1 波士顿房价预测

In [4]:

```python
from sklearn.datasets import load_boston
from sklearn.model_selection import cross_val_score
from sklearn.tree import DecisionTreeRegressor
```

In [5]:

```python
boston = load_boston()
```

In [6]:

```python
boston
```


```
{'data': array([[6.3200e-03, 1.8000e+01, 2.3100e+00, ..., 1.5300e+01, 3.9690e+02,
         4.9800e+00],
        [2.7310e-02, 0.0000e+00, 7.0700e+00, ..., 1.7800e+01, 3.9690e+02,
         9.1400e+00],
        [2.7290e-02, 0.0000e+00, 7.0700e+00, ..., 1.7800e+01, 3.9283e+02,
         4.0300e+00],
        ...,
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         5.6400e+00],
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        29.8, 13.8, 13.3, 16.7, 12. , 14.6, 21.4, 23. , 23.7, 25. , 21.8,
        20.6, 21.2, 19.1, 20.6, 15.2,  7. ,  8.1, 13.6, 20.1, 21.8, 24.5,
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 'feature_names': array(['CRIM', 'ZN', 'INDUS', 'CHAS', 'NOX', 'RM', 'AGE', 'DIS', 'RAD',
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 'DESCR': ".. _boston_dataset:\n\nBoston house prices dataset\n---------------------------\n\n**Data Set Characteristics:**  \n\n    :Num
ber of Instances: 506 \n\n    :Number of Attributes: 13 numeric/categorical predictive. Median Value (attribute 14) is usually the targe
t.\n\n    :Attribute Information (in order):\n        - CRIM     per capita crime rate by town\n        - ZN       proportion of resident
ial land zoned for lots over 25,000 sq.ft.\n        - INDUS    proportion of non-retail business acres per town\n        - CHAS     Charl
es River dummy variable (= 1 if tract bounds river; 0 otherwise)\n        - NOX      nitric oxides concentration (parts per 10 million)\n
- RM       average number of rooms per dwelling\n        - AGE      proportion of owner-occupied units built prior to 1940\n        - DIS
weighted distances to five Boston employment centres\n        - RAD      index of accessibility to radial highways\n        - TAX      fu
ll-value property-tax rate per $10,000\n        - PTRATIO  pupil-teacher ratio by town\n        - B        1000(Bk - 0.63)^2 where Bk is
the proportion of blacks by town\n        - LSTAT    % lower status of the population\n        - MEDV     Median value of owner-occupied
homes in $1000's\n\n    :Missing Attribute Values: None\n\n    :Creator: Harrison, D. and Rubinfeld, D.L.\n\nThis is a copy of UCI ML hou
sing dataset.\nhttps://archive.ics.uci.edu/ml/machine-learning-databases/housing/\n\n\nThis dataset was taken from the StatLib library wh
ich is maintained at Carnegie Mellon University.\n\nThe Boston house-price data of Harrison, D. and Rubinfeld, D.L. 'Hedonic\nprices and
the demand for clean air', J. Environ. Economics & Management,\nvol.5, 81-102, 1978.   Used in Belsley, Kuh & Welsch, 'Regression diagnos
tics\n...', Wiley, 1980.   N.B. Various transformations are used in the table on\npages 244-261 of the latter.\n\nThe Boston house-price
data has been used in many machine learning papers that address regression\nproblems.   \n     \n.. topic:: References\n\n   - Belsley, K
uh & Welsch, 'Regression diagnostics: Identifying Influential Data and Sources of Collinearity', Wiley, 1980. 244-261.\n   - Quinlan,R.
(1993). Combining Instance-Based and Model-Based Learning. In Proceedings on the Tenth International Conference of Machine Learning, 236-
243, University of Massachusetts, Amherst. Morgan Kaufmann.\n",
 'filename': 'E:\\Anaconda3\\lib\\site-packages\\sklearn\\datasets\\data\\boston_house_prices.csv'}
```

In [7]:

```
boston.data
```

```
array([[6.3200e-03, 1.8000e+01, 2.3100e+00, ..., 1.5300e+01, 3.9690e+02,
        4.9800e+00],
       [2.7310e-02, 0.0000e+00, 7.0700e+00, ..., 1.7800e+01, 3.9690e+02,
        9.1400e+00],
       [2.7290e-02, 0.0000e+00, 7.0700e+00, ..., 1.7800e+01, 3.9283e+02,
        4.0300e+00],
       ...,
       [6.0760e-02, 0.0000e+00, 1.1930e+01, ..., 2.1000e+01, 3.9690e+02,
        5.6400e+00],
       [1.0959e-01, 0.0000e+00, 1.1930e+01, ..., 2.1000e+01, 3.9345e+02,
        6.4800e+00],
       [4.7410e-02, 0.0000e+00, 1.1930e+01, ..., 2.1000e+01, 3.9690e+02,
        7.8800e+00]])
```

In [8]:

```
boston.target
```

```
array([24. , 21.6, 34.7, 33.4, 36.2, 28.7, 22.9, 27.1, 16.5, 18.9, 15. ,
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       21.2, 19.3, 20. , 16.6, 14.4, 19.4, 19.7, 20.5, 25. , 23.4, 18.9,
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       23.6, 28.7, 22.6, 22. , 22.9, 25. , 20.6, 28.4, 21.4, 38.7, 43.8,
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       23.1, 19.7, 18.3, 21.2, 17.5, 16.8, 22.4, 20.6, 23.9, 22. , 11.9])
```

In [15]:

```
regressor = DecisionTreeRegressor(random_state=0) #实例化
# 传入完整数据，自动划分和循环
# 默认返回R平方,越接近1越好,有正有负
cross_val_score(regressor, boston.data, boston.target, cv=10)
```

```
array([ 0.48141081,  0.60461936, -1.32633384,  0.54154398,  0.75705408,
        0.33934083,  0.18757206,  0.40679147, -1.9602183 , -0.32967889])
```

In [14]:

```
# 使用负均方误差,去掉负号就是均方误差
cross_val_score(regressor, boston.data, boston.target, cv=10,scoring = "neg_mean_squared_error")
```

```
array([-18.08941176, -10.61843137, -16.31843137, -44.97803922,
       -17.12509804, -49.71509804, -12.9986    , -88.4514    ,
       -55.7914    , -25.0816    ])
```

In [17]:

```
# 求个平均
cross_val_score(regressor, boston.data, boston.target, cv=10,scoring = "neg_mean_squared_error").mean()
```

```
-33.91675098039215
```

In [ ]: