Problem statement

A real estate agent want help to predict the house price for regions in USA.He gave us the dataset to work on to use Linear Regression model.Create a model that hepls to determine

Data collection

Importing libraries

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

Importing dataset

In [2]:

```
data=pd.read_csv(r"C:\Users\user\Downloads\H.csv")
data
```

Out[2]:

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price	Address
0	79545.45857	5.682861	7.009188	4.09	23086.80050	1.059034e+06	208 Michael Ferry Apt. 674\nLaurabury, NE 3701...
1	79248.64245	6.002900	6.730821	3.09	40173.07217	1.505891e+06	188 Johnson Views Suite 079\nLake Kathleen, CA...
2	61287.06718	5.865890	8.512727	5.13	36882.15940	1.058988e+06	9127 Elizabeth Stravenue\nDanieltown, WI 06482...
3	63345.24005	7.188236	5.586729	3.26	34310.24283	1.260617e+06	USS Barnett\nFPO AP 44820
4	59982.19723	5.040555	7.839388	4.23	26354.10947	6.309435e+05	USNS Raymond\nFPO AE 09386
...	...	...	...	...	...	...	...
4995	60567.94414	7.830362	6.137356	3.46	22837.36103	1.060194e+06	USNS Williams\nFPO AP 30153-7653
4996	78491.27543	6.999135	6.576763	4.02	25616.11549	1.482618e+06	PSC 9258, Box 8489\nAPO AA 42991-3352

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price	Address
4997	63390.68689	7.250591	4.805081	2.13	33266.14549	1.030730e+06	4215 Tracy Garden Suite 076\nJoshualand, VA 01...
4998	68001.33124	5.534388	7.130144	5.44	42625.62016	1.198657e+06	USS Wallace\nFPO AE 73316
4999	65510.58180	5.992305	6.792336	4.07	46501.28380	1.298950e+06	37778 George Ridges Apt. 509\nEast Holly, NV 2...

5000 rows × 7 columns

head

In [3]:

```
# to display first 8 dataset values
data.head(8)
```

Out[3]:

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price	Address
0	79545.45857	5.682861	7.009188	4.09	23086.80050	1.059034e+06	208 Michael Ferry Apt. 674\nLaurabury, NE 3701...
1	79248.64245	6.002900	6.730821	3.09	40173.07217	1.505891e+06	188 Johnson Views Suite 079\nLake Kathleen, CA...
2	61287.06718	5.865890	8.512727	5.13	36882.15940	1.058988e+06	9127 Elizabeth Stravenue\nDanieltown, WI 06482...
3	63345.24005	7.188236	5.586729	3.26	34310.24283	1.260617e+06	USS Barnett\nFPO AP 44820
4	59982.19723	5.040555	7.839388	4.23	26354.10947	6.309435e+05	USNS Raymond\nFPO AE 09386
5	80175.75416	4.988408	6.104512	4.04	26748.42842	1.068138e+06	06039 Jennifer Islands Apt. 443\nTracyport, KS...
6	64698.46343	6.025336	8.147760	3.41	60828.24909	1.502056e+06	4759 Daniel Shoals Suite 442\nNguyenburgh, CO ...
7	78394.33928	6.989780	6.620478	2.42	36516.35897	1.573937e+06	972 Joyce Viaduct\nLake William, TN 17778-6483

info

In [4]:

```
# to identify missing values
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5000 entries, 0 to 4999
Data columns (total 7 columns):
 #   Column                        Non-Null Count  Dtype  
---  ------                        --------------  -----  
 0   Avg. Area Income              5000 non-null   float64
 1   Avg. Area House Age           5000 non-null   float64
 2   Avg. Area Number of Rooms     5000 non-null   float64
 3   Avg. Area Number of Bedrooms  5000 non-null   float64
 4   Area Population               5000 non-null   float64
 5   Price                         5000 non-null   float64
 6   Address                       5000 non-null   object 
dtypes: float64(6), object(1)
memory usage: 273.6+ KB
```

describe

In [5]:

```
# to display summary of the dataset
data.describe()
```

Out[5]:

	Avg. Area Income	Avg. Area House Age	Avg. Area Number of Rooms	Avg. Area Number of Bedrooms	Area Population	Price
count	5000.000000	5000.000000	5000.000000	5000.000000	5000.000000	5.000000e+03
mean	68583.108984	5.977222	6.987792	3.981330	36163.516039	1.232073e+06
std	10657.991214	0.991456	1.005833	1.234137	9925.650114	3.531176e+05
min	17796.631190	2.644304	3.236194	2.000000	172.610686	1.593866e+04
25%	61480.562390	5.322283	6.299250	3.140000	29403.928700	9.975771e+05
50%	68804.286405	5.970429	7.002902	4.050000	36199.406690	1.232669e+06
75%	75783.338665	6.650808	7.665871	4.490000	42861.290770	1.471210e+06
max	107701.748400	9.519088	10.759588	6.500000	69621.713380	2.469066e+06

columns

In [6]:

```
# to display headings of the dataset
data.columns
```

Out[6]:

```
Index(['Avg. Area Income', 'Avg. Area House Age', 'Avg. Area Number of Rooms',
       'Avg. Area Number of Bedrooms', 'Area Population', 'Price', 'Address'],
      dtype='object')
```

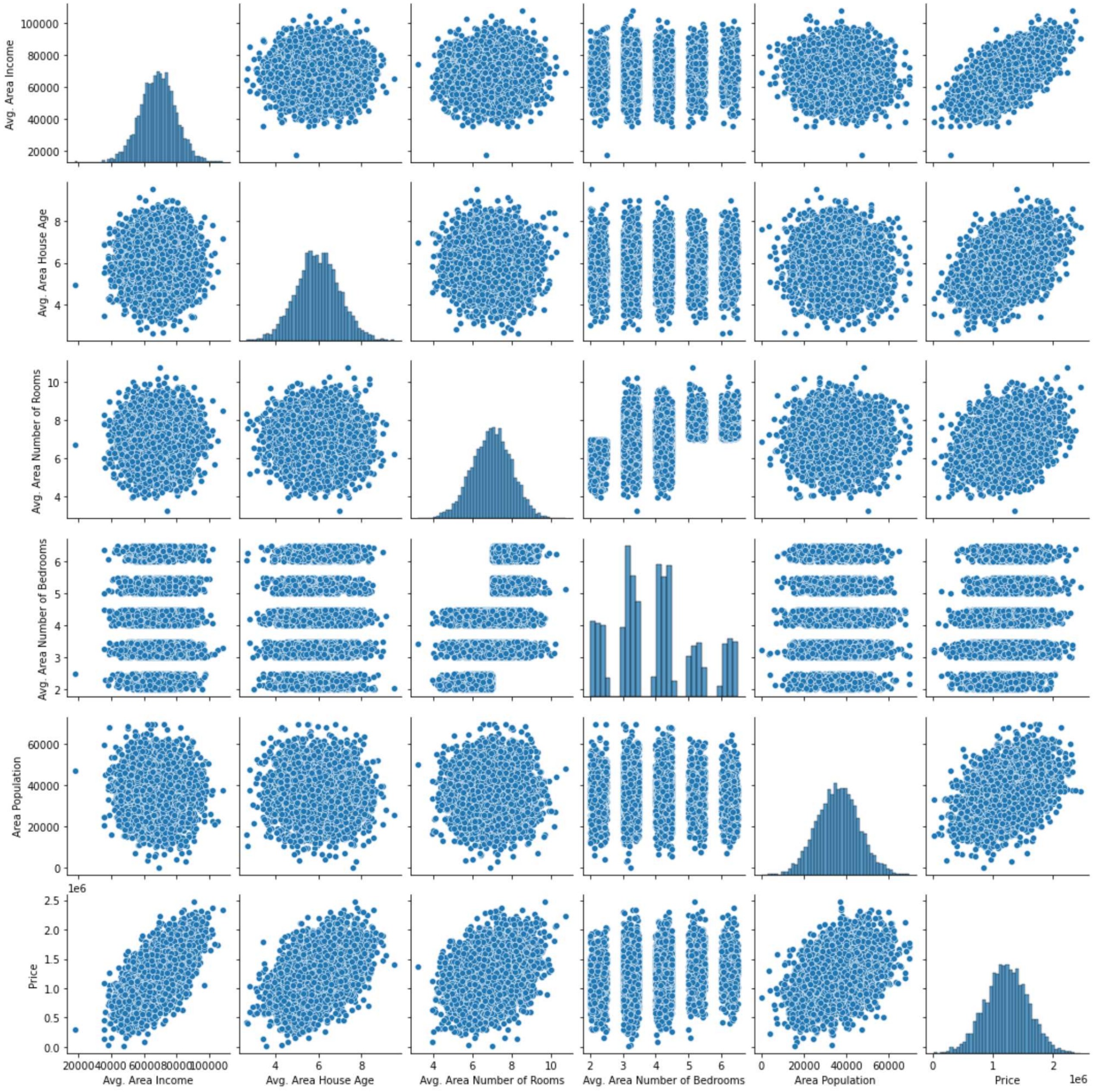
EDA and Visualization

In [7]:

```
sns.pairplot(data)
```

Out[7]:

```
<seaborn.axisgrid.PairGrid at 0x248b465f430>
```



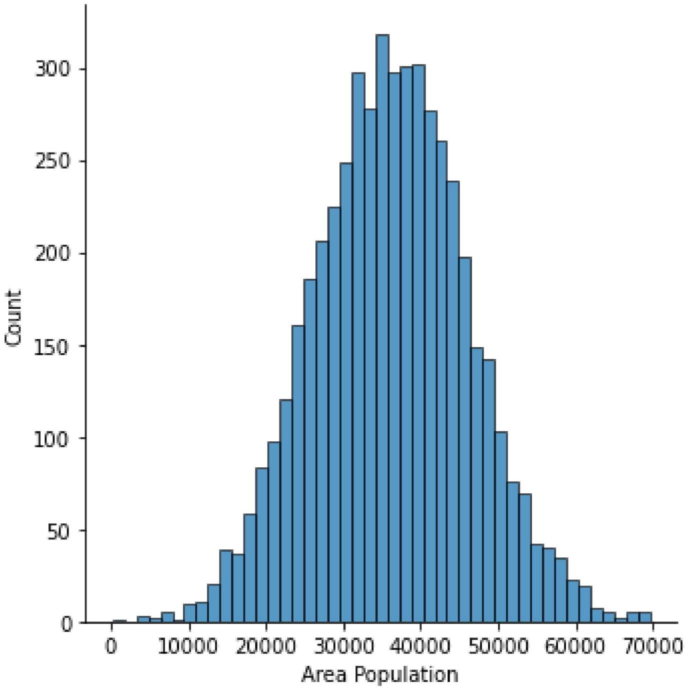
distribution plot

In [8]:

```
sns.displot(data["Area Population"])
```

Out[8]:

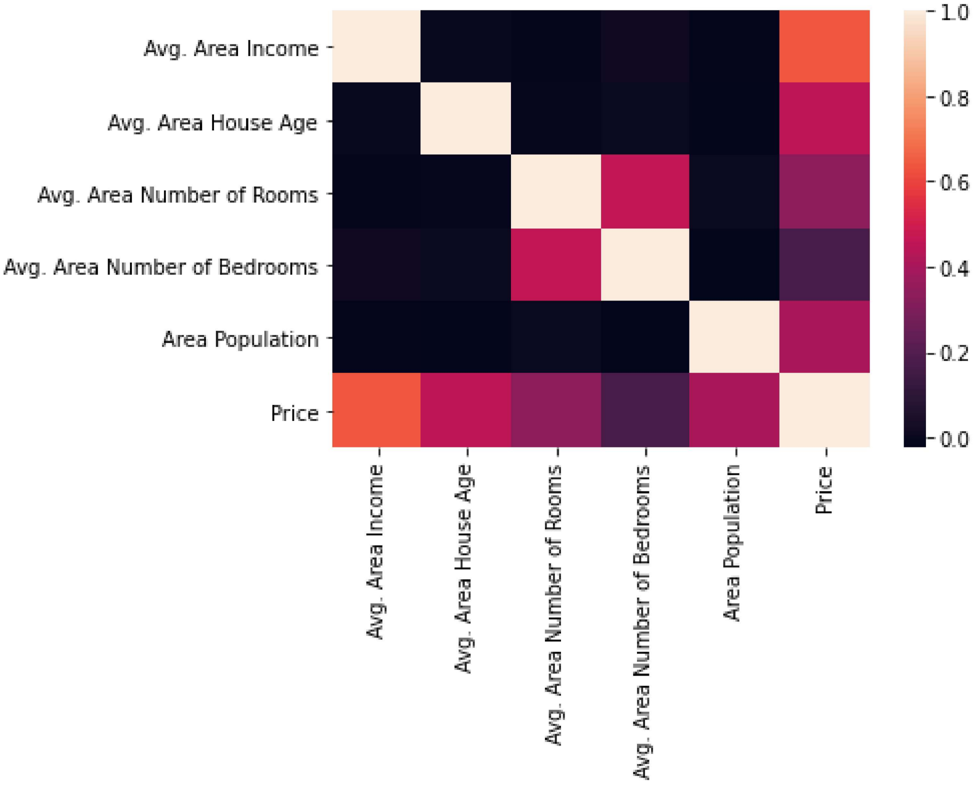
```
<seaborn.axisgrid.FacetGrid at 0x248b465f910>
```



correlation

```
In [9]:
da=data[['Avg. Area Income', 'Avg. Area House Age', 'Avg. Area Number of Rooms',
       'Avg. Area Number of Bedrooms', 'Area Population', 'Price', 'Address']]
sns.heatmap(da.corr())
```

```
Out[9]: <AxesSubplot:>
```



To train the model-Model Building

we are going to train Linear Regression model;we need to split out data into two variables x and y where x is independent variable and y is dependent variable on x (output) we could ignore address column as it is not required for our model

In [10]:

```
x=da[['Avg. Area Income', 'Avg. Area House Age', 'Avg. Area Number of Rooms',
       'Avg. Area Number of Bedrooms', 'Area Population']]
y=da['Price']
```

In [11]:

```
# to split my dataset into training and test data
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)
```

In [12]:

```
from sklearn.linear_model import LinearRegression
lr= LinearRegression()
lr.fit(x_train,y_train)
```

Out[12]:

```
LinearRegression()
```

In [13]:

```
print(lr.intercept_)
```

```
-2637937.5603702217
```

In [14]:

```
coeff=pd.DataFrame(lr.coef_,x.columns,columns=['Co-efficient'])
coeff
```

Out[14]:

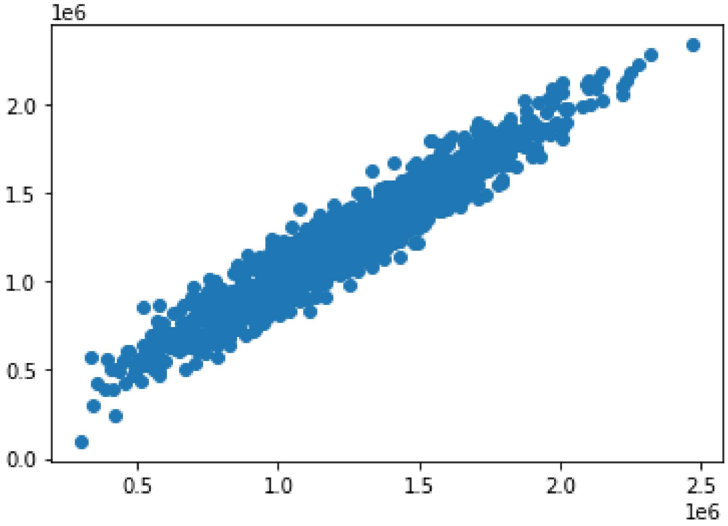
	Co-efficient
Avg. Area Income	21.610966
Avg. Area House Age	165415.423387
Avg. Area Number of Rooms	120901.707576
Avg. Area Number of Bedrooms	920.427999
Area Population	15.232640

In [15]:

```
prediction=lr.predict(x_test)
plt.scatter(y_test,prediction)
```

Out[15]:

```
<matplotlib.collections.PathCollection at 0x248b7791970>
```



In [16]:
```
print(lr.score(x_test,y_test))
```

```
0.9157772232713607
```

In [17]:
```
lr.score(x_train,y_train)
```

Out[17]:
```
0.9188884356053647
```

Ridge regression

In [18]:
```
from sklearn.linear_model import Ridge,Lasso
```

In [21]:
```
rr=Ridge(alpha=10)
rr.fit(x_train,y_train)
rr.score(x_test,y_test)
```

Out[21]:
```
0.9157728251515059
```

In [22]:
```
rr.score(x_train,y_train)
```

Out[22]:
```
0.9188855005670066
```

LaSSO regression

In [26]:
```
la=Lasso(alpha=10)
la.fit(x_train,y_train)
la.score(x_train,y_train)
```

Out[26]:
```
0.9188884339089254
```

In [29]:
```
la.score(x_test,y_test)
```

```
Out[29]: 0.9157768184155307
```

```
In [ ]:
```