $33,337          3.5        6.0       265.0      17.0
23.0
```

```
1    $21,761           2.0        4.0       200.0      24.0
31.0
2    $24,647           2.4        4.0       200.0      22.0
29.0
3    $30,299           3.2        6.0       270.0      20.0
28.0
4    $39,014           3.5        6.0       225.0      18.0
24.0
..       ...           ...        ...         ...       ...           ..
.
427  $38,203           2.4        5.0       197.0      21.0
28.0
428  $40,083           2.3        5.0       242.0      20.0
26.0
429  $42,573           2.9        6.0       268.0      19.0
26.0
430  $24,641           1.9        4.0       170.0      22.0
29.0
431  $33,112           2.5        5.0       208.0      20.0
27.0

     Weight  Wheelbase  Length
0    4451.0      106.0   189.0
1    2778.0      101.0   172.0
2    3230.0      105.0   183.0
3    3575.0      108.0   186.0
4    3880.0      115.0   197.0
..      ...        ...     ...
427  3450.0      105.0   186.0
428  3450.0      105.0   186.0
429  3653.0      110.0   190.0
430  2822.0      101.0   180.0
431  3823.0      109.0   186.0

[432 rows x 15 columns]
```

```
#no of rows and columns
car.shape
```

```
(432, 15)
```

Data Cleaning

Find all null values in the dataset. If there is any null values in any column then fill it with mean of that column

```
#check for null values
car.isnull().sum()
```

```
Make            4
Model           4
Type            4
Origin          4
DriveTrain      4
MSRP            4
Invoice         4
EngineSize      4
Cylinders       6
Horsepower      4
MPG_City        4
MPG_Highway     4
Weight          4
Wheelbase       4
Length          4
dtype: int64
```

```
#so now we have got the idea of null values
#we have relaced the null value by Omni
car['Make'].fillna('Omni',inplace=True)
```

```
car['Make'].isnull().sum()
```

```
0
```

```
#similarly other columns are also be treated to remove null values
car['Model'].fillna('MDX',inplace=True)
```

```
car['Type'].fillna('Sedan',inplace=True)
```

```
car['Origin'].fillna('Asia',inplace=True)
```

```
car['DriveTrain'].fillna('Front',inplace=True)
```

```
car['MSRP'].fillna('$36,945',inplace=True)
```

```
car['Invoice'].fillna('$33,337',inplace=True)
```

```
car['EngineSize'].fillna(car['EngineSize'].mean(),inplace=True)
```

```
car['Cylinders'].fillna(car['Cylinders'].mean(),inplace=True)
```

```
car['Horsepower'].fillna(car['Horsepower'].mean(),inplace=True)
```

```
car['MPG_City'].fillna(car['MPG_City'].mean(),inplace=True)
```

```
car['MPG_Highway'].fillna(car['MPG_Highway'].mean(),inplace=True)
```

```
car['Weight'].fillna(car['Weight'].mean(),inplace=True)
```

```
car['Wheelbase'].fillna(car['Wheelbase'].mean(),inplace=True)
```

```
car['Length'].fillna(car['Length'].mean(),inplace=True)
```

```
#now all columns are well adjusted
car.isnull().sum()
```

```
Make            0
Model           0
Type            0
Origin          0
DriveTrain      0
MSRP            0
Invoice         0
EngineSize      0
Cylinders       0
Horsepower      0
MPG_City        0
MPG_Highway     0
Weight          0
Wheelbase       0
Length          0
dtype: int64
```

Q-> What are the different types of make in our dataset? And what are the count of each make?

```
car.head(5)
```

```
    Make            Model   Type Origin DriveTrain      MSRP   Invoice
\
0  Acura              MDX    SUV   Asia        All  $36,945   $33,337

1  Acura  RSX Type S 2dr  Sedan   Asia      Front  $23,820   $21,761

2  Acura          TSX 4dr  Sedan   Asia      Front  $26,990   $24,647

3  Acura           TL 4dr  Sedan   Asia      Front  $33,195   $30,299

4  Acura      3.5 RL 4dr  Sedan   Asia      Front  $43,755   $39,014


   EngineSize  Cylinders  Horsepower  MPG_City  MPG_Highway  Weight  \
0         3.5        6.0       265.0      17.0         23.0  4451.0
1         2.0        4.0       200.0      24.0         31.0  2778.0
2         2.4        4.0       200.0      22.0         29.0  3230.0
3         3.2        6.0       270.0      20.0         28.0  3575.0
4         3.5        6.0       225.0      18.0         24.0  3880.0

   Wheelbase  Length
0      106.0   189.0
1      101.0   172.0
2      105.0   183.0
```

```
3      108.0   186.0
4      115.0   197.0
```

```
car['Make'].value_counts()
```

```
Toyota            28
Chevrolet         27
Mercedes-Benz     26
Ford              23
BMW               20
Audi              19
Nissan            17
Honda             17
Chrysler          15
Volkswagen        15
Mitsubishi        13
Dodge             13
Hyundai           12
Jaguar            12
Volvo             12
Kia               11
Mazda             11
Lexus             11
Pontiac           11
Subaru            11
Lincoln            9
Mercury            9
Buick              9
Saturn             8
Infiniti           8
GMC                8
Cadillac           8
Suzuki             8
Porsche            7
Saab               7
Acura              7
Omni               4
Oldsmobile         3
Jeep               3
Land Rover         3
MINI               2
Scion              2
Isuzu              2
Hummer             1
Name: Make, dtype: int64
```

Q-> Show all the records where origin is Asia or Europe.

```
car.head(5)
```

```
    Make            Model   Type Origin DriveTrain      MSRP   Invoice
\
0  Acura              MDX    SUV   Asia        All  $36,945   $33,337

1  Acura  RSX Type S 2dr  Sedan   Asia      Front  $23,820   $21,761

2  Acura          TSX 4dr  Sedan   Asia      Front  $26,990   $24,647

3  Acura           TL 4dr  Sedan   Asia      Front  $33,195   $30,299

4  Acura      3.5 RL 4dr  Sedan   Asia      Front  $43,755   $39,014


   EngineSize  Cylinders  Horsepower  MPG_City  MPG_Highway  Weight  \
0         3.5        6.0       265.0      17.0         23.0  4451.0
1         2.0        4.0       200.0      24.0         31.0  2778.0
2         2.4        4.0       200.0      22.0         29.0  3230.0
3         3.2        6.0       270.0      20.0         28.0  3575.0
4         3.5        6.0       225.0      18.0         24.0  3880.0

   Wheelbase  Length
0      106.0   189.0
1      101.0   172.0
2      105.0   183.0
3      108.0   186.0
4      115.0   197.0
```

```
car[(car['Origin']=='Asia')|(car['Origin']=='Europe')]
```

```
      Make                    Model   Type  Origin DriveTrain
MSRP  \
0    Acura                      MDX    SUV    Asia        All  $36,945

1    Acura           RSX Type S 2dr  Sedan    Asia      Front  $23,820

2    Acura                  TSX 4dr  Sedan    Asia      Front  $26,990

3    Acura                   TL 4dr  Sedan    Asia      Front  $33,195

4    Acura               3.5 RL 4dr  Sedan    Asia      Front  $43,755

..     ...                      ...    ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr  Sedan  Europe      Front  $40,565

428  Volvo  C70 HPT convertible 2dr  Sedan  Europe      Front  $42,565

429  Volvo               S80 T6 4dr  Sedan  Europe      Front  $45,210

430  Volvo                    V40  Wagon  Europe      Front  $26,135
```

```
431  Volvo                    XC70  Wagon  Europe        All  $35,145


      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
0    $33,337          3.5        6.0       265.0      17.0
23.0
1    $21,761          2.0        4.0       200.0      24.0
31.0
2    $24,647          2.4        4.0       200.0      22.0
29.0
3    $30,299          3.2        6.0       270.0      20.0
28.0
4    $39,014          3.5        6.0       225.0      18.0
24.0
..       ...          ...        ...         ...       ...           ..
.
427  $38,203          2.4        5.0       197.0      21.0
28.0
428  $40,083          2.3        5.0       242.0      20.0
26.0
429  $42,573          2.9        6.0       268.0      19.0
26.0
430  $24,641          1.9        4.0       170.0      22.0
29.0
431  $33,112          2.5        5.0       208.0      20.0
27.0

     Weight  Wheelbase  Length
0    4451.0      106.0   189.0
1    2778.0      101.0   172.0
2    3230.0      105.0   183.0
3    3575.0      108.0   186.0
4    3880.0      115.0   197.0
..      ...        ...     ...
427  3450.0      105.0   186.0
428  3450.0      105.0   186.0
429  3653.0      110.0   190.0
430  2822.0      101.0   180.0
431  3823.0      109.0   186.0

[285 rows x 15 columns]

#same thing an be ritten as-
car[car['Origin'].isin(['Asia','Europe'])]

      Make                    Model   Type  Origin DriveTrain
MSRP  \
0    Acura                     MDX    SUV    Asia        All  $36,945
```

```
1    Acura            RSX Type S 2dr  Sedan    Asia      Front  $23,820
2    Acura                   TSX 4dr  Sedan    Asia      Front  $26,990
3    Acura                    TL 4dr  Sedan    Asia      Front  $33,195
4    Acura                3.5 RL 4dr  Sedan    Asia      Front  $43,755
..     ...                       ...    ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr  Sedan  Europe      Front  $40,565
428  Volvo  C70 HPT convertible 2dr  Sedan  Europe      Front  $42,565
429  Volvo                S80 T6 4dr  Sedan  Europe      Front  $45,210
430  Volvo                       V40  Wagon  Europe      Front  $26,135
431  Volvo                      XC70  Wagon  Europe        All  $35,145


      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
0    $33,337          3.5        6.0       265.0      17.0
23.0
1    $21,761          2.0        4.0       200.0      24.0
31.0
2    $24,647          2.4        4.0       200.0      22.0
29.0
3    $30,299          3.2        6.0       270.0      20.0
28.0
4    $39,014          3.5        6.0       225.0      18.0
24.0
..       ...          ...        ...         ...       ...          ..
.
427  $38,203          2.4        5.0       197.0      21.0
28.0
428  $40,083          2.3        5.0       242.0      20.0
26.0
429  $42,573          2.9        6.0       268.0      19.0
26.0
430  $24,641          1.9        4.0       170.0      22.0
29.0
431  $33,112          2.5        5.0       208.0      20.0
27.0

     Weight  Wheelbase  Length
0    4451.0      106.0   189.0
1    2778.0      101.0   172.0
2    3230.0      105.0   183.0
```

```
3    3575.0       108.0   186.0
4    3880.0       115.0   197.0
..      ...         ...     ...
427  3450.0       105.0   186.0
428  3450.0       105.0   186.0
429  3653.0       110.0   190.0
430  2822.0       101.0   180.0
431  3823.0       109.0   186.0

[285 rows x 15 columns]
```

Q-> Remove all the records where Weight is above 4000 (rows).

```
car

      Make                      Model   Type  Origin DriveTrain
MSRP  \
0    Acura                        MDX    SUV    Asia        All  $36,945

1    Acura             RSX Type S 2dr  Sedan    Asia      Front  $23,820

2    Acura                    TSX 4dr  Sedan    Asia      Front  $26,990

3    Acura                     TL 4dr  Sedan    Asia      Front  $33,195

4    Acura                 3.5 RL 4dr  Sedan    Asia      Front  $43,755

..     ...                        ...    ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr  Sedan  Europe      Front  $40,565

428  Volvo  C70 HPT convertible 2dr  Sedan  Europe      Front  $42,565

429  Volvo                 S80 T6 4dr  Sedan  Europe      Front  $45,210

430  Volvo                        V40  Wagon  Europe      Front  $26,135

431  Volvo                      XC70  Wagon  Europe        All  $35,145


      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
0    $33,337          3.5        6.0       265.0      17.0
23.0
1    $21,761          2.0        4.0       200.0      24.0
31.0
2    $24,647          2.4        4.0       200.0      22.0
29.0
3    $30,299          3.2        6.0       270.0      20.0
28.0
4    $39,014          3.5        6.0       225.0      18.0
```

```
24.0
..        ...          ...         ...          ...       ...           ..
.
427  $38,203          2.4         5.0       197.0      21.0
28.0
428  $40,083          2.3         5.0       242.0      20.0
26.0
429  $42,573          2.9         6.0       268.0      19.0
26.0
430  $24,641          1.9         4.0       170.0      22.0
29.0
431  $33,112          2.5         5.0       208.0      20.0
27.0

     Weight  Wheelbase  Length
0    4451.0      106.0   189.0
1    2778.0      101.0   172.0
2    3230.0      105.0   183.0
3    3575.0      108.0   186.0
4    3880.0      115.0   197.0
..      ...        ...     ...
427  3450.0      105.0   186.0
428  3450.0      105.0   186.0
429  3653.0      110.0   190.0
430  2822.0      101.0   180.0
431  3823.0      109.0   186.0

[432 rows x 15 columns]
```

```
car[car['Weight']>4000]  #we have to remove all these records
```

```
           Make                               Model    Type  Origin
DriveTrain  \
0         Acura                                 MDX     SUV    Asia
All
15         Audi  A4 3.0 Quattro convertible 2dr   Sedan  Europe
All
17         Audi               A6 4.2 Quattro 4dr   Sedan  Europe
All
18         Audi                 A8 L Quattro 4dr   Sedan  Europe
All
20         Audi                          RS 6 4dr  Sports  Europe
Front
..          ...                               ...     ...     ...
...
405  Volkswagen                       Touareg V6     SUV  Europe
All
415  Volkswagen                      Phaeton 4dr   Sedan  Europe
Front
416  Volkswagen                  Phaeton W12 4dr   Sedan  Europe
```

```
Front
419  Volkswagen                        Passat W8   Wagon  Europe
Front
420       Volvo                          XC90 T6     SUV  Europe
All

          MSRP   Invoice  EngineSize  Cylinders  Horsepower
MPG_City  \
0    $36,945   $33,337          3.5        6.0       265.0      17.0

15   $44,240   $40,075          3.0        6.0       220.0      18.0

17   $49,690   $44,936          4.2        8.0       300.0      17.0

18   $69,190   $64,740          4.2        8.0       330.0      17.0

20   $84,600   $76,417          4.2        8.0       450.0      15.0

..       ...       ...          ...        ...         ...       ...

405  $35,515   $32,243          3.2        6.0       220.0      15.0

415  $65,000   $59,912          4.2        8.0       335.0      16.0

416  $75,000   $69,130          6.0       12.0       420.0      12.0

419  $40,235   $36,956          4.0        8.0       270.0      18.0

420  $41,250   $38,851          2.9        6.0       268.0      15.0


     MPG_Highway  Weight  Wheelbase  Length
0           23.0  4451.0      106.0   189.0
15          25.0  4013.0      105.0   180.0
17          24.0  4024.0      109.0   193.0
18          24.0  4399.0      121.0   204.0
20          22.0  4024.0      109.0   191.0
..           ...     ...        ...     ...
405         20.0  5086.0      112.0   187.0
415         22.0  5194.0      118.0   204.0
416         19.0  5399.0      118.0   204.0
419         25.0  4067.0      106.0   184.0
420         20.0  4638.0      113.0   189.0

[103 rows x 15 columns]

car=car[~(car['Weight']>4000)]  # ~ is used to drop
#car = car.drop(car[car['Weight'] > 4000].index)  this can also be
used
```

```
      Make                       Model   Type  Origin DriveTrain
MSRP  \
1    Acura           RSX Type S 2dr  Sedan    Asia      Front  $23,820
2    Acura                 TSX 4dr  Sedan    Asia      Front  $26,990
3    Acura                  TL 4dr  Sedan    Asia      Front  $33,195
4    Acura               3.5 RL 4dr  Sedan    Asia      Front  $43,755
5    Acura  3.5 RL w/Navigation 4dr  Sedan    Asia      Front  $46,100
..     ...                       ...    ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr  Sedan  Europe      Front  $40,565
428  Volvo  C70 HPT convertible 2dr  Sedan  Europe      Front  $42,565
429  Volvo               S80 T6 4dr  Sedan  Europe      Front  $45,210
430  Volvo                  V40  Wagon  Europe      Front  $26,135
431  Volvo                 XC70  Wagon  Europe        All  $35,145


      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
1    $21,761          2.0        4.0       200.0      24.0
31.0
2    $24,647          2.4        4.0       200.0      22.0
29.0
3    $30,299          3.2        6.0       270.0      20.0
28.0
4    $39,014          3.5        6.0       225.0      18.0
24.0
5    $41,100          3.5        6.0       225.0      18.0
24.0
..       ...          ...        ...         ...       ...           ..
.
427  $38,203          2.4        5.0       197.0      21.0
28.0
428  $40,083          2.3        5.0       242.0      20.0
26.0
429  $42,573          2.9        6.0       268.0      19.0
26.0
430  $24,641          1.9        4.0       170.0      22.0
29.0
431  $33,112          2.5        5.0       208.0      20.0
27.0

     Weight  Wheelbase  Length
```

```
1    2778.0       101.0   172.0
2    3230.0       105.0   183.0
3    3575.0       108.0   186.0
4    3880.0       115.0   197.0
5    3893.0       115.0   197.0
..      ...         ...     ...
427  3450.0       105.0   186.0
428  3450.0       105.0   186.0
429  3653.0       110.0   190.0
430  2822.0       101.0   180.0
431  3823.0       109.0   186.0

[329 rows x 15 columns]
```

```
car.shape
```

```
(329, 15)
```

Q-> Increase all the value of column "MPG_City" by 3.

```
car
```

```
      Make                       Model   Type  Origin DriveTrain
MSRP  \
1    Acura            RSX Type S 2dr  Sedan    Asia      Front  $23,820

2    Acura                   TSX 4dr  Sedan    Asia      Front  $26,990

3    Acura                    TL 4dr  Sedan    Asia      Front  $33,195

4    Acura                3.5 RL 4dr  Sedan    Asia      Front  $43,755

5    Acura  3.5 RL w/Navigation 4dr  Sedan    Asia      Front  $46,100

..     ...                        ...    ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr  Sedan  Europe      Front  $40,565

428  Volvo  C70 HPT convertible 2dr  Sedan  Europe      Front  $42,565

429  Volvo                S80 T6 4dr  Sedan  Europe      Front  $45,210

430  Volvo                       V40  Wagon  Europe      Front  $26,135

431  Volvo                      XC70  Wagon  Europe        All  $35,145


      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
1    $21,761          2.0        4.0       200.0      24.0
31.0
```

```
2    $24,647          2.4        4.0       200.0      22.0
29.0
3    $30,299          3.2        6.0       270.0      20.0
28.0
4    $39,014          3.5        6.0       225.0      18.0
24.0
5    $41,100          3.5        6.0       225.0      18.0
24.0
..       ...          ...        ...         ...       ...          ..
.
427  $38,203          2.4        5.0       197.0      21.0
28.0
428  $40,083          2.3        5.0       242.0      20.0
26.0
429  $42,573          2.9        6.0       268.0      19.0
26.0
430  $24,641          1.9        4.0       170.0      22.0
29.0
431  $33,112          2.5        5.0       208.0      20.0
27.0

     Weight  Wheelbase  Length
1    2778.0      101.0   172.0
2    3230.0      105.0   183.0
3    3575.0      108.0   186.0
4    3880.0      115.0   197.0
5    3893.0      115.0   197.0
..      ...        ...     ...
427  3450.0      105.0   186.0
428  3450.0      105.0   186.0
429  3653.0      110.0   190.0
430  2822.0      101.0   180.0
431  3823.0      109.0   186.0

[329 rows x 15 columns]
```

```
# to do this kind of arithmetic operation we take help of lambda
car['MPG_City']=car['MPG_City'].apply(lambda x:x+3)
```

```
C:\Users\Intel\AppData\Local\Temp\ipykernel_10564\185313597.py:2:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation:
https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#
returning-a-view-versus-a-copy
  car['MPG_City']=car['MPG_City'].apply(lambda x:x+3)
```

```
car
```

```
      Make                       Model   Type  Origin DriveTrain
MSRP  \
1    Acura           RSX Type S 2dr  Sedan    Asia      Front  $23,820
2    Acura                 TSX 4dr  Sedan    Asia      Front  $26,990
3    Acura                  TL 4dr  Sedan    Asia      Front  $33,195
4    Acura               3.5 RL 4dr  Sedan    Asia      Front  $43,755
5    Acura  3.5 RL w/Navigation 4dr  Sedan    Asia      Front  $46,100
..     ...                       ...    ...     ...        ...       ..
.
427  Volvo  C70 LPT convertible 2dr  Sedan  Europe      Front  $40,565
428  Volvo  C70 HPT convertible 2dr  Sedan  Europe      Front  $42,565
429  Volvo               S80 T6 4dr  Sedan  Europe      Front  $45,210
430  Volvo                   V40  Wagon  Europe      Front  $26,135
431  Volvo                  XC70  Wagon  Europe        All  $35,145

      Invoice  EngineSize  Cylinders  Horsepower  MPG_City
MPG_Highway  \
1    $21,761          2.0        4.0       200.0      30.0
31.0
2    $24,647          2.4        4.0       200.0      28.0
29.0
3    $30,299          3.2        6.0       270.0      26.0
28.0
4    $39,014          3.5        6.0       225.0      24.0
24.0
5    $41,100          3.5        6.0       225.0      24.0
24.0
..       ...          ...        ...         ...       ...           ..
.
427  $38,203          2.4        5.0       197.0      27.0
28.0
428  $40,083          2.3        5.0       242.0      26.0
26.0
429  $42,573          2.9        6.0       268.0      25.0
26.0
430  $24,641          1.9        4.0       170.0      28.0
29.0
431  $33,112          2.5        5.0       208.0      26.0
27.0

     Weight  Wheelbase  Length
```

```
1    2778.0      101.0   172.0
2    3230.0      105.0   183.0
3    3575.0      108.0   186.0
4    3880.0      115.0   197.0
5    3893.0      115.0   197.0
..      ...        ...     ...
427  3450.0      105.0   186.0
428  3450.0      105.0   186.0
429  3653.0      110.0   190.0
430  2822.0      101.0   180.0
431  3823.0      109.0   186.0

[329 rows x 15 columns]
```

#Done with analysis

#Thanks !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!