jupyter HP Last Checkpoint: 11/18/2020 (autosaved)

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Not Trusted Python 3

Run Code

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
from IPython.display import display
from sklearn.preprocessing import LabelEncoder, MinMaxScaler, StandardScaler
import pickle
```

In [2]:
```
df = pd.read_csv('housing.data', delim_whitespace=True, header=None)

df.columns = ['CRIM', 'ZN', 'INDUS', 'CHAS', 'NOX', 'RM', 'AGE',
              'DIS', 'RAD', 'TAX', 'PTRATIO', 'B', 'LSTAT', 'MEDV']

df.head()
```

Out[2]:

	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	B	LSTAT	MEDV
0	0.00632	18.0	2.31	0	0.538	6.575	65.2	4.0900	1	296.0	15.3	396.90	4.98	24.0
1	0.02731	0.0	7.07	0	0.469	6.421	78.9	4.9671	2	242.0	17.8	396.90	9.14	21.6
2	0.02729	0.0	7.07	0	0.469	7.185	61.1	4.9671	2	242.0	17.8	392.83	4.03	34.7
3	0.03237	0.0	2.18	0	0.458	6.998	45.8	6.0622	3	222.0	18.7	394.63	2.94	33.4
4	0.06905	0.0	2.18	0	0.458	7.147	54.2	6.0622	3	222.0	18.7	396.90	5.33	36.2

In [3]:
```
df.info()
print('COUNT NO OF NULL IN EACH COLUMN','\n',df.isnull().sum())
```

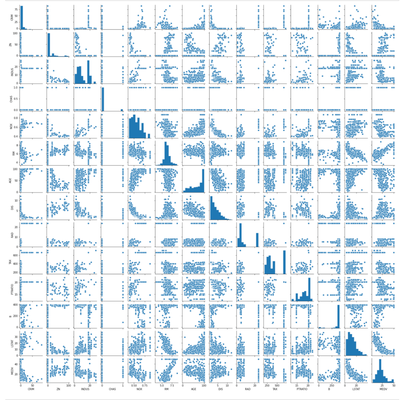
```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 506 entries, 0 to 505
Data columns (total 14 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   CRIM     506 non-null    float64
 1   ZN       506 non-null    float64
 2   INDUS    506 non-null    float64
 3   CHAS     506 non-null    int64
 4   NOX      506 non-null    float64
 5   RM       506 non-null    float64
 6   AGE      506 non-null    float64
 7   DIS      506 non-null    float64
 8   RAD      506 non-null    int64
 9   TAX      506 non-null    float64
 10  PTRATIO  506 non-null    float64
 11  B        506 non-null    float64
 12  LSTAT    506 non-null    float64
 13  MEDV     506 non-null    float64
dtypes: float64(12), int64(2)
memory usage: 55.5 KB
COUNT NO OF NULL IN EACH COLUMN
 CRIM       0
ZN         0
INDUS      0
CHAS       0
NOX        0
RM         0
AGE        0
DIS        0
RAD        0
TAX        0
PTRATIO    0
B          0
LSTAT      0
MEDV       0
dtype: int64
```

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

Out[4]:

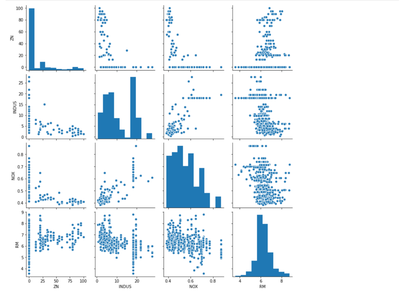
	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	B	
count	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.000000	506.0
mean	3.613524	11.363636	11.136779	0.069170	0.554695	6.284634	68.574901	3.795043	9.549407	408.237154	18.455534	356.674032	12.6
std	8.601545	23.322453	6.860353	0.253994	0.115878	0.702617	28.148861	2.105710	8.707259	168.537116	2.164946	91.294864	7.1
min	0.006320	0.000000	0.460000	0.000000	0.385000	3.561000	2.900000	1.129600	1.000000	187.000000	12.600000	0.320000	1.7
25%	0.082045	0.000000	5.190000	0.000000	0.449000	5.885500	45.025000	2.100175	4.000000	279.000000	17.400000	375.377500	6.9
50%	0.256510	0.000000	9.690000	0.000000	0.538000	6.208500	77.500000	3.207450	5.000000	330.000000	19.050000	391.440000	11.3
75%	3.677082	12.500000	18.100000	0.000000	0.624000	6.623500	94.075000	5.188425	24.000000	666.000000	20.200000	396.225000	16.9
max	88.976200	100.000000	27.740000	1.000000	0.871000	8.780000	100.000000	12.126500	24.000000	711.000000	22.000000	396.900000	37.9

In [5]:
```
sns.pairplot(df, height = 1.5)
plt.show()
```



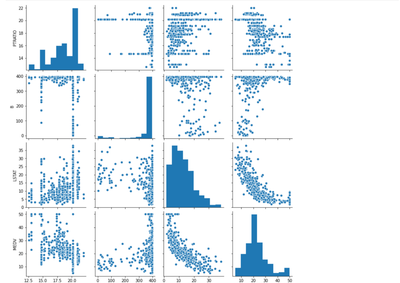
In [6]:
```
col_study = ['ZN', 'INDUS', 'NOX', 'RM']
```

In [7]:
```
sns.pairplot(df[col_study], height=2.5);
plt.show()
```



In [8]:
```
col_study = ['PTRATIO', 'B', 'LSTAT', 'MEDV']
```

In [9]:
```
sns.pairplot(df[col_study], height=2.5);
plt.show()
```



In [10]:
```
plt.figure(figsize=(16,10))
sns.heatmap(df.corr(), annot=True)
plt.show()
```

In [11]:
```
df.corr().nlargest(15,'MEDV')['MEDV']
```

Out[11]:
```
MEDV       1.000000
RM         0.695360
ZN         0.360445
B          0.333461
DIS        0.249929
CHAS       0.175260
AGE       -0.376955
RAD       -0.381626
CRIM      -0.388305
NOX       -0.427321
TAX       -0.468536
INDUS     -0.483725
PTRATIO   -0.507787
LSTAT     -0.737663
Name: MEDV, dtype: float64
```

In [12]:
```
X = df.iloc[:,:-1].values
y = df['MEDV'].values
```

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=42)
```

In [14]:
```
from sklearn.ensemble import RandomForestRegressor

forest = RandomForestRegressor(n_estimators=500, criterion='mse',random_state=42, n_jobs=-1)

forest.fit(X_train, y_train)
```

Out[14]:
```
RandomForestRegressor(n_estimators=500, n_jobs=-1, random_state=42)
```

In [15]:
```
y_train_pred = forest.predict(X_train)

y_test_pred = forest.predict(X_test)
```

In [16]:
```
from sklearn.metrics import mean_squared_error

print('MEAN SQUARED ERROR FOR train: {0:.4f}'.format(mean_squared_error(y_train, y_train_pred)))

print('MEAN SQUARED ERROR FOR TEST: {0:.4f}'.format(mean_squared_error(y_test, y_test_pred)))
```

```
MEAN SQUARED ERROR FOR train: 1.8753
MEAN SQUARED ERROR FOR TEST: 9.3256
```

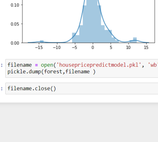
In [17]:
```
from sklearn.metrics import r2_score

print('R^2 FOR train: {0:.4f}'.format(r2_score(y_train, y_train_pred)))

print('R^2 FOR TEST: {0:.4f}'.format(r2_score(y_test, y_test_pred)))
```

```
R^2 FOR train: 0.9787
R^2 FOR TEST: 0.8748
```

In [18]:
```
sns.distplot(y_test-y_test_pred)
plt.show()
```



In [19]:
```
filename = open('housepricepredictmodel.pkl', 'wb')
pickle.dump(forest,filename )
```

In [20]:
```
filename.close()
```