Part 1:Predict the price of a house

importing the libraries

In [52]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
from sklearn.metrics import r2_score,mean_absolute_error
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression,Lasso,Ridge
from sklearn.tree import DecisionTreeRegressor
from sklearn.svm import SVR
from sklearn.ensemble import RandomForestRegressor,AdaBoostRegressor,GradientBoos
from sklearn.neighbors import KNeighborsRegressor
```

In [2]:
```
df=pd.read_excel('houseprice.xlsx')
df
```

Out[2]:

	Transaction date	House Age	Distance from nearest Metro station (km)	Number of convenience stores	latitude	longitude	Number of bedrooms	House size (sqft)	House price of unit area
0	2012.916667	32.0	84.87882	10	24.98298	121.54024	1	575	37.9
1	2012.916667	19.5	306.59470	9	24.98034	121.53951	2	1240	42.2
2	2013.583333	13.3	561.98450	5	24.98746	121.54391	3	1060	47.3
3	2013.500000	13.3	561.98450	5	24.98746	121.54391	2	875	54.8
4	2012.833333	5.0	390.56840	5	24.97937	121.54245	1	491	43.1
...	...	...	...	...	...	...	...	...	...
409	2013.000000	13.7	4082.01500	0	24.94155	121.50381	3	803	15.4
410	2012.666667	5.6	90.45606	9	24.97433	121.54310	2	1278	50.0
411	2013.250000	18.8	390.96960	7	24.97923	121.53986	1	503	40.6
412	2013.000000	8.1	104.81010	5	24.96674	121.54067	1	597	52.5
413	2013.500000	6.5	90.45606	9	24.97433	121.54310	2	1097	63.9

414 rows × 9 columns

Perform a EDA

In [3]:
```
df.shape
```
Out[3]: (414, 9)

In [4]:
```
df.describe()
```
Out[4]:

	Transaction date	House Age	Distance from nearest Metro station (km)	Number of convenience stores	latitude	longitude	Number of bedrooms	H
count	414.000000	414.000000	414.000000	414.000000	414.000000	414.000000	414.000000	4
mean	2013.148953	17.712560	1083.885689	4.094203	24.969030	121.533361	1.987923	9
std	0.281995	11.392485	1262.109595	2.945562	0.012410	0.015347	0.818875	3
min	2012.666667	0.000000	23.382840	0.000000	24.932070	121.473530	1.000000	4
25%	2012.916667	9.025000	289.324800	1.000000	24.963000	121.528085	1.000000	5
50%	2013.166667	16.100000	492.231300	4.000000	24.971100	121.538630	2.000000	9
75%	2013.416667	28.150000	1454.279000	6.000000	24.977455	121.543305	3.000000	12
max	2013.583333	43.800000	6488.021000	10.000000	25.014590	121.566270	3.000000	15

In [5]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 414 entries, 0 to 413
Data columns (total 9 columns):
 #   Column                                  Non-Null Count  Dtype
---  ------                                  --------------  -----
 0   Transaction date                        414 non-null    float64
 1   House Age                               414 non-null    float64
 2   Distance from nearest Metro station (km) 414 non-null   float64
 3   Number of convenience stores            414 non-null    int64
 4   latitude                                414 non-null    float64
 5   longitude                               414 non-null    float64
 6   Number of bedrooms                      414 non-null    int64
 7   House size (sqft)                       414 non-null    int64
 8   House price of unit area                414 non-null    float64
dtypes: float64(6), int64(3)
memory usage: 29.2 KB
```

In [6]:
```
df.isnull()
```

Out[6]:

	Transaction date	House Age	Distance from nearest Metro station (km)	Number of convenience stores	latitude	longitude	Number of bedrooms	House size (sqft)	House price of unit area
0	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...	...
409	False	False	False	False	False	False	False	False	False
410	False	False	False	False	False	False	False	False	False
411	False	False	False	False	False	False	False	False	False
412	False	False	False	False	False	False	False	False	False
413	False	False	False	False	False	False	False	False	False

414 rows × 9 columns

In [7]:
```
df.isnull().sum()
```

Out[7]:
```
Transaction date                          0
House Age                                 0
Distance from nearest Metro station (km)  0
Number of convenience stores              0
latitude                                  0
longitude                                 0
Number of bedrooms                        0
House size (sqft)                         0
House price of unit area                  0
dtype: int64
```

In [8]:

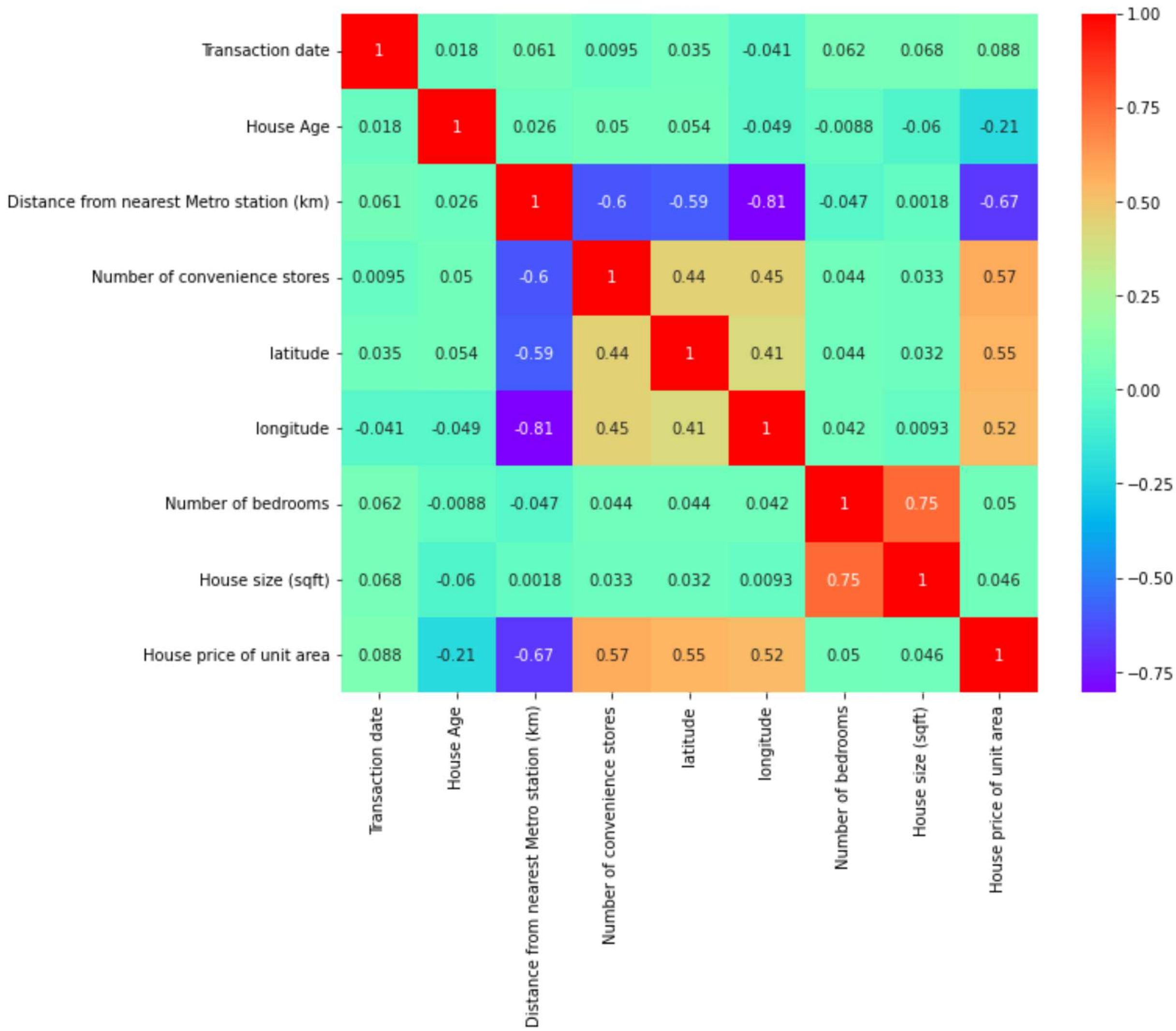
```
df.corr()
```

Out[8]:

	Transaction date	House Age	Distance from nearest Metro station (km)	Number of convenience stores	latitude	longitude	Number of bedrooms	H
Transaction date	1.000000	0.017542	0.060880	0.009544	0.035016	-0.041065	0.061985	0.06
House Age	0.017542	1.000000	0.025622	0.049593	0.054420	-0.048520	-0.008756	-0.06
Distance from nearest Metro station (km)	0.060880	0.025622	1.000000	-0.602519	-0.591067	-0.806317	-0.046856	0.0
Number of convenience stores	0.009544	0.049593	-0.602519	1.000000	0.444143	0.449099	0.043638	0.03
latitude	0.035016	0.054420	-0.591067	0.444143	1.000000	0.412924	0.043921	0.03
longitude	-0.041065	-0.048520	-0.806317	0.449099	0.412924	1.000000	0.041680	0.0
Number of bedrooms	0.061985	-0.008756	-0.046856	0.043638	0.043921	0.041680	1.000000	0.75
House size (sqft)	0.068405	-0.060361	0.001795	0.033286	0.031696	0.009322	0.752276	1.0
House price of unit area	0.087529	-0.210567	-0.673613	0.571005	0.546307	0.523287	0.050265	0.04

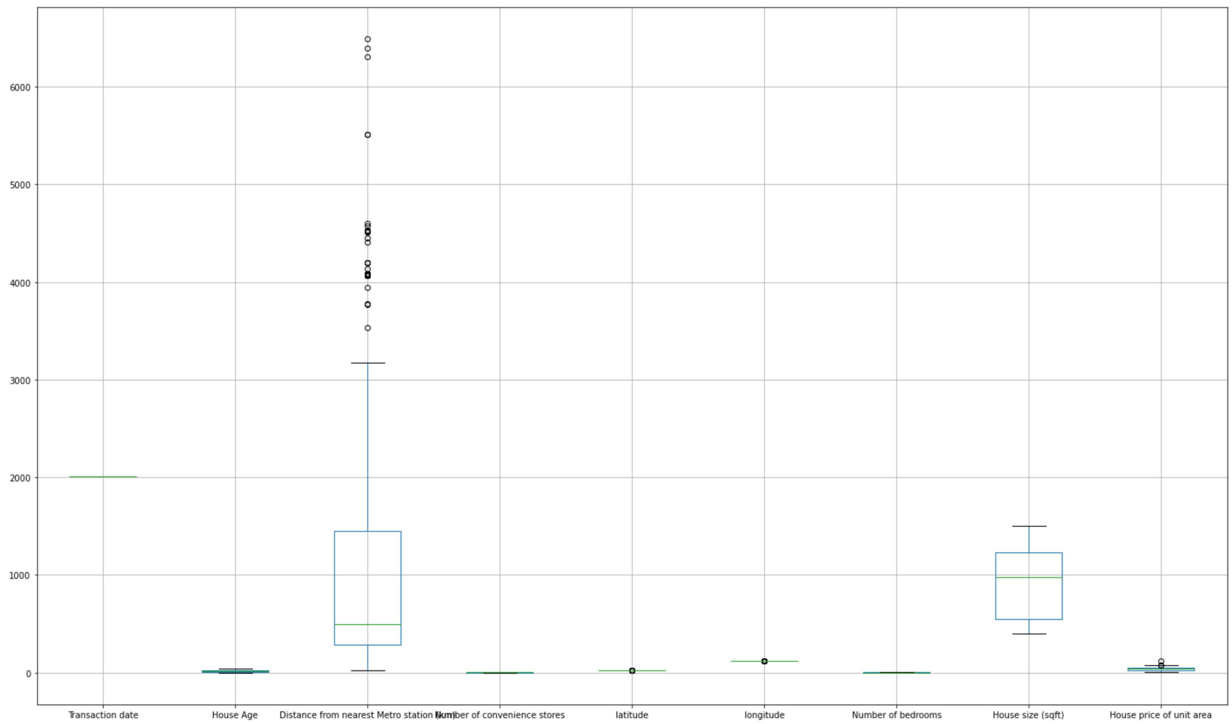
In [9]:
```
plt.figure(figsize=(10,8))
sns.heatmap(df.corr(),annot=True,cmap='rainbow')
```

Out[9]: <AxesSubplot:>



In [10]:
```python
plt.figure(figsize=(25,15))
df.boxplot()
```

Out[10]: <AxesSubplot:>



From the above box plot we say that the variable 'Distance from nearest metro station' contain many outliers so we drop that columns.

In [55]:
```python
df1=df.drop(columns=['Distance from nearest Metro station (km)'])
```

In [56]:
```
x=df1.iloc[:,:-1]
x
```

Out[56]:

	Transaction date	House Age	Number of convenience stores	latitude	longitude	Number of bedrooms	House size (sqft)
0	2012.916667	32.0	10	24.98298	121.54024	1	575
1	2012.916667	19.5	9	24.98034	121.53951	2	1240
2	2013.583333	13.3	5	24.98746	121.54391	3	1060
3	2013.500000	13.3	5	24.98746	121.54391	2	875
4	2012.833333	5.0	5	24.97937	121.54245	1	491
...	...	...	...	...	...	...	...
409	2013.000000	13.7	0	24.94155	121.50381	3	803
410	2012.666667	5.6	9	24.97433	121.54310	2	1278
411	2013.250000	18.8	7	24.97923	121.53986	1	503
412	2013.000000	8.1	5	24.96674	121.54067	1	597
413	2013.500000	6.5	9	24.97433	121.54310	2	1097

414 rows × 7 columns

In [57]:
```
x.shape
```

Out[57]:
```
(414, 7)
```

In [59]:
```
y=df1.iloc[:,-1]
y
```

Out[59]:
```
0      37.9
1      42.2
2      47.3
3      54.8
4      43.1
       ...
409    15.4
410    50.0
411    40.6
412    52.5
413    63.9
Name: House price of unit area, Length: 414, dtype: float64
```

In [60]:
```
y.shape
```

Out[60]:
```
(414,)
```

In [78]:
```
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=10
```

In [80]:
```
x_train.shape
```

Out[80]:
```
(331, 7)
```

In [81]:
```
x_test.shape
```
Out[81]:
```
(83, 7)
```

In [82]:
```
y_train.shape
```
Out[82]:
```
(331,)
```

In [83]:
```
y_test.shape
```
Out[83]:
```
(83,)
```

In [85]:
```
k = 42
models = [LinearRegression(),DecisionTreeRegressor(random_state=k),RandomForestRe
          Ridge(random_state=k),SVR(),AdaBoostRegressor(random_state=k),GradientB
for i in models:
    print(20*'=',i,20*'=')
    model=i
    model.fit(x_train,y_train)
    y_pred=model.predict(x_test)
    print('R^2_Score  :',r2_score(y_test,y_pred))
    print('Mean Absolute Error:' , mean_absolute_error(y_test,y_pred))
    print(70*'*')
```

```
==================== LinearRegression() ====================
R^2_Score  : 0.6348333998620814
Mean Absolute Error: 5.7943206440635295
**********************************************************************
==================== DecisionTreeRegressor(random_state=42) ===================
=
R^2_Score  : 0.6854281647279253
Mean Absolute Error: 5.353012048192771
**********************************************************************
==================== RandomForestRegressor(random_state=42) ===================
=
R^2_Score  : 0.8417226447318275
Mean Absolute Error: 3.7600602409638544
**********************************************************************
==================== Lasso(random_state=42) ====================
R^2_Score  : 0.4988391733969735
Mean Absolute Error: 7.039104412989815
**********************************************************************
==================== Ridge(random_state=42) ====================
R^2_Score  : 0.5246295588465157
Mean Absolute Error: 6.933806861827341
**********************************************************************
==================== SVR() ====================
R^2_Score  : -0.010565565070761673
Mean Absolute Error: 9.821697854756335
**********************************************************************
==================== AdaBoostRegressor(random_state=42) ====================
R^2_Score  : 0.7241076656036954
Mean Absolute Error: 4.999809487777276
**********************************************************************
==================== GradientBoostingRegressor(random_state=42) ===============
=====
R^2_Score  : 0.8396747073035247
Mean Absolute Error: 3.8748143010645912
**********************************************************************
```

So here we can see that Random Forest has mininum mean_absolute_error and highest accuracy so we can say that this is a best model for our problem statment.

In [ ]: