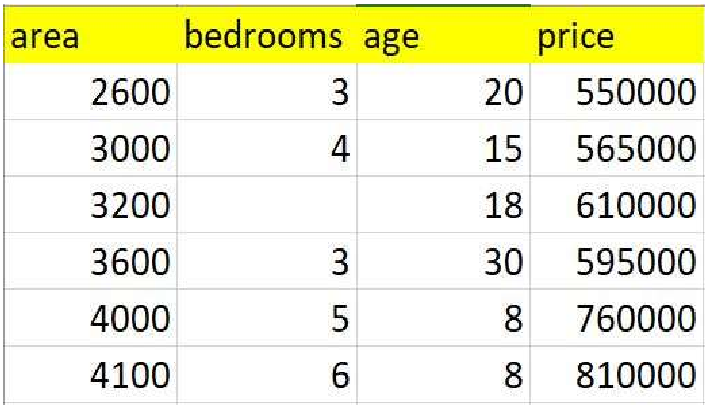
Machine Learning With Python: Linear Regression Multiple Variables

Sample problem of predicting home price in monroe, new jersey (USA)

Below is the table containing home prices in monroe twp, NJ. Here price depends on **area (square feet), bed rooms and age of the home (in years)**. Given these prices we have to predict prices of new homes based on area, bed rooms and age.



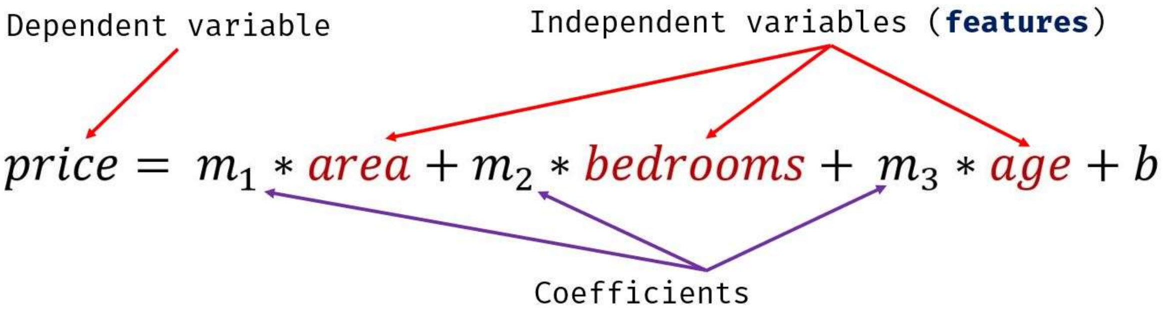
area	bedrooms	age	price
2600	3	20	550000
3000	4	15	565000
3200		18	610000
3600	3	30	595000
4000	5	8	760000
4100	6	8	810000

Given these home prices find out price of a home that has,

3000 sqr ft area, 3 bedrooms, 40 year old

2500 sqr ft area, 4 bedrooms, 5 year old

We will use regression with multiple variables here. Price can be calculated using following equation,



$$price = m_1 * area + m_2 * bedrooms + m_3 * age + b$$

$$y = m_1 x_1 + m_2 x_2 + m_3 x_3 + b$$

Here area, bedrooms, age are called independant variables or **features** whereas price is a dependant variable

In [1]:

```
import pandas as pd
import numpy as np
from sklearn import linear_model
```

In [2]:

```
df = pd.read_csv('homeprices.csv')
df
```

Out[2]:

	area	bedrooms	age	price
0	2600	3.0	20	550000
1	3000	4.0	15	565000
2	3200	NaN	18	610000
3	3600	3.0	30	595000
4	4000	5.0	8	760000
5	4100	6.0	8	810000

Data Preprocessing: Fill NA values with median value of a column

In [3]:

```
df.bedrooms.median()
```

Out[3]:

```
4.0
```

In [4]:

```
df.bedrooms = df.bedrooms.fillna(df.bedrooms.median())
df
```

Out[4]:

	area	bedrooms	age	price
0	2600	3.0	20	550000
1	3000	4.0	15	565000
2	3200	4.0	18	610000
3	3600	3.0	30	595000
4	4000	5.0	8	760000
5	4100	6.0	8	810000

In [6]:

```
reg = linear_model.LinearRegression()
reg.fit(df.drop('price',axis='columns'),df.price)
```

Out[6]:

```
LinearRegression()
```

In [7]:

```
reg.coef_
```

Out[7]:

```
array([  112.06244194, 23388.88007794, -3231.71790863])
```

In [8]:
```
reg.intercept_
```

Out[8]:
```
221323.00186540408
```

Find price of home with 3000 sqr ft area, 3 bedrooms, 40 year old

In [9]:
```
reg.predict([[3000, 3, 40]])
```

```
C:\Users\hp\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning:
X does not have valid feature names, but LinearRegression was fitted with
feature names
  warnings.warn(
```

Out[9]:
```
array([498408.25158031])
```

In [10]:
```
112.06244194*3000 + 23388.88007794*3 + -3231.71790863*40 + 221323.001865403
```

Out[10]:
```
498408.25157402386
```

Find price of home with 2500 sqr ft area, 4 bedrooms, 5 year old

In [11]:
```
reg.predict([[2500, 4, 5]])
```

```
C:\Users\hp\anaconda3\lib\site-packages\sklearn\base.py:450: UserWarning:
X does not have valid feature names, but LinearRegression was fitted with
feature names
  warnings.warn(
```

Out[11]:
```
array([578876.03748933])
```

Exercise

In exercise folder (same level as this notebook on github) there is **hiring.csv**. This file contains hiring statics for a firm such as experience of candidate, his written test score and personal interview score. Based on these 3 factors, HR will decide the salary. Given this data, you need to build a machine learning model for HR department that can help them decide salaries for future candidates. Using this predict salaries for following candidates,

2 yr experience, 9 test score, 6 interview score

12 yr experience, 10 test score, 10 interview score

Answer

53713.86 and 93747.79

In [ ]: