机器学习第二次作业

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2024 年 3 月 18 日

1 ROC 曲线

```python
import numpy as np
import matplotlib.pyplot as plt
tt=[[0,0,1],[0,1,0],[1,0,0],[0,0,1],[1,0,0],[0,1,0],[0,1,0],[0,1,0],[0,0,1],[0,1,0]]
pp
    =[[0.1,0.2,0.7],[0.1,0.6,0.3],[0.5,0.2,0.3],[0.1,0.1,0.8],[0.4,0.2,0.4],[0.6,0.3,0.1],[0.4,0.2,0.4],[0.4,0.1,0.5],[
for i in range(3):
    aa=[]
    for j in range(len(pp)):#获取预测值
        aa.append(pp[j][i])
    aa.sort(reverse=True)
    TPR = []
    FPR = []
    for k in aa:
        tp = 0
        fn = 0
        fp = 0
        tn = 0
        for a in range(len(pp)):
            if (tt[a][i] == 1) and (pp[a][i] >= k):
                tp = tp + 1
            elif (tt[a][i] == 1) and (pp[a][i] < k):
                fn = fn + 1
            elif (tt[a][i] == 0) and (pp[a][i] >= k):
                fp = fp + 1
            elif (tt[a][i] == 0) and (pp[a][i] < k):
                tn = tn + 1
        x = float(tp) / (tp + fn)
        fpr = float(fp) / (tn + fp)
        TPR.append(x)
        FPR.append(fpr)
```

```python
    plt.figure(figsize=(5, 5))
    filename = f'Class {i+1} ROC curve.jpg'
    plt.title(filename, fontsize=16)
    plt.plot(FPR, TPR)
    plt.plot(FPR, TPR, 'ro')
    plt.xlabel("FPR", fontsize=16)
    plt.ylabel('TPR', fontsize=16)

    plt.savefig(filename) # 保存为JPG格式
    plt.show()

tt=np.array(tt).reshape(1,-1)[0]
pp=np.array(pp).reshape(1,-1)[0]
pp.sort()
pp = pp[::-1]
TPR = []
FPR = []
for k in pp:
    tp = 0
    fn = 0
    fp = 0
    tn = 0
    for a in range(len(pp)):
        if (tt[a]== 1) and (pp[a] >= k):
            tp = tp + 1
        elif (tt[a] == 1) and (pp[a] < k):
            fn = fn + 1
        elif (tt[a]== 0) and (pp[a] >= k):
            fp = fp + 1
        elif (tt[a] == 0) and (pp[a] < k):
            tn = tn + 1
    x = float(tp) / (tp + fn)
    fpr = float(fp) / (tn + fp)
    TPR.append(x)
    FPR.append(fpr)
plt.figure(figsize=(5, 5))
plt.title('Micro ROC curve', fontsize=16)
plt.plot(FPR, TPR)
plt.plot(FPR, TPR, 'ro')
plt.xlabel("FPR", fontsize=16)
plt.ylabel('TPR', fontsize=16)
plt.savefig('Micro ROC curve.jpg') # 保存为JPG格式
plt.show()
```
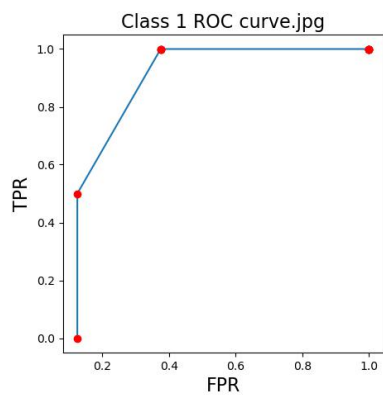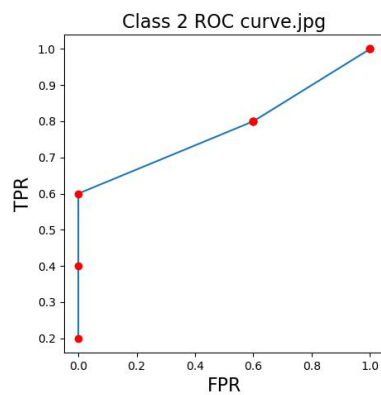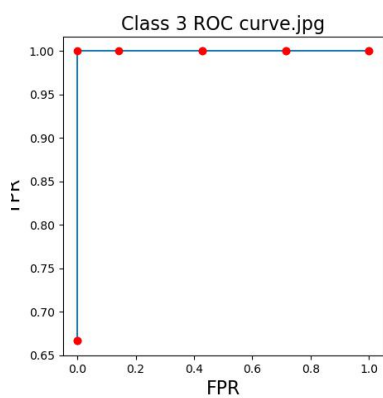
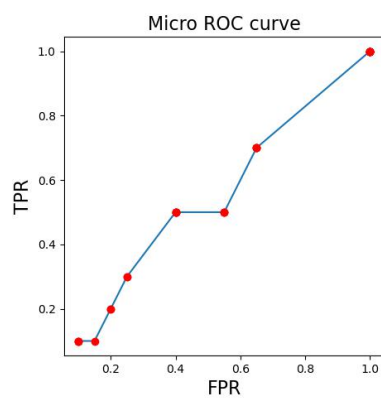图 1: Class 1 ROC curv

图 2: Class 2 ROC curve

图 3: Class 3 ROC curve

图 4: Micro ROC curve