In [2]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
df=pd.read_csv(r"C:\Users\prajapath Arjun\Downloads\fiat500_VehicleSelection_Dataset.csv
print(df)
```

```
        ID   model  engine_power  age_in_days      km  previous_owners
0        1  lounge            51          882   25000                1  \
1        2     pop            51         1186   32500                1
2        3   sport            74         4658  142228                1
3        4  lounge            51         2739  160000                1
4        5     pop            73         3074  106880                1
...    ...     ...           ...          ...     ...              ...
1533  1534   sport            51         3712  115280                1
1534  1535  lounge            74         3835  112000                1
1535  1536     pop            51         2223   60457                1
1536  1537  lounge            51         2557   80750                1
1537  1538     pop            51         1766   54276                1

            lat        lon  price
0     44.907242   8.611560   8900
1     45.666359  12.241890   8800
2     45.503300  11.417840   4200
3     40.633171  17.634609   6000
4     41.903221  12.495650   5700
...         ...        ...    ...
1533  45.069679   7.704920   5200
1534  45.845692   8.666870   4600
1535  45.481541   9.413480   7500
1536  45.000702   7.682270   5990
1537  40.323410  17.568270   7900

[1538 rows x 9 columns]
```

In [3]:

```
df.head()
```

Out[3]:

	ID	model	engine_power	age_in_days	km	previous_owners	lat	lon	p
0	1	lounge	51	882	25000	1	44.907242	8.611560	8
1	2	pop	51	1186	32500	1	45.666359	12.241890	8
2	3	sport	74	4658	142228	1	45.503300	11.417840	4
3	4	lounge	51	2739	160000	1	40.633171	17.634609	6
4	5	pop	73	3074	106880	1	41.903221	12.495650	5

In [4]:

```
df.tail()
```

Out[4]:

	ID	model	engine_power	age_in_days	km	previous_owners	lat	l
1533	1534	sport	51	3712	115280	1	45.069679	7.704
1534	1535	lounge	74	3835	112000	1	45.845692	8.666
1535	1536	pop	51	2223	60457	1	45.481541	9.413
1536	1537	lounge	51	2557	80750	1	45.000702	7.682
1537	1538	pop	51	1766	54276	1	40.323410	17.568

In [5]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1538 entries, 0 to 1537
Data columns (total 9 columns):
 #   Column           Non-Null Count  Dtype  
---  ------           --------------  -----  
 0   ID               1538 non-null   int64  
 1   model            1538 non-null   object 
 2   engine_power     1538 non-null   int64  
 3   age_in_days      1538 non-null   int64  
 4   km               1538 non-null   int64  
 5   previous_owners  1538 non-null   int64  
 6   lat              1538 non-null   float64
 7   lon              1538 non-null   float64
 8   price            1538 non-null   int64  
dtypes: float64(2), int64(6), object(1)
memory usage: 108.3+ KB
```

In [6]:

```
df.shape
```

Out[6]:

```
(1538, 9)
```

In [7]:

```
df.describe()
```

Out[7]:

	ID	engine_power	age_in_days	km	previous_owners	l
count	1538.000000	1538.000000	1538.000000	1538.000000	1538.000000	1538.00000
mean	769.500000	51.904421	1650.980494	53396.011704	1.123537	43.54136
std	444.126671	3.988023	1289.522278	40046.830723	0.416423	2.13351
min	1.000000	51.000000	366.000000	1232.000000	1.000000	36.85583
25%	385.250000	51.000000	670.000000	20006.250000	1.000000	41.80299
50%	769.500000	51.000000	1035.000000	39031.000000	1.000000	44.39409
75%	1153.750000	51.000000	2616.000000	79667.750000	1.000000	45.46796
max	1538.000000	77.000000	4658.000000	235000.000000	4.000000	46.79561

In [8]:

```
df.columns
```

Out[8]:

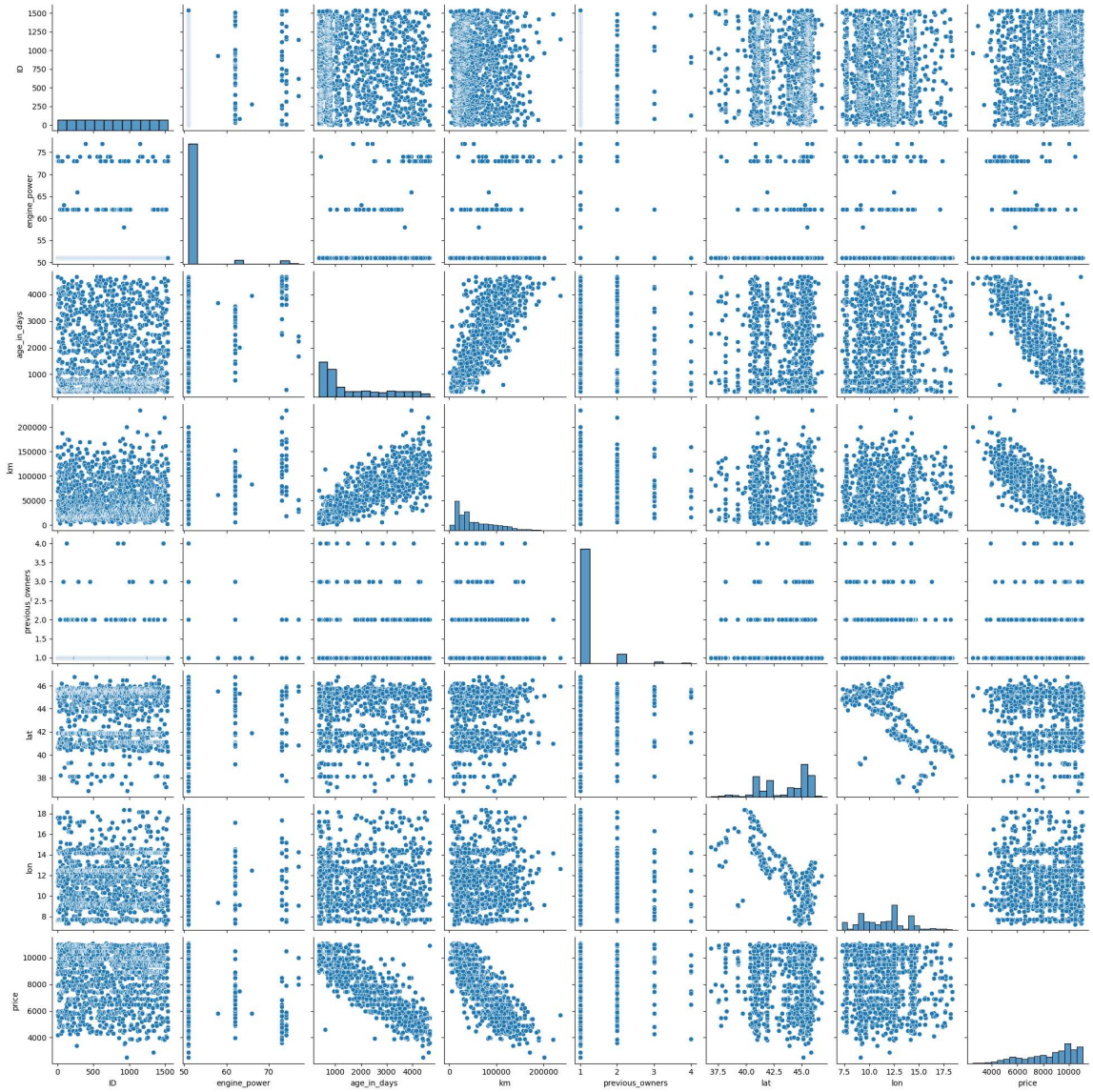
```
Index(['ID', 'model', 'engine_power', 'age_in_days', 'km', 'previous_owner
s',
       'lat', 'lon', 'price'],
      dtype='object')
```

In [9]:

```
#EDA
sns.pairplot(df)
```

Out[9]:

```
<seaborn.axisgrid.PairGrid at 0x1ba68f1a090>
```

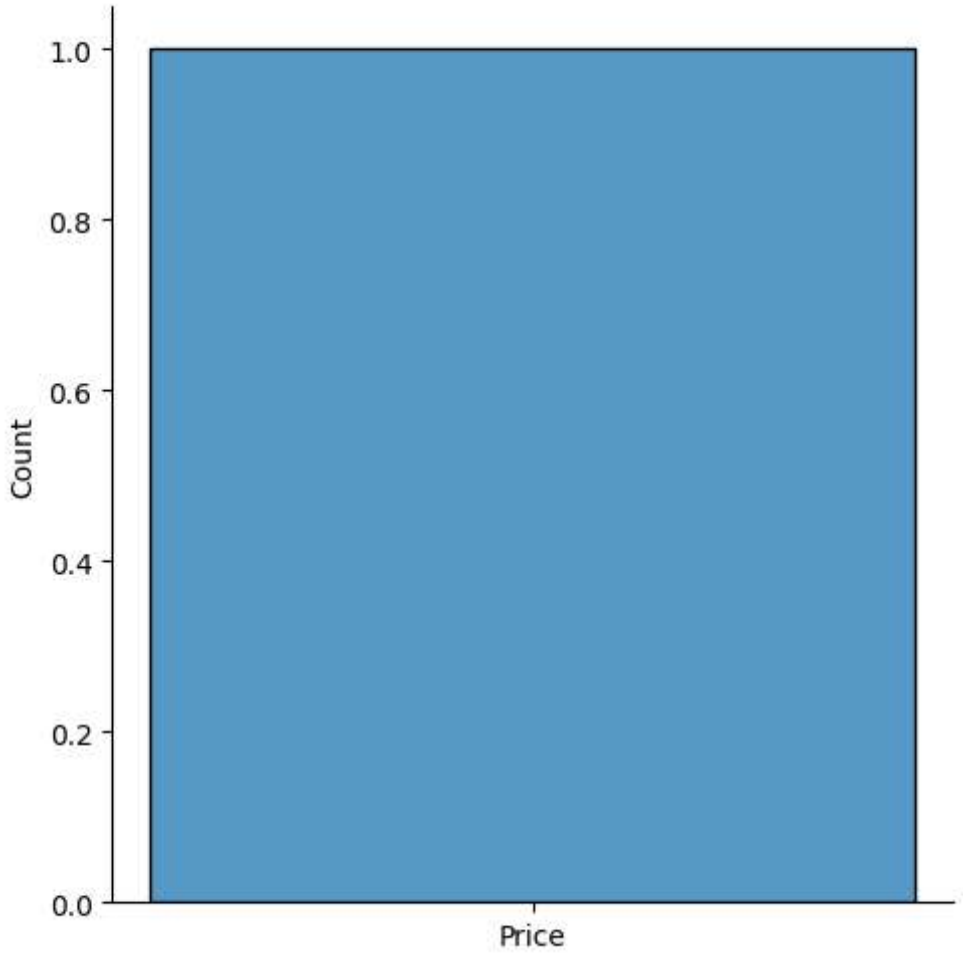


In [10]:

```
sns.displot(['Price'])
```

Out[10]:

```
<seaborn.axisgrid.FacetGrid at 0x1ba02650810>
```

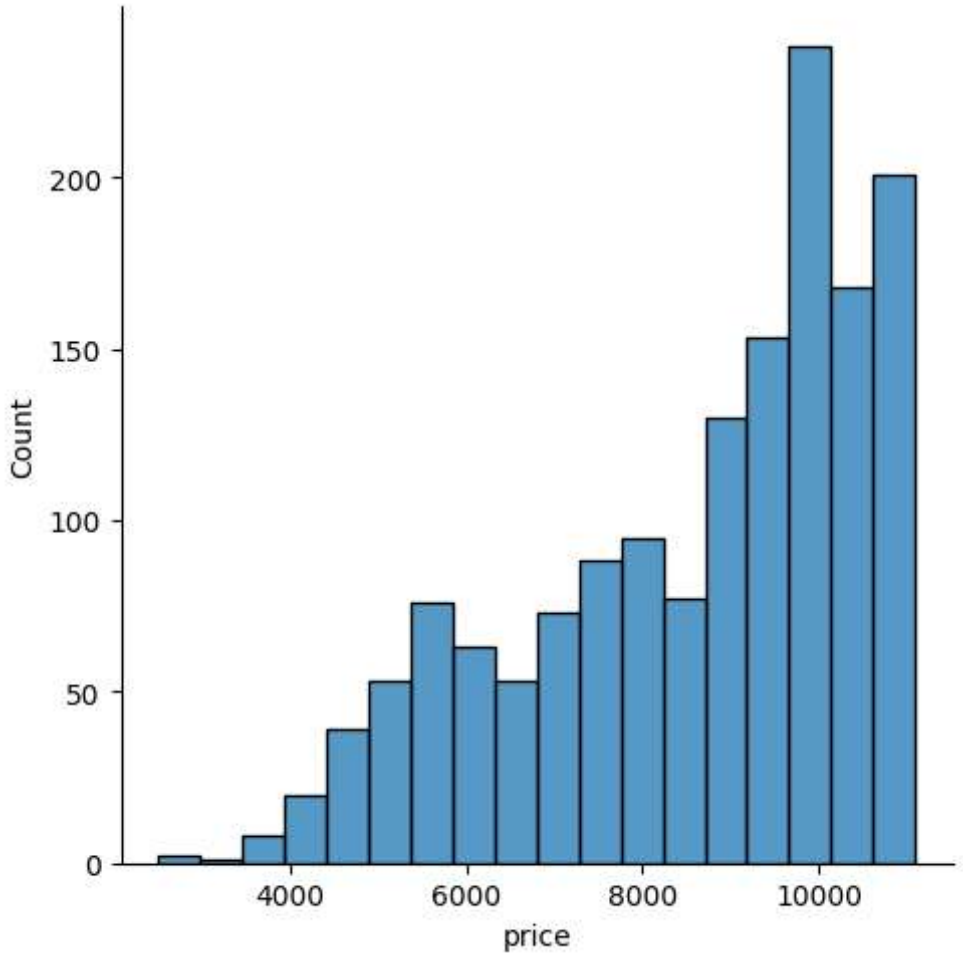


In [11]:

```
sns.displot(df['price'])
```

Out[11]:

```
<seaborn.axisgrid.FacetGrid at 0x1ba028c3a90>
```

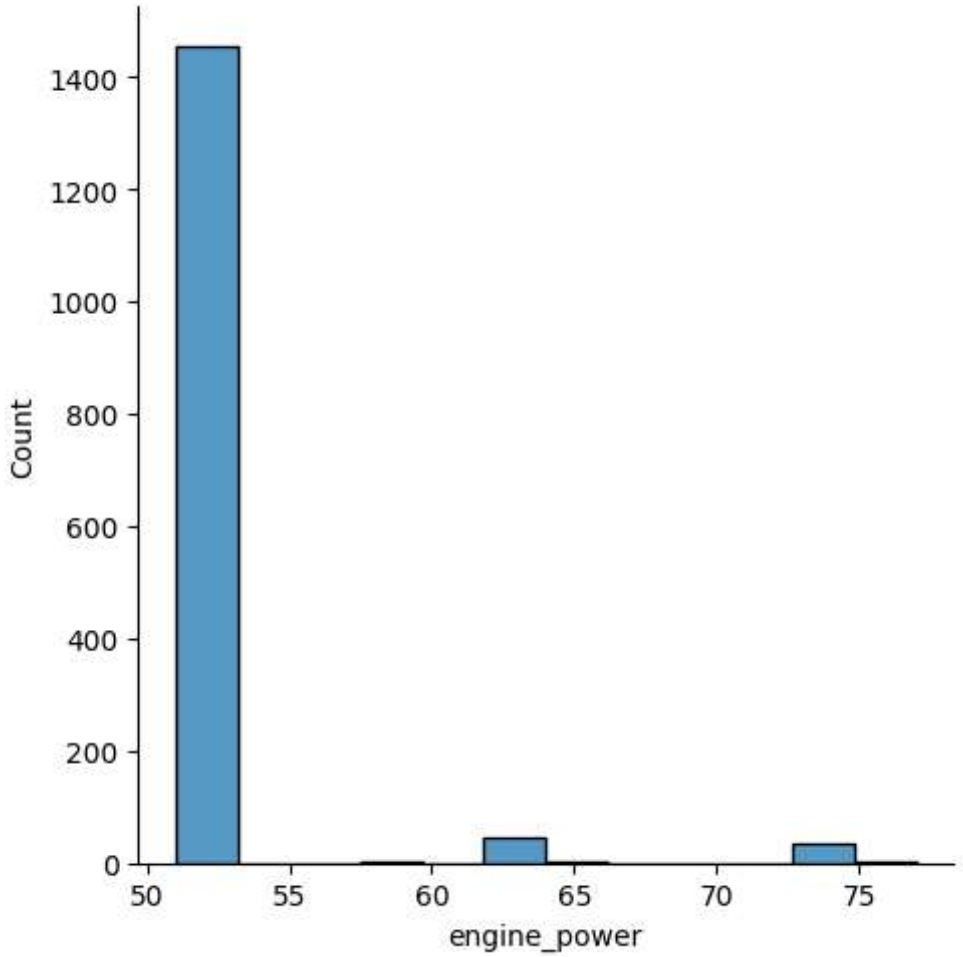


In [12]:

```
sns.displot(df['engine_power'])
```

Out[12]:

```
<seaborn.axisgrid.FacetGrid at 0x1ba028fe350>
```

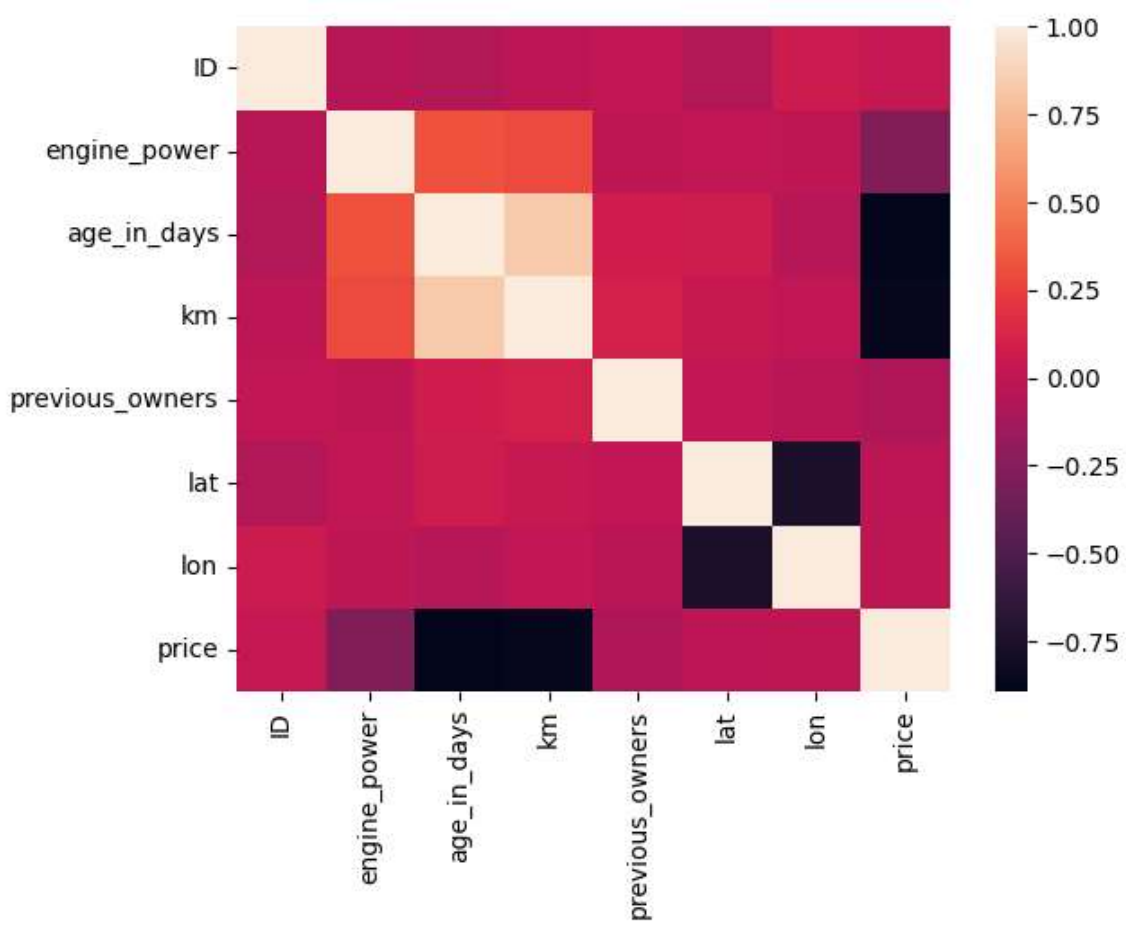


In [13]:

```
fiatdf=df[['ID', 'engine_power', 'age_in_days', 'km', 'previous_owners',
 'lat', 'lon','price']]
sns.heatmap(fiatdf.corr())
```

Out[13]:

<Axes: >

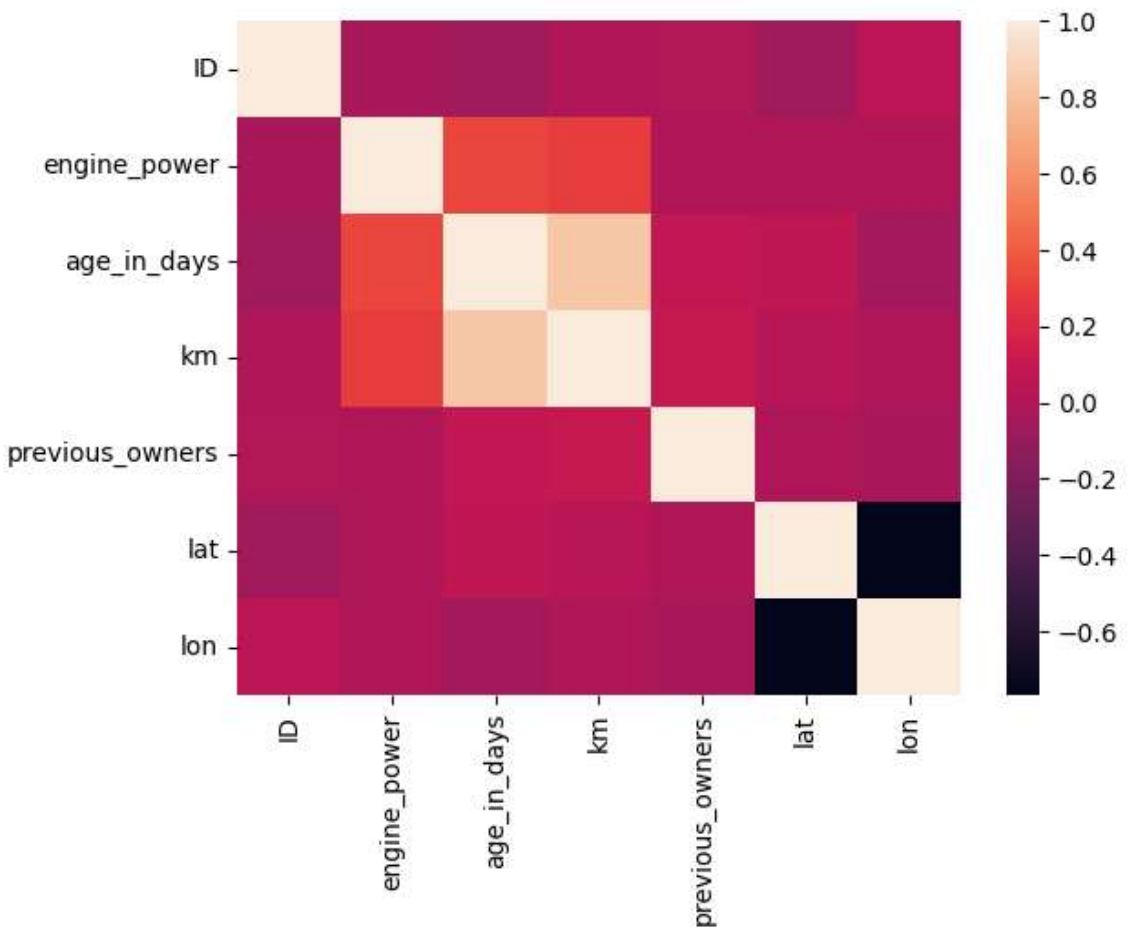


In [14]:

```
fiatdf=df[['ID', 'engine_power', 'age_in_days', 'km', 'previous_owners',
 'lat', 'lon']]
sns.heatmap(fiatdf.corr())#without price
```

Out[14]:

<Axes: >



In [15]:

```
X=fiatdf[['ID', 'engine_power', 'age_in_days', 'km', 'previous_owners',
 'lat', 'lon']]
y=df['price']
```

In [16]:

```
from sklearn.model_selection import train_test_split
X_train,X_test,y_train,y_test=train_test_split(X,y,test_size=0.3,random_state=101)
from sklearn.linear_model import LinearRegression
regr=LinearRegression()
regr.fit(X_train,y_train)
print(regr.intercept_)
```

```
8971.195685070259
```

In [17]:

```
coeff_df=pd.DataFrame(regr.coef_,X.columns,columns=['coefficient'])
coeff_df
```

Out[17]:

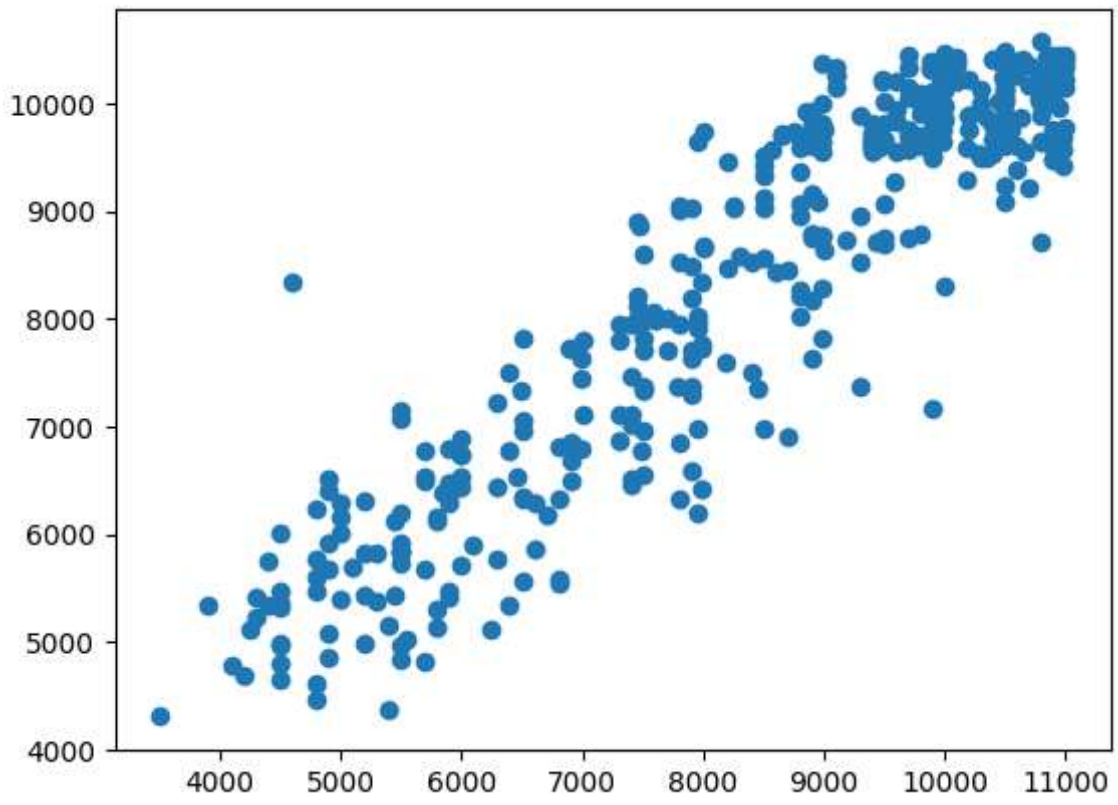
	coefficient
ID	-0.046704
engine_power	11.646408
age_in_days	-0.898018
km	-0.017232
previous_owners	26.400886
lat	32.189709
lon	0.161073

In [18]:

```
predictions=regr.predict(X_test)
plt.scatter(y_test,predictions)
```

Out[18]:

```
<matplotlib.collections.PathCollection at 0x1ba04c6fd50>
```

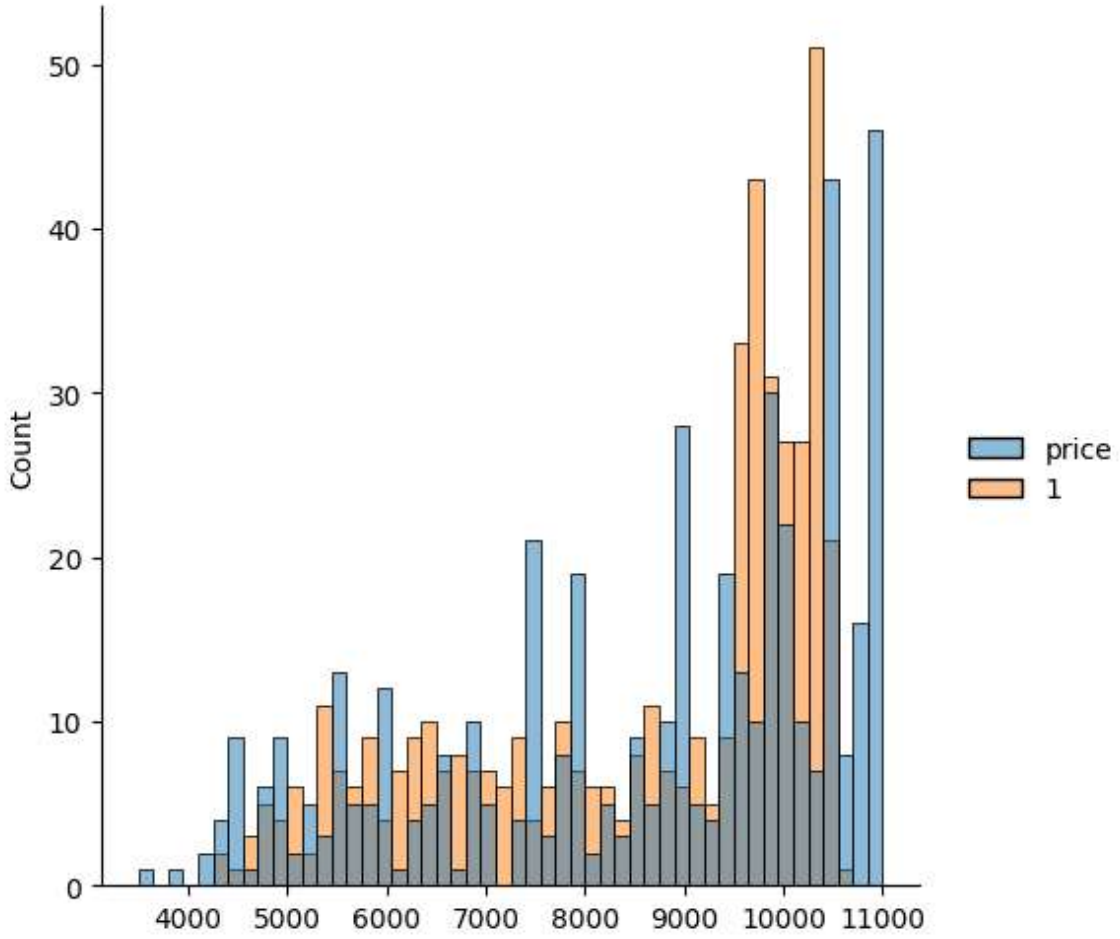


In [19]:

```
sns.displot((y_test,predictions),bins=50)#without semicolon
```

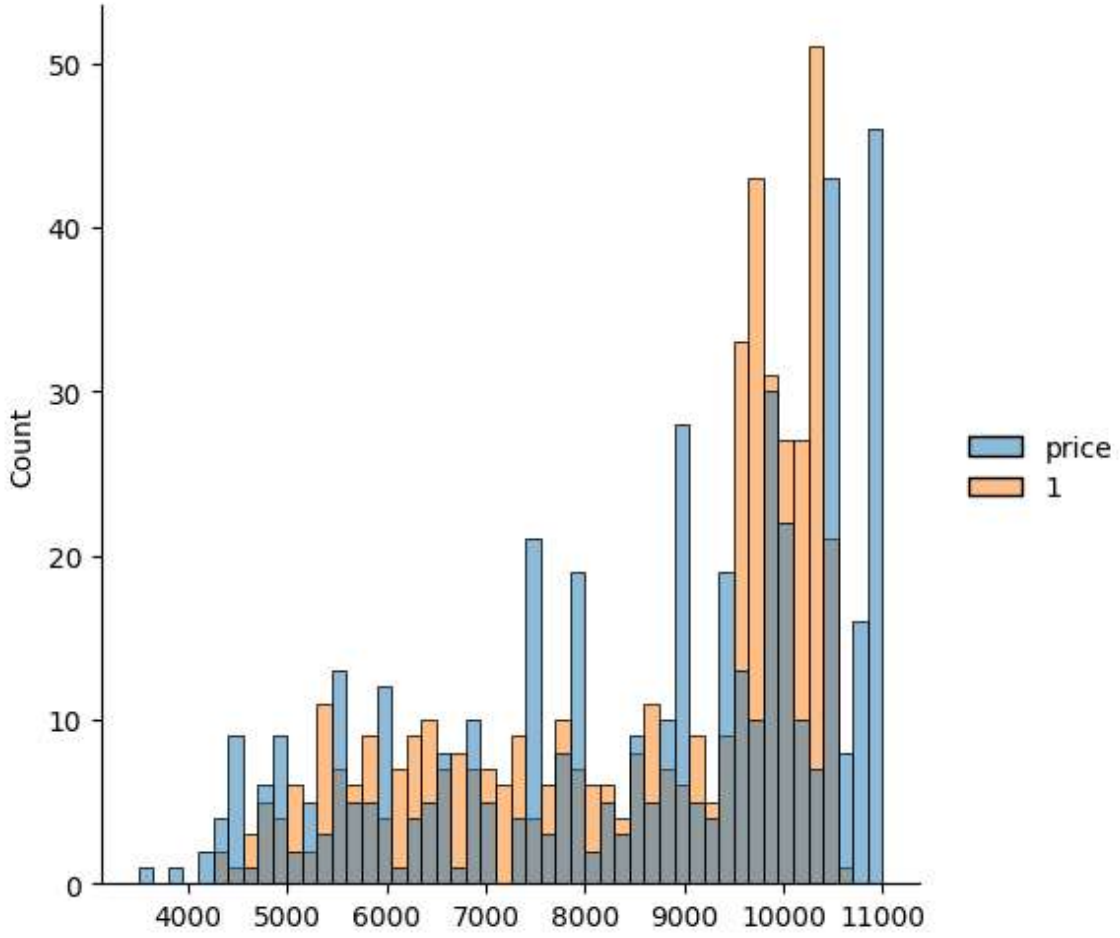
Out[19]:

```
<seaborn.axisgrid.FacetGrid at 0x1ba04bf9350>
```



In [20]:

```
sns.displot((y_test,predictions),bins=50);#with semicolon
```



In [21]:

```
from sklearn import metrics
print('MAE:',metrics.mean_absolute_error(y_test,predictions))
print('MSE:',metrics.mean_squared_error(y_test,predictions))
print('MAE:',np.sqrt(metrics.mean_squared_error(y_test,predictions)))
```

```
MAE: 593.0876179521579
MSE: 551442.6799675114
MAE: 742.5918663488791
```

In [22]:

```
#accuracy
regr=LinearRegression()
regr.fit(X_train,y_train)
regr.fit(X_train,y_train)
print(regr.score(X_test,y_test))
```

```
0.8597136704313113
```

In [23]:

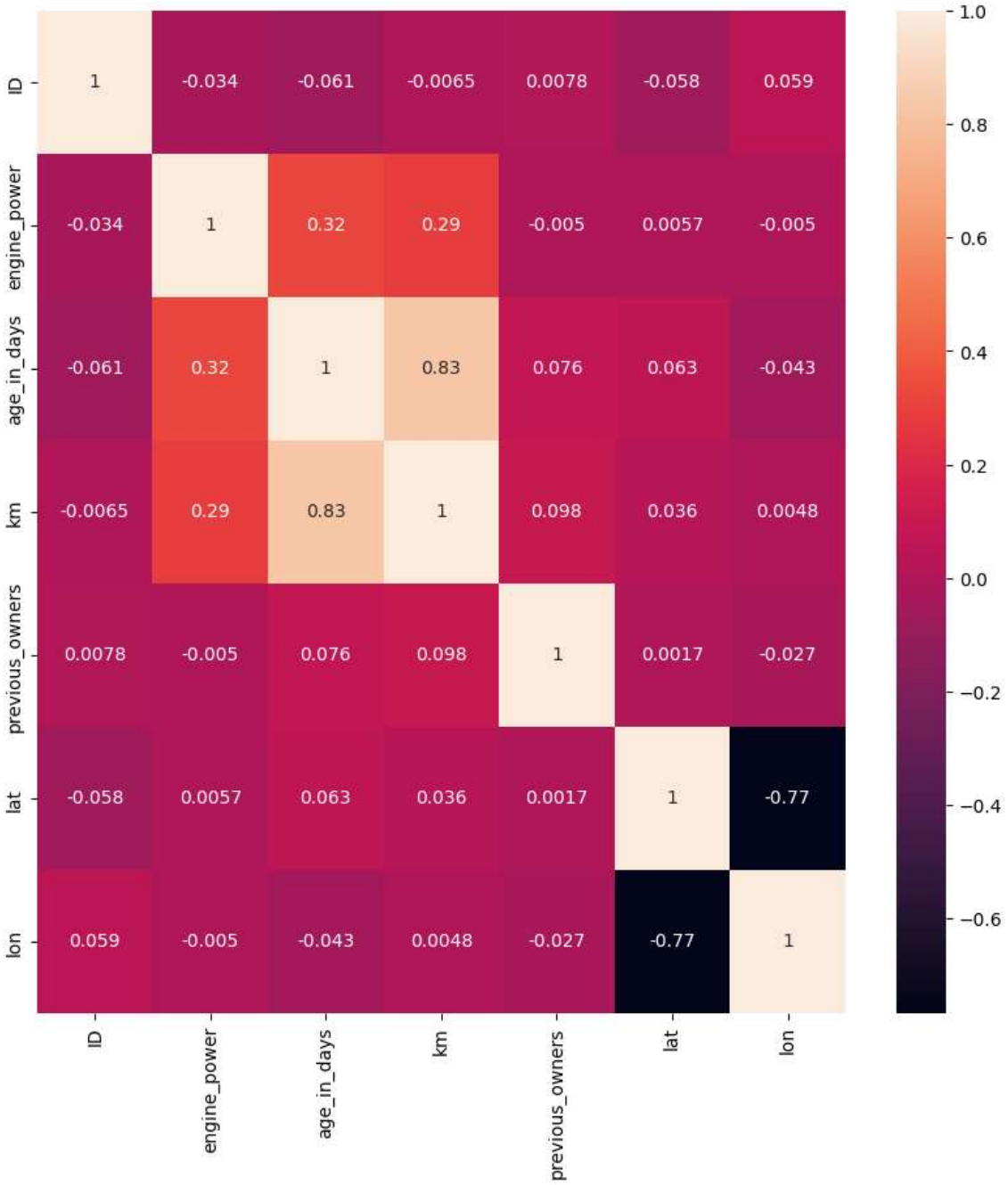
```
from sklearn.linear_model import Lasso,Ridge
from sklearn.preprocessing import StandardScaler
```

In [24]:

```
plt.figure(figsize=(10,10))
sns.heatmap(fiatdf.corr(),annot=True)
```

Out[24]:

<Axes: >

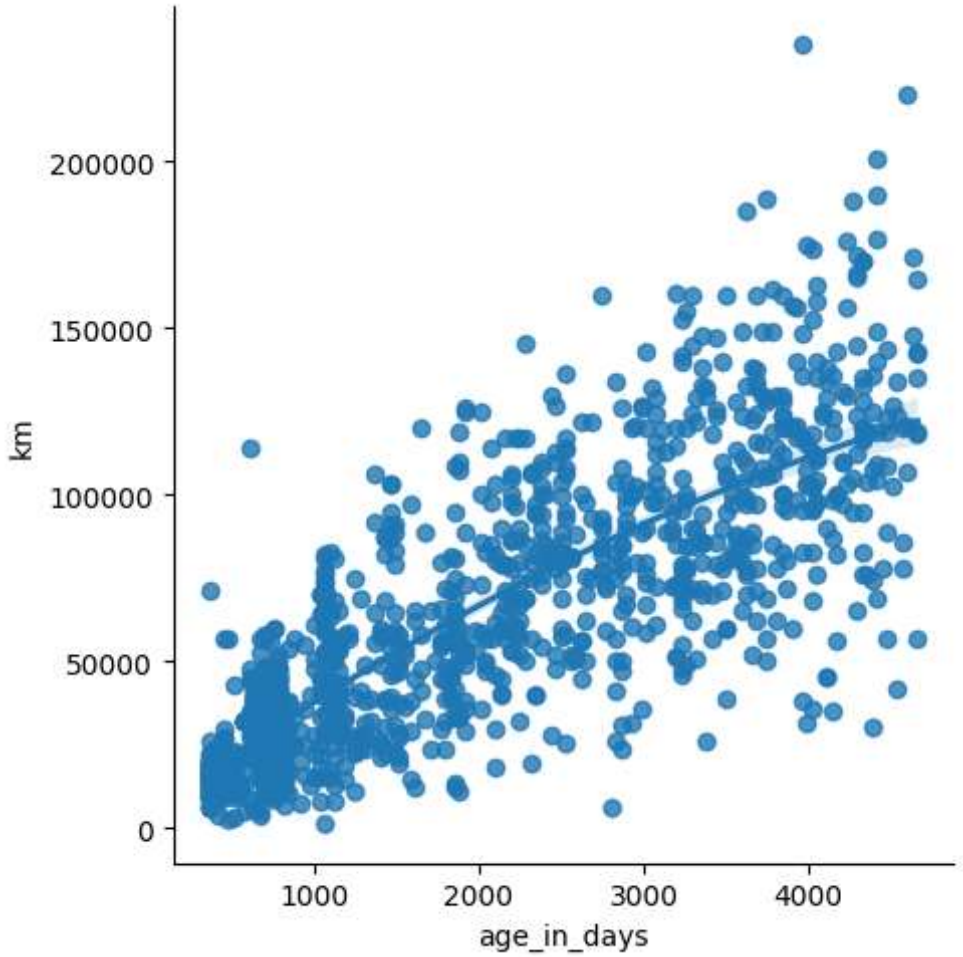


In [25]:

```
sns.lmplot(x="age_in_days",y="km",data=fiatdf,order=2)
```

Out[25]:

```
<seaborn.axisgrid.FacetGrid at 0x1ba07418350>
```

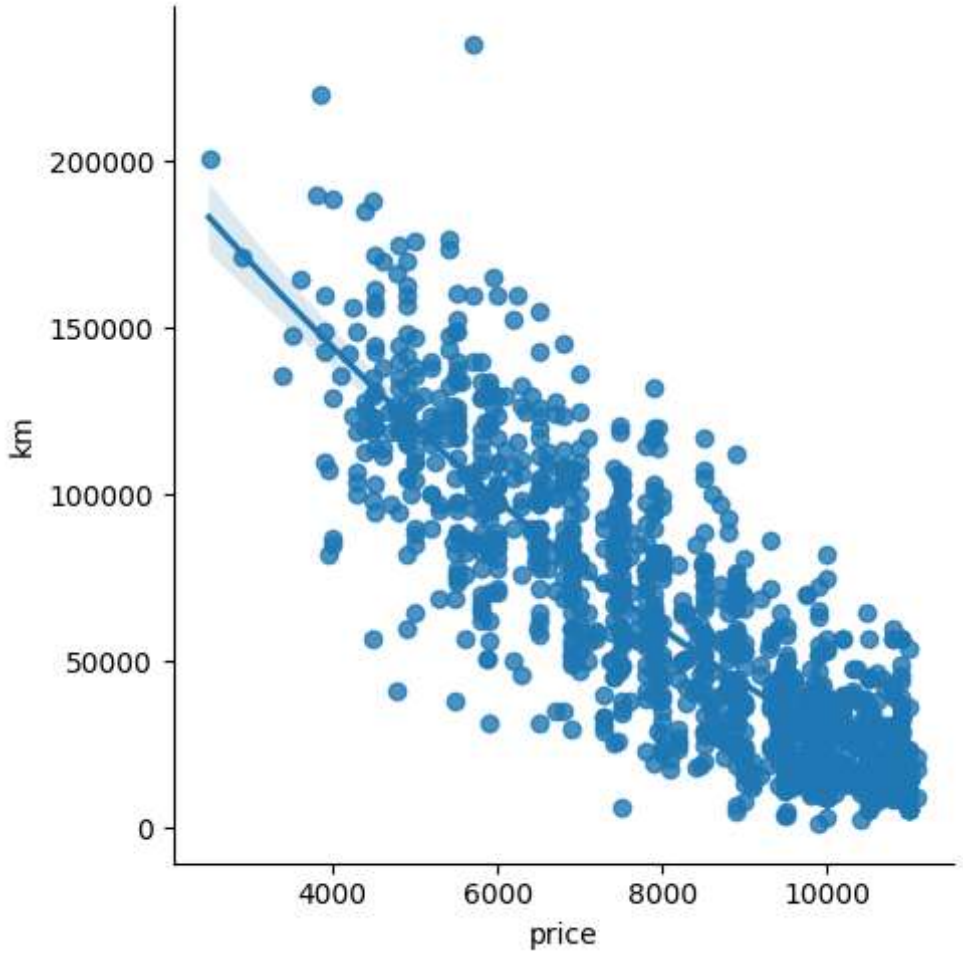


In [26]:

```
sns.lmplot(x="price",y="km",data=df,order=2)
```

Out[26]:

```
<seaborn.axisgrid.FacetGrid at 0x1ba0744eed0>
```



In [27]:

```
df.fillna(method='ffill',inplace=True)
x=np.array(df['age_in_days']).reshape(-1,1)
y=np.array(df['km']).reshape(-1,1)
df.dropna(inplace=True)
```

In [28]:

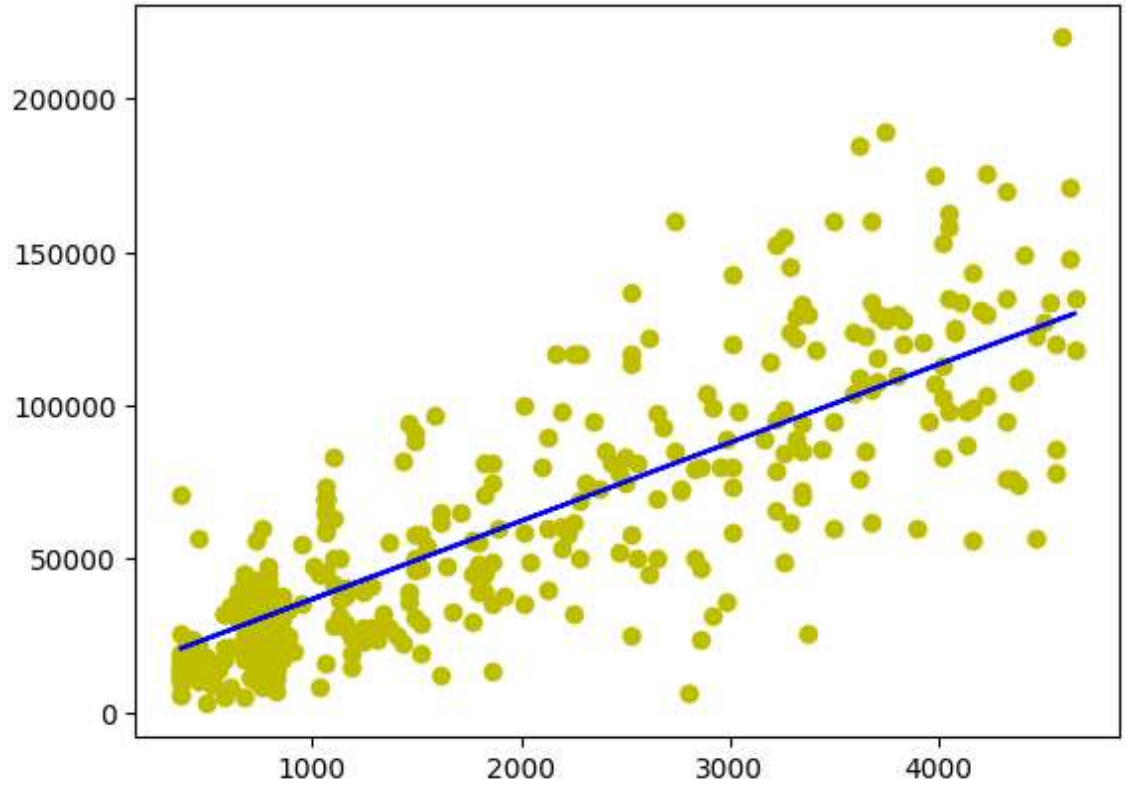
```
X_train,X_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
regr.fit(X_train,y_train)
regr.fit(X_train,y_train)
```

Out[28]:

```
▾ LinearRegression
LinearRegression()
```

In [29]:

```
y_pred=regr.predict(X_test)
plt.scatter(X_test,y_test,color='y')
plt.plot(X_test,y_pred,color='b')
plt.show()
```



In [31]:

```
#elasticnet
from sklearn.linear_model import ElasticNet
regr=ElasticNet()
regr.fit(x,y)
print(regr.coef_)
print(regr.intercept_)
y_pred_elastic=regr.predict(X_train)
mean_squared_error=np.mean((y_pred_elastic-y_train)**2)
print("Mean Squared Error on test set",mean_squared_error)
```

```
[25.89689696]
[10640.73996329]
Mean Squared Error on test set 2647092420.670548
```

In [ ]:

```

```