

9.3 实例:解析法实现一元线性回归

#### ■ 房屋销售记录

序号	面积 (平方米)	销售价格 (万元)	序号	面积 (平方米)	销售价格 (万元)
1	137.97	145.00	9	106.69	62.00
2	104.50	110.00	10	138.05	133.00
3	100.00	93.00	11	53.75	51.00
4	124.32	116.00	12	46.91	45.00
5	79.20	65.32	13	68.00	78.50
6	99.00	104.00	14	63.02	69.65
7	124.00	118.00	15	81.26	75.69
8	114.00	91.00	16	86.21	95.30

□ 加载样本数据: x, y

□ 学习模型: 计算w,b

$$w = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2}$$

$$b = \bar{y} - w\bar{x}$$

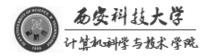
#### ■ 待评估的房屋面积

[128.15, 45.00, 141.43, 106.27, 99.00, 53.84, 85.36, 70.00]

### □ 预测房价

$$\hat{y} = wx + b$$

- □ 导入库,设置字体
- □ 加载样本数据



回归问题

### 9.3 实例:解析法实现一元线性回归



### ■ 学习模型——计算 w, b

In [3]: meanX=tf.reduce mean(x) meanY=tf.reduce mean(v) sumXY=tf.reduce sum((x-meanX)\*(y-meanY)) sumX=tf.reduce sum((x-meanX)\*(x-meanX)) w=sumXY/sumX b= meanY-w\*meanX

$$w = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2}$$

$$b = \bar{y} - w\bar{x}$$

In [4]: print("权值w=", w. numpy(), "\n偏置值b=", b. numpy()) print("线性模型:y=", w. numpy(), "\*x+", b. numpy())

> 权值w= 0.8945604 偏置值b= 5.4108505 线性模型:y= 0.8945604 \*x+ 5.4108505





## □ 预测房价

```
In [5]:
        x_test=np.array([128.15, 45.00, 141.43, 106.27, 99.00, 53.84, 85.36, 70.00])
        y pred=(w*x test+b).numpy()
In [6]:
        print("面积\t估计房价")
        n=len(x test)
         for i in range(n):
             print(x test[i], "\t", round(y pred[i], 2))
                估计房价
         面积
         128, 15
                 120, 05
        45.0
                 45, 67
        141, 43
                 131, 93
        106, 27
                 100, 48
        99.0
                 93.97
        53.84
                 53, 57
        85, 36
                 81.77
        70.0
                 68, 03
```



回归问题



# □ 数据和模型可视化

```
plt.figure()
In [7]:
        plt. scatter(x, y, color="red", label="销售记录")
        plt. scatter(x test, y pred, color="blue", label="预测房价")
        plt.plot(x test, v pred, color="green", label="拟合直线", linewidth=2)
        plt. xlabel("面积(平方米)", fontsize=14)
        plt. vlabel("价格(万元)", fontsize=14)
        plt. xlim((40, 150))
        plt. ylim((40, 150))
                                                                价格(万元)
        plt. suptitle("商品房销售价格评估系统v1.0", fontsize=20)
        plt. legend(loc="upper left")
        plt. show()
```

