In [1]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
df=pd.read_csv(r"C:\Users\G S R  KARTHIK\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 [2]:

```
df.head(10)
```

Out[2]:

	ID	model	engine_power	age_in_days	km	previous_owners	lat	lon
0	1	lounge	51	882	25000	1	44.907242	8.611560
1	2	pop	51	1186	32500	1	45.666359	12.241890
2	3	sport	74	4658	142228	1	45.503300	11.417840
3	4	lounge	51	2739	160000	1	40.633171	17.634609
4	5	pop	73	3074	106880	1	41.903221	12.495650
5	6	pop	74	3623	70225	1	45.000702	7.682270
6	7	lounge	51	731	11600	1	44.907242	8.611560
7	8	lounge	51	1521	49076	1	41.903221	12.495650
8	9	sport	73	4049	76000	1	45.548000	11.549470
9	10	sport	51	3653	89000	1	45.438301	10.991700

In [3]:

```
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 [4]:

```
df.describe()
```

Out[4]:

	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 [5]:

```
df.columns
```

Out[5]:

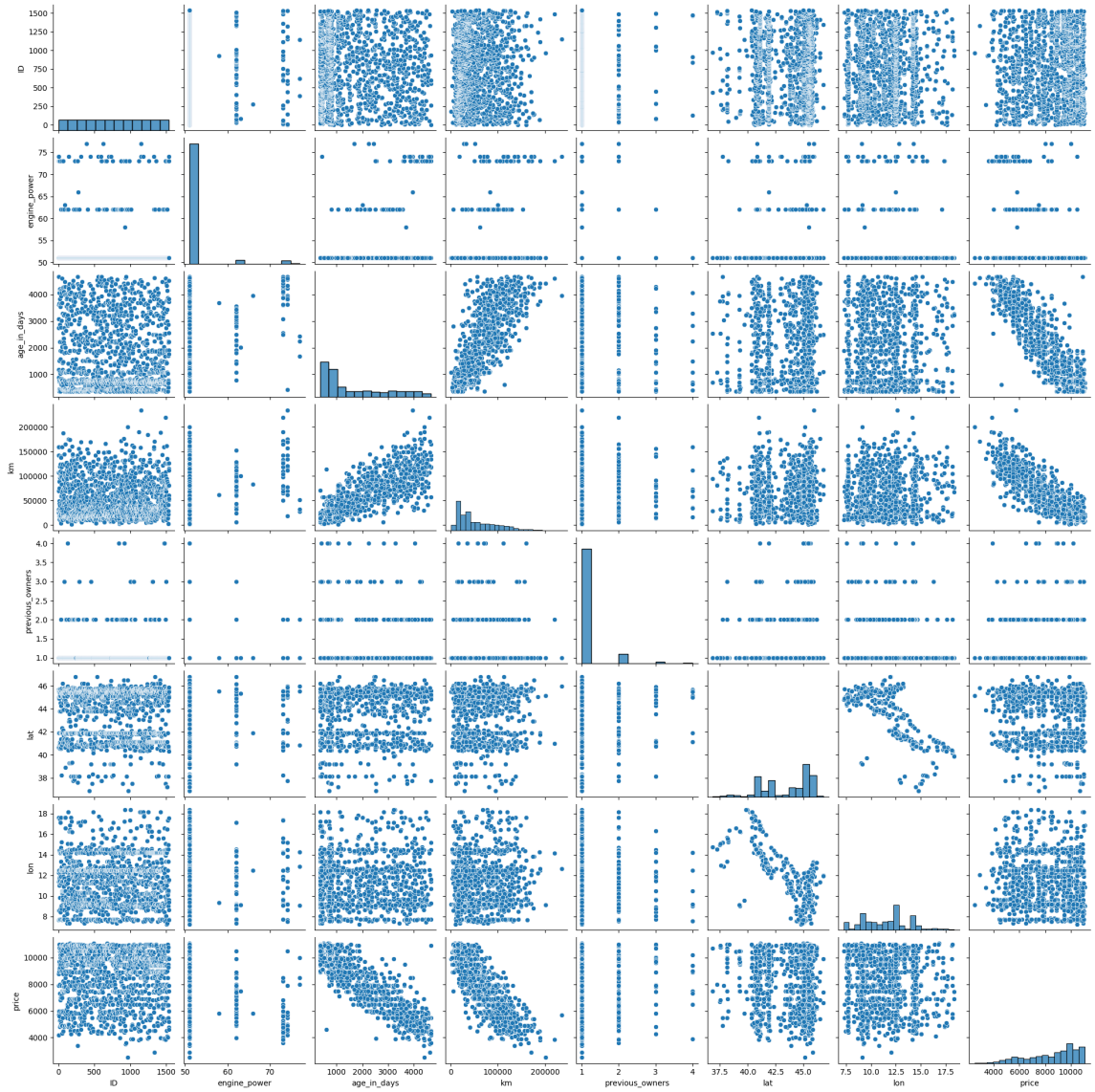
```
Index(['ID', 'model', 'engine_power', 'age_in_days', 'km', 'previous_owner
s',
       'lat', 'lon', 'price'],
      dtype='object')
```

In [6]:

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

Out[6]:

```
<seaborn.axisgrid.PairGrid at 0x11d927903a0>
```

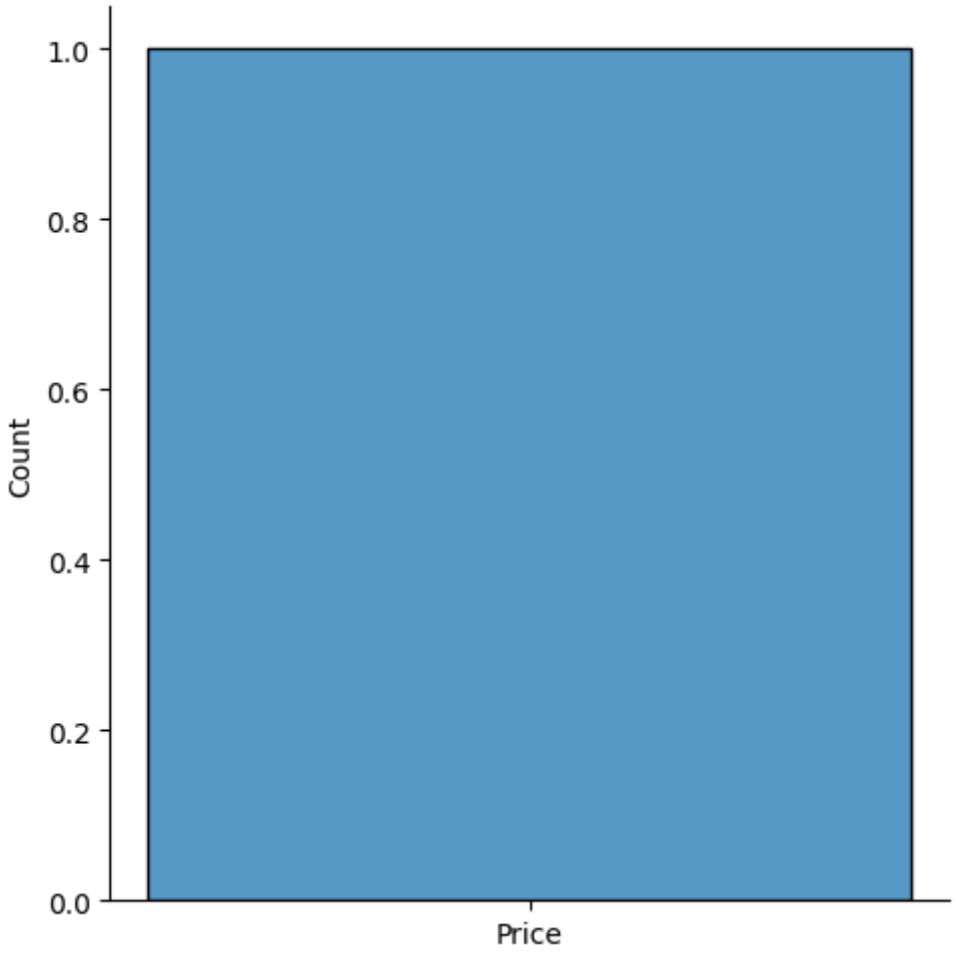


In [7]:

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

Out[7]:

```
<seaborn.axisgrid.FacetGrid at 0x11d97ed2f80>
```

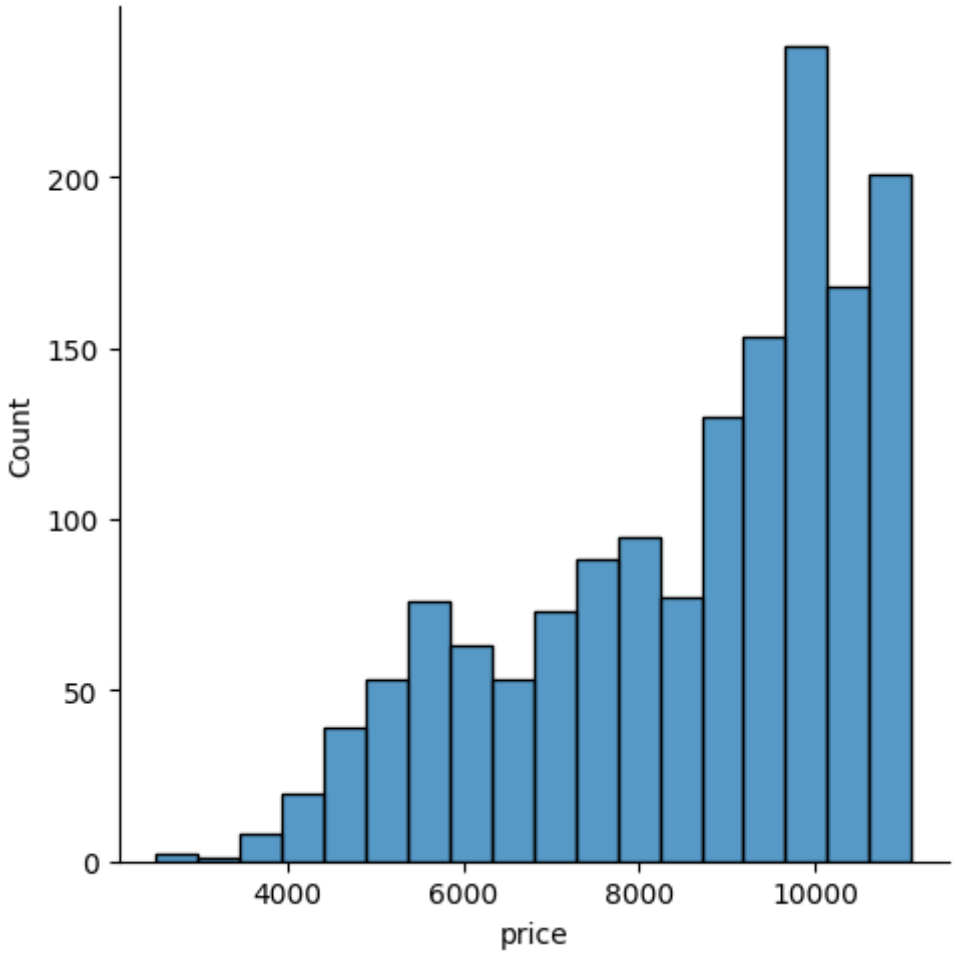


In [8]:

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

Out[8]:

```
<seaborn.axisgrid.FacetGrid at 0x11d97ed33d0>
```

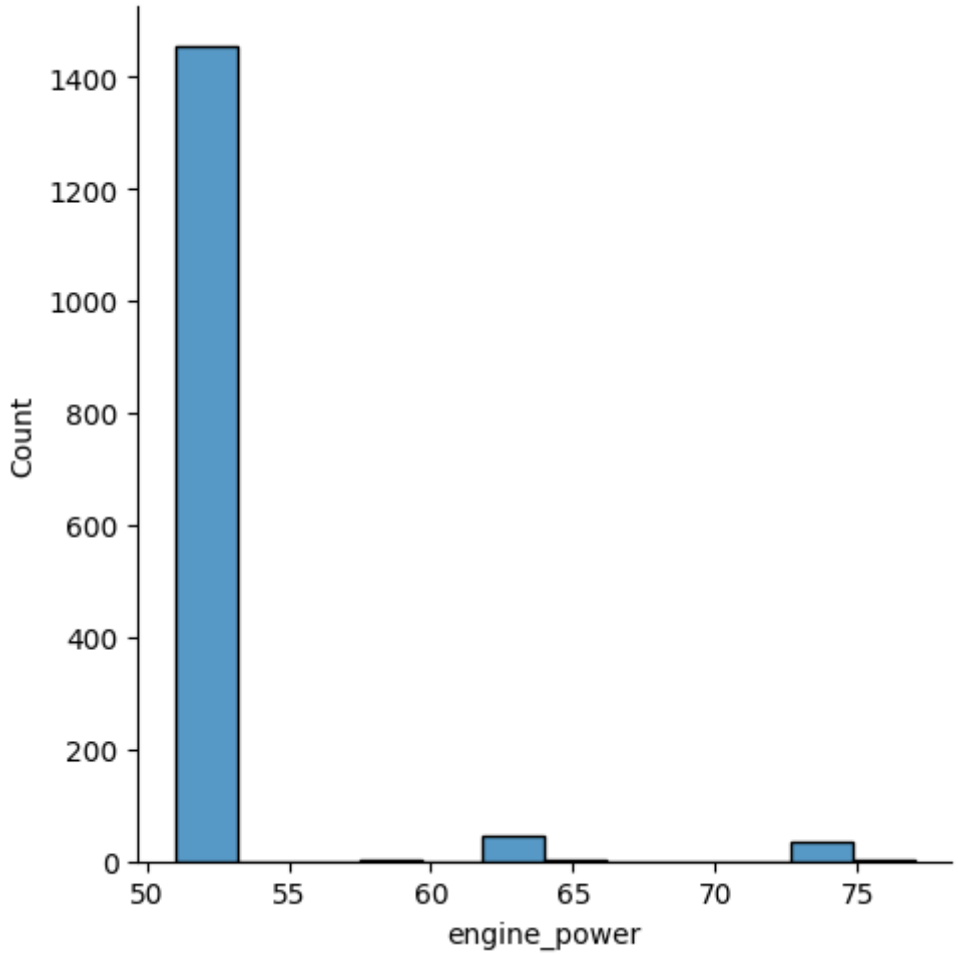


In [9]:

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

Out[9]:

```
<seaborn.axisgrid.FacetGrid at 0x11d92790070>
```

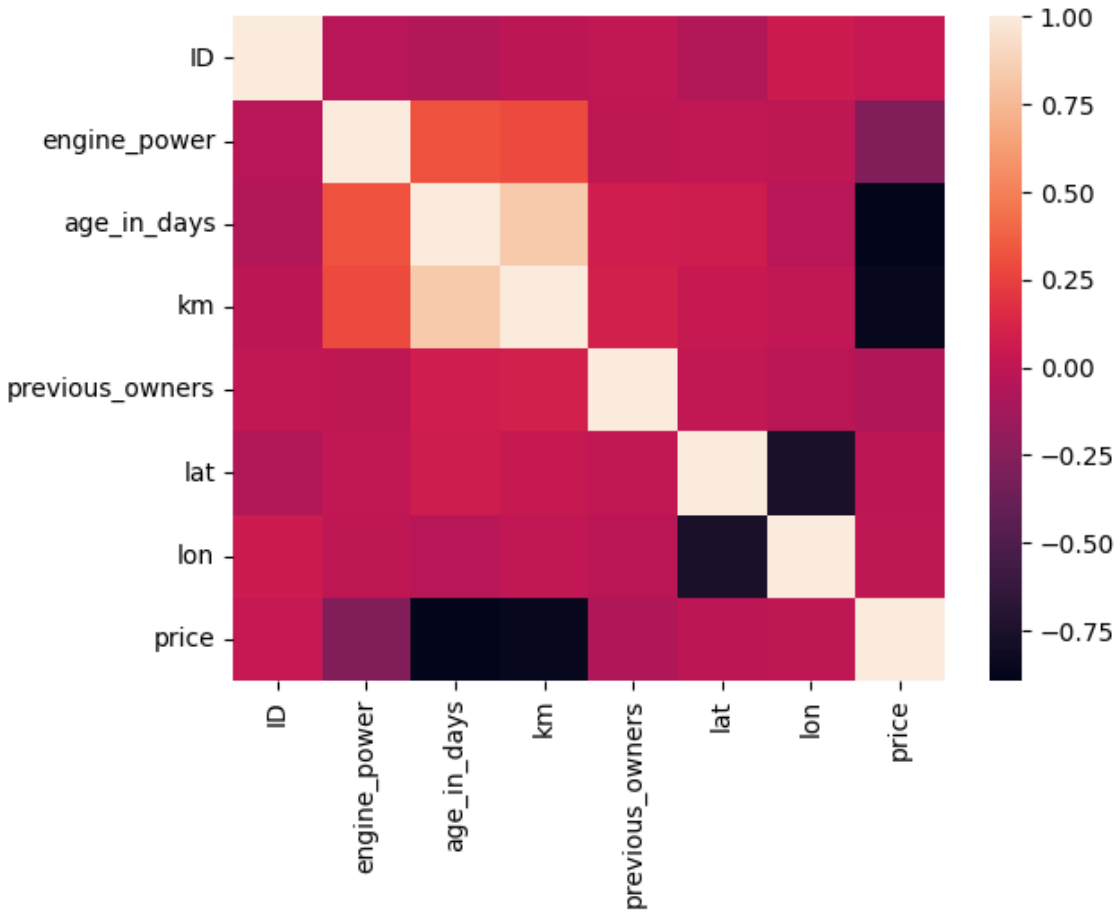


In [10]:

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

Out[10]:

<Axes: >

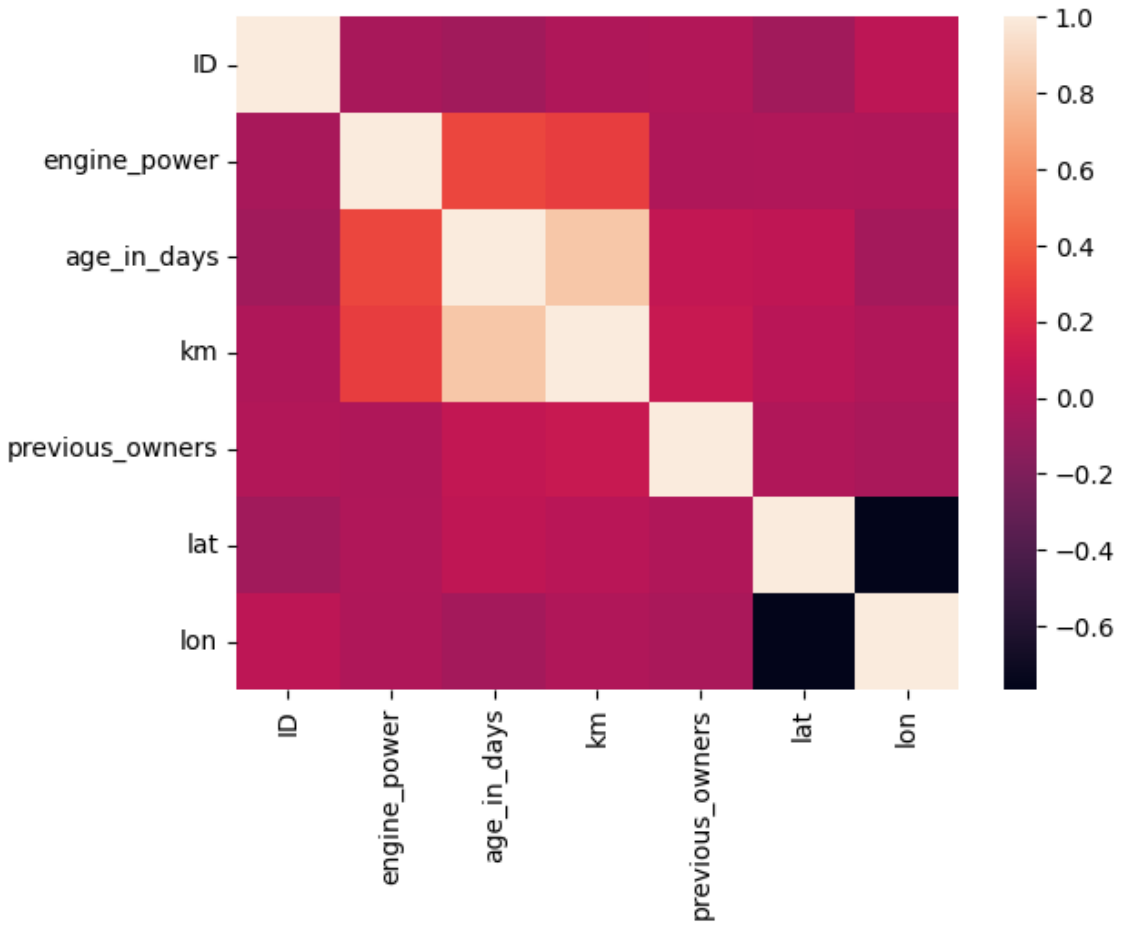


In [11]:

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

Out[11]:

```
<Axes: >
```



In [12]:

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

In [13]:

```
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_)
```

```
8971.195683500027
```

In [14]:

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

Out[14]:

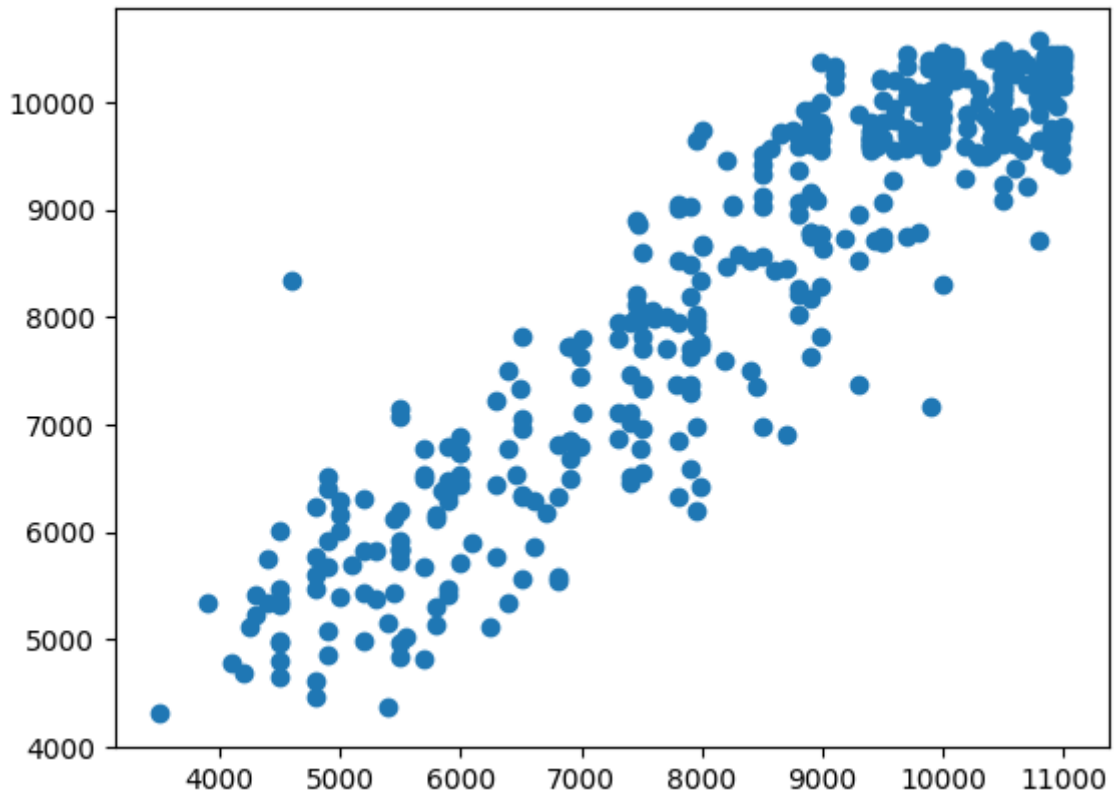
	coefficient
ID	-0.046704
engine_power	11.646408
age_in_days	-0.898018
km	-0.017232
previous_owners	26.400886
lat	32.189709
lon	0.161073

In [15]:

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

Out[15]:

```
<matplotlib.collections.PathCollection at 0x11d9b303e80>
```

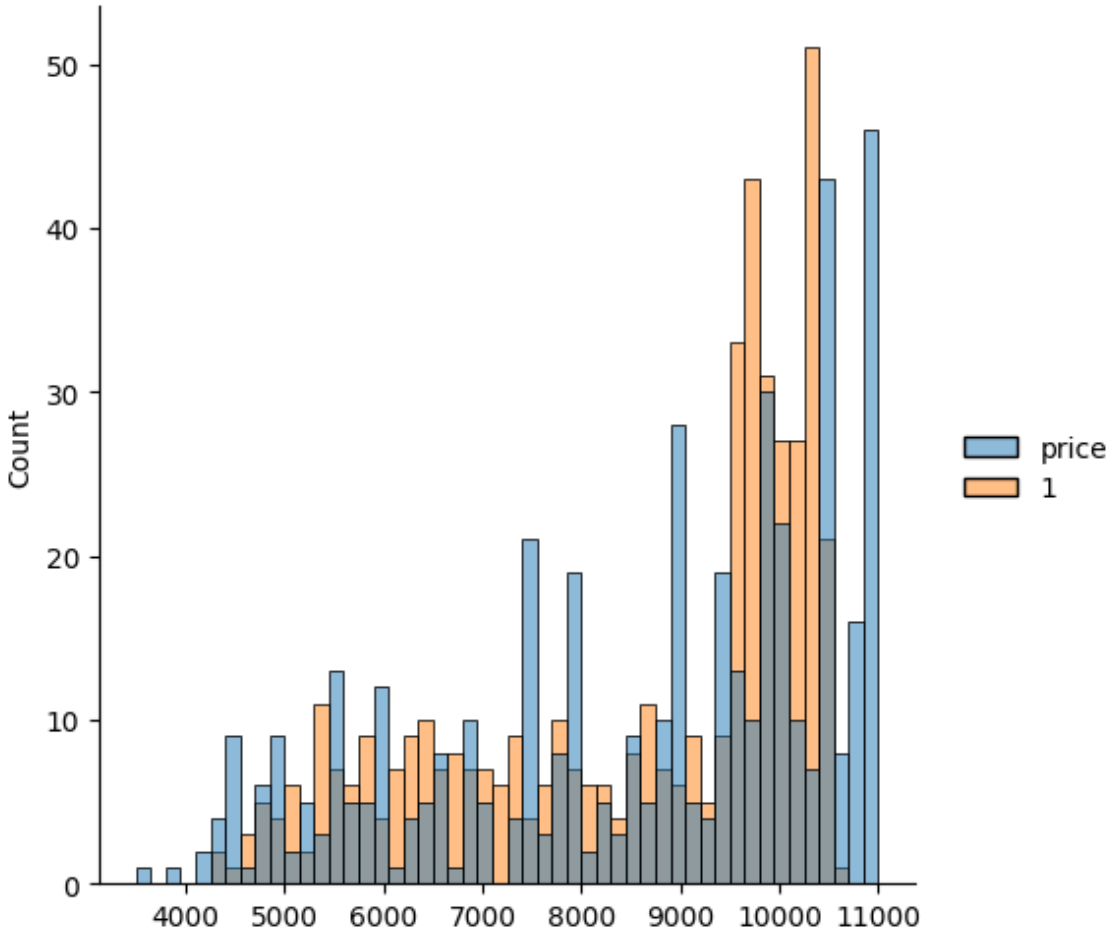


In [17]:

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

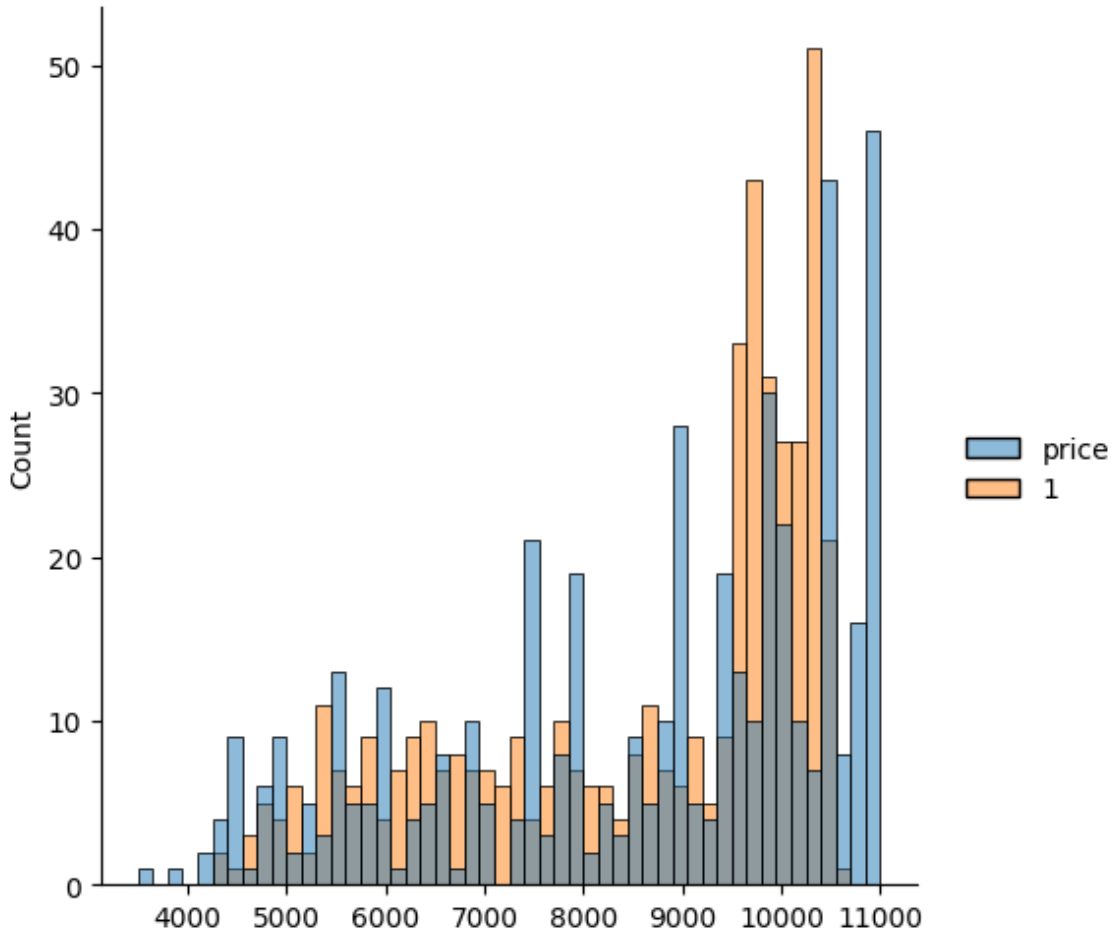
Out[17]:

```
<seaborn.axisgrid.FacetGrid at 0x11d9b2d2c80>
```



In [18]:

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



In [19]:

```
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: 593.0876179519989
MSE: 551442.6799691883
MAE: 742.5918663500081
```

In [20]:

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

```
0.8597136704308846
```

In [22]:

```
df.fillna(method='ffill',inplace=True)
```

In [23]:

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

In [24]:

```
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)
```

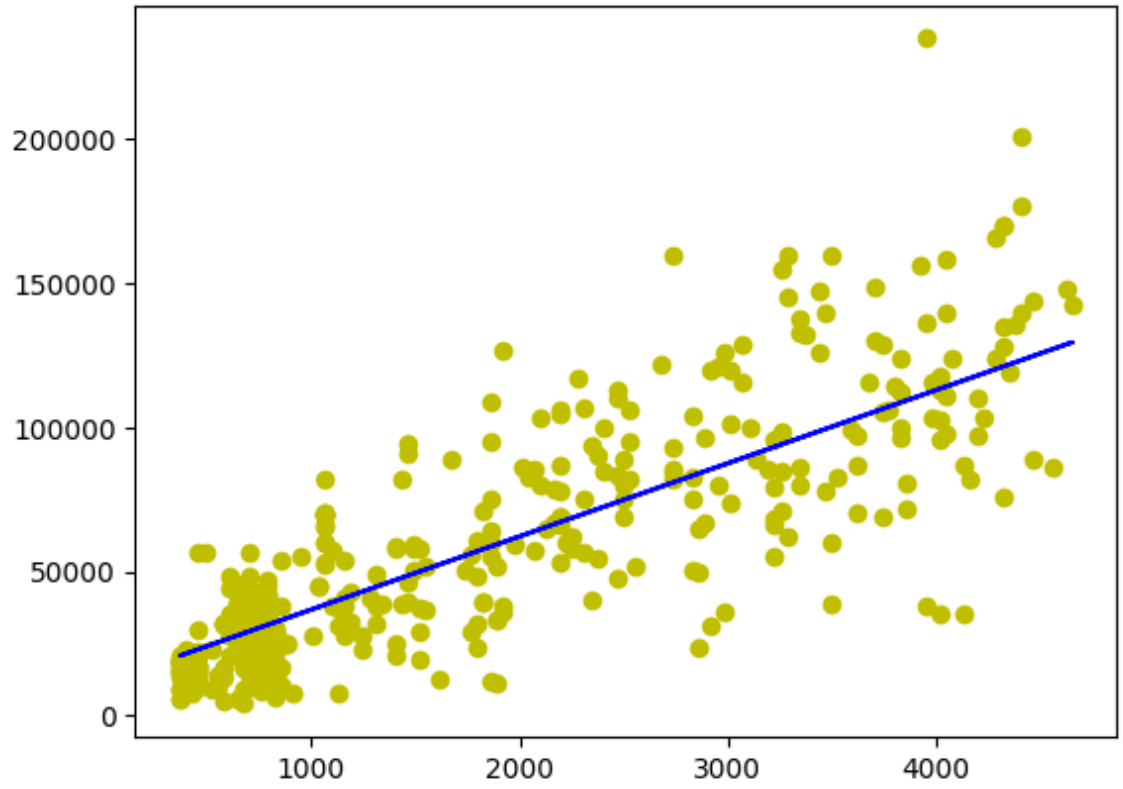
Out[24]:

```
LinearRegression()
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [25]:

```
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 [57]:

```
#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)
```

```
[-90.71386288]
8677.92428806976
Mean Squared Error on test set 3678763.554360448
```

In [ ]: