In [1]:
```
import pandas as pd
import warnings
warnings.filterwarnings('ignore')
data=pd.read_csv("/home/placement/Downloads/fiat500.csv")
```

In [2]:
```
data1=data.drop(['lon','lat','ID'],axis=1)
data1
```

Out[2]:

	model	engine_power	age_in_days	km	previous_owners	price
0	lounge	51	882	25000	1	8900
1	pop	51	1186	32500	1	8800
2	sport	74	4658	142228	1	4200
3	lounge	51	2739	160000	1	6000
4	pop	73	3074	106880	1	5700
...	...	...	...	...	...	...
1533	sport	51	3712	115280	1	5200
1534	lounge	74	3835	112000	1	4600
1535	pop	51	2223	60457	1	7500
1536	lounge	51	2557	80750	1	5990
1537	pop	51	1766	54276	1	7900

1538 rows × 6 columns

In [3]:
```
data1=pd.get_dummies(data1)
data1
```

Out[3]:

	engine_power	age_in_days	km	previous_owners	price	model_lounge	model_pop	model_sport
0	51	882	25000	1	8900	1	0	0
1	51	1186	32500	1	8800	0	1	0
2	74	4658	142228	1	4200	0	0	1
3	51	2739	160000	1	6000	1	0	0
4	73	3074	106880	1	5700	0	1	0
...	...	...	...	...	...	...	...	...
1533	51	3712	115280	1	5200	0	0	1
1534	74	3835	112000	1	4600	1	0	0
1535	51	2223	60457	1	7500	0	1	0
1536	51	2557	80750	1	5990	1	0	0
1537	51	1766	54276	1	7900	0	1	0

1538 rows × 8 columns

In [4]:
```
#adding to seperate dataframe the value,we want to predict
y=data1['price']
#removing the value we want to predict from orginal dataframe
x=data1.drop('price',axis=1)
```

In [5]:
```
y
```

Out[5]:
```
0       8900
1       8800
2       4200
3       6000
4       5700
        ...
1533    5200
1534    4600
1535    7500
1536    5990
1537    7900
Name: price, Length: 1538, dtype: int64
```

In [6]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.33,random_state=42)
```

In [7]:
```
#linearRegression
```

In [8]:
```
from sklearn.linear_model import LinearRegression
reg=LinearRegression()#creating object of LinearRegression
reg.fit(x_train,y_train)#training and fitting LR object using training data
```

Out[8]:
```
LinearRegression()
```

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In [9]:
```
ypred=reg.predict(x_test)
ypred
```

Out[9]:
```
array([ 5867.6503378 ,  7133.70142341,  9866.35776216,  9723.28874535,
       10039.59101162,  9654.07582608,  9673.14563045, 10118.70728123,
        9903.85952664,  9351.55828437, 10434.34963575,  7732.26255693,
        7698.67240131,  6565.95240435,  9662.90103518, 10373.20344286,
        9599.94844451,  7699.34400418,  4941.33017994, 10455.2719478 ,
       10370.51555682, 10391.60424404,  7529.06622456,  9952.37340054,
        7006.13845729,  9000.1780961 ,  4798.36770637,  6953.10376491,
        7810.39767825,  9623.80497535,  7333.52158317,  5229.18705519,
        5398.21541073,  5157.65652129,  8948.63632836,  5666.62365159,
        9822.1231461 ,  8258.46551788,  6279.2040404 ,  8457.38443276,
        9773.86444066,  6767.04074749,  9182.99904787, 10210.05195479,
        8694.90545226, 10328.43369248,  9069.05761443,  8866.7826029 ,
        7058.39787506,  9073.33877162,  9412.68162121, 10293.69451263,
       10072.49011135,  6748.5794244 ,  9785.95841801,  9354.09969973,
        9507.9444386 , 10443.01608254,  9795.31884316,  7197.84932877,
       10108.31707235,  7009.6597206 ,  9853.90699412,  7146.87414965,
        6417.69133992,  9996.97382441,  9781.18795953,  8515.83255277,
        8456.30006203,  6499.76668237,  7768.57829985,  6832.86406122,
        8347.96113362, 10439.02404036,  7356.43463051,  8562.56562053,
```

In [10]:
```
from sklearn.metrics import r2_score
r2_score(y_test,ypred)
```

Out[10]:
```
0.8415526986865394
```

In [11]:
```
from sklearn.metrics import mean_squared_error#calculating MSE
mean_squared_error(ypred,y_test)
```

Out[11]:
```
581887.727391353
```

In [12]:
```
import math
print(math.sqrt(581887.727391353))
```

```
762.8156575420782
```

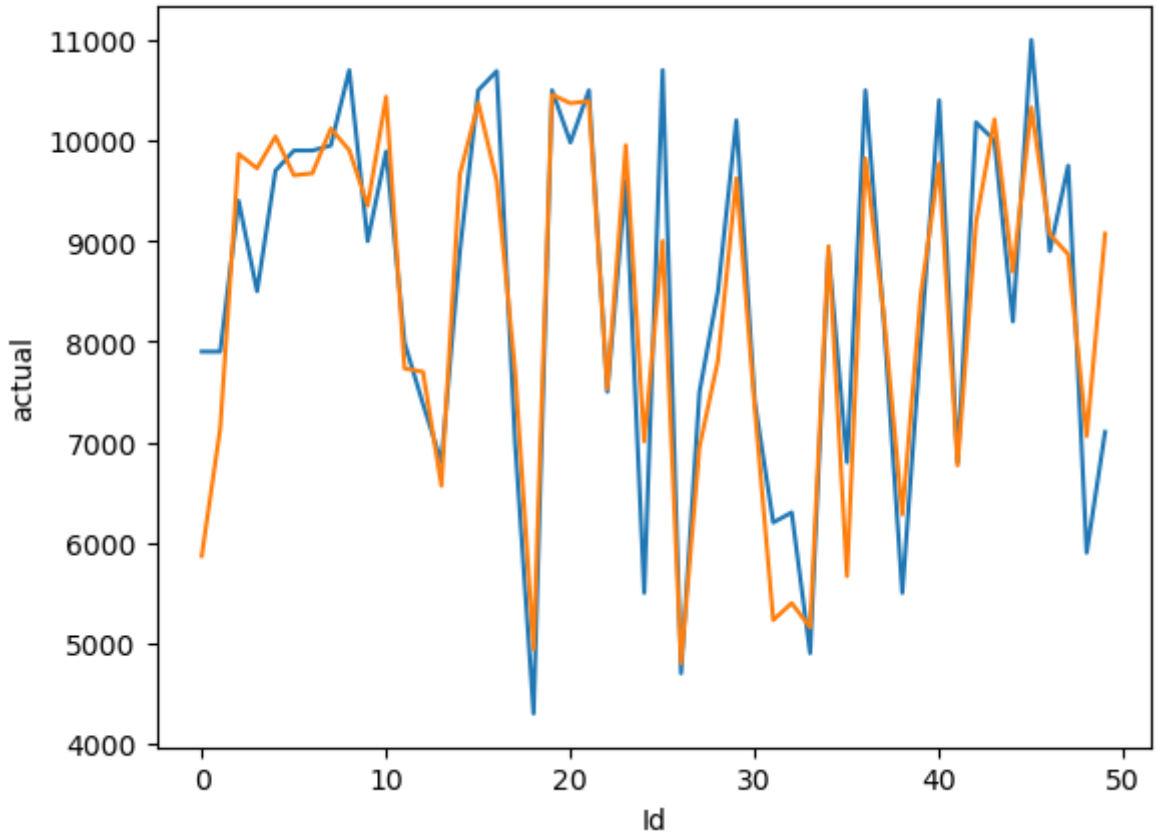
In [13]:
```
Results=pd.DataFrame(columns=['actual','predicted'])
Results['actual']=y_test
Results['predicted']=ypred
Results=Results.reset_index()
Results['Id']=Results.index
Results.head(15)
```

Out[13]:

	index	actual	predicted	Id
0	481	7900	5867.650338	0
1	76	7900	7133.701423	1
2	1502	9400	9866.357762	2
3	669	8500	9723.288745	3
4	1409	9700	10039.591012	4
5	1414	9900	9654.075826	5
6	1089	9900	9673.145630	6
7	1507	9950	10118.707281	7
8	970	10700	9903.859527	8
9	1198	8999	9351.558284	9
10	1088	9890	10434.349636	10
11	576	7990	7732.262557	11
12	965	7380	7698.672401	12
13	1488	6800	6565.952404	13
14	1432	8900	9662.901035	14

In [14]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.lineplot(x='Id',y='actual',data=Results.head(50))
sns.lineplot(x='Id',y='predicted',data=Results.head(50))
plt.plot()
```

Out[14]: []



In [15]:
```
#Ridge Regression
```

In [16]:
```
from sklearn.model_selection import GridSearchCV
from sklearn.linear_model import Ridge
alpha=[1e-15,1e-10,1e-8,1e-4,1e-3,1e-2,1,5,10,20,30]
ridge=Ridge()
parameters={'alpha':alpha}
ridge_regressor=GridSearchCV(ridge,parameters)
ridge_regressor.fit(x_train,y_train)
```

Out[16]:
```
GridSearchCV(estimator=Ridge(),
             param_grid={'alpha': [1e-15, 1e-10, 1e-08, 0.0001, 0.001, 0.01, 1,
                                   5, 10, 20, 30]})
```

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In [17]:
```
ridge_regressor.best_params_
```

Out[17]:
```
{'alpha': 30}
```

In [18]:
```
ridge=Ridge(30)
ridge.fit(x_train,y_train)
y_pred_ridge=ridge.predict(x_test)
```

In [19]:
```
from sklearn.metrics import mean_squared_error#calculating MSE
Ridge_Error=mean_squared_error(y_pred_ridge,y_test)
Ridge_Error
```

Out[19]:
```
579521.7970897449
```

In [20]:
```
from sklearn.metrics import r2_score
r2_score(y_test,y_pred_ridge)
```

Out[20]:
```
0.8421969385523054
```

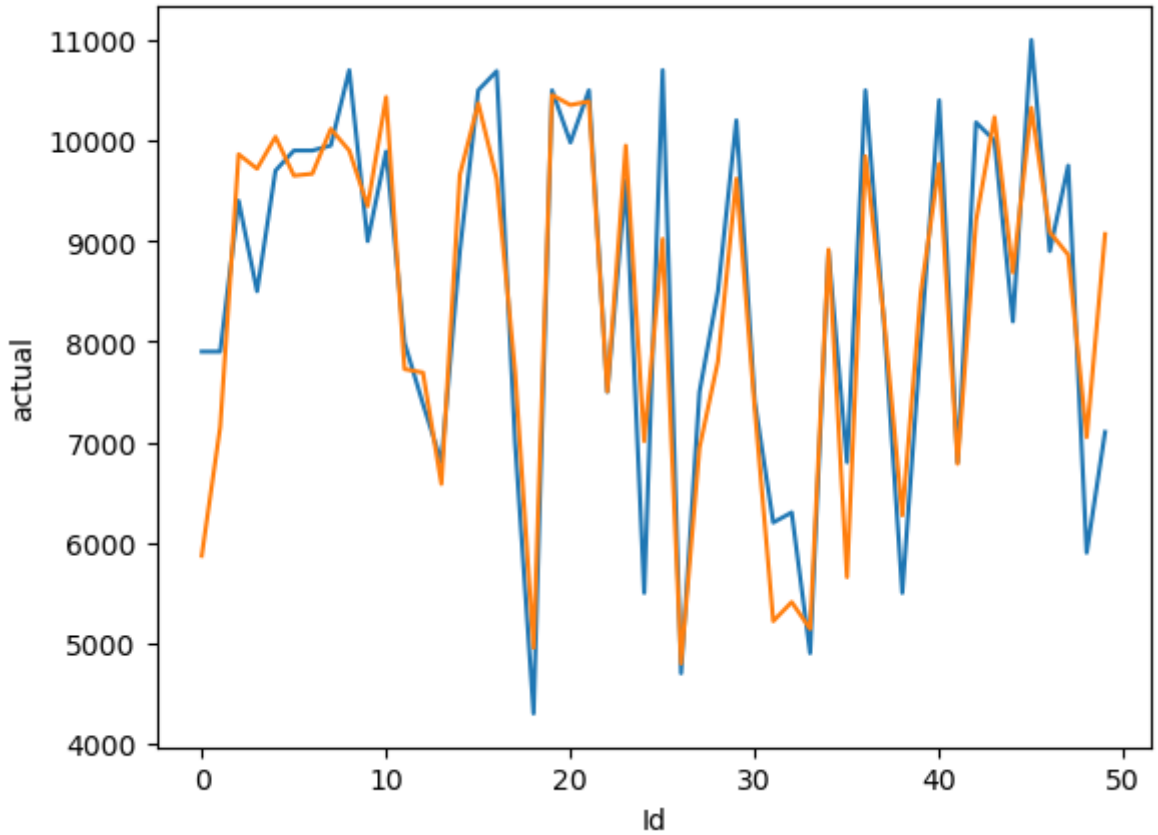
In [21]:
```
Results=pd.DataFrame(columns=['actual','predicted'])
Results['actual']=y_test
Results['predicted']=y_pred_ridge
Results=Results.reset_index()
Results['Id']=Results.index
Results.head(15)
```

Out[21]:

	index	actual	predicted	Id
0	481	7900	5869.741155	0
1	76	7900	7149.563327	1
2	1502	9400	9862.785355	2
3	669	8500	9719.283532	3
4	1409	9700	10035.895686	4
5	1414	9900	9650.311090	5
6	1089	9900	9669.183317	6
7	1507	9950	10115.128380	7
8	970	10700	9900.241944	8
9	1198	8999	9347.080772	9
10	1088	9890	10431.237961	10
11	576	7990	7725.756431	11
12	965	7380	7691.089846	12
13	1488	6800	6583.674680	13
14	1432	8900	9659.240069	14

In [22]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.lineplot(x='Id',y='actual',data=Results.head(50))
sns.lineplot(x='Id',y='predicted',data=Results.head(50))
plt.plot()
```

Out[22]: []



In [23]:
```
#elasticnet
```

In [24]:
```
from sklearn.model_selection import GridSearchCV
from sklearn.linear_model import ElasticNet

elastic = ElasticNet()

parameters = {'alpha': [1e-15, 1e-10, 1e-8, 1e-4, 1e-3,1e-2, 1, 5, 10, 20]}

elastic_regressor = GridSearchCV(elastic, parameters)

elastic_regressor.fit(x_train, y_train)
```

Out[24]:
```
GridSearchCV(estimator=ElasticNet(),
             param_grid={'alpha': [1e-15, 1e-10, 1e-08, 0.0001, 0.001, 0.01, 1,
                                   5, 10, 20]})
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
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In [25]:
```
elastic_regressor.best_params_
```

Out[25]:
```
{'alpha': 0.01}
```

In [26]:
```
elastic=ElasticNet(alpha=0.01)
elastic.fit(x_train,y_train)
y_pred_elastic=elastic.predict(x_test)
```

In [27]:
```
from sklearn.metrics import mean_squared_error#calculating MSE
elastic_Error=mean_squared_error(y_pred_elastic,y_test)
elastic_Error
```

Out[27]:
```
581390.7642825295
```

In [28]:
```
from sklearn.metrics import r2_score
r2_score(y_test,y_pred_elastic)
```

Out[28]:
```
0.841688021120299
```

In [29]:
```
Results=pd.DataFrame(columns=['actual','predicted'])
Results['actual']=y_test
Results['predicted']=y_pred_elastic
Results=Results.reset_index()
Results['Id']=Results.index
Results.head(15)
```

Out[29]:

	index	actual	predicted	Id
0	481	7900	5867.742075	0
1	76	7900	7136.527402	1
2	1502	9400	9865.726723	2
3	669	8500	9722.573593	3
4	1409	9700	10038.936496	4
5	1414	9900	9653.407122	5
6	1089	9900	9672.438692	6
7	1507	9950	10118.075470	7
8	970	10700	9903.219809	8
9	1198	8999	9350.750929	9
10	1088	9890	10433.808937	10
11	576	7990	7731.059127	11
12	965	7380	7697.260395	12
13	1488	6800	6569.177338	13
14	1432	8900	9662.252449	14

In [30]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.lineplot(x='Id',y='actual',data=Results.head(50))
sns.lineplot(x='Id',y='predicted',data=Results.head(50))
plt.plot()
```

Out[30]: []