

# 机器学习第二次作业

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## 1 ROC 曲线

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1 import numpy as np
2 import matplotlib.pyplot as plt
3 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]]
4 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],[
5 for i in range(3):
6     aa=[]
7     for j in range(len(pp)):#获取预测值
8         aa.append(pp[j][i])
9     aa.sort(reverse=True)
10    TPR = []
11    FPR = []
12    for k in aa:
13        tp = 0
14        fn = 0
15        fp = 0
16        tn = 0
17        for a in range(len(pp)):
18            if (tt[a][i] == 1) and (pp[a][i] >= k):
19                tp = tp + 1
20            elif (tt[a][i] == 1) and (pp[a][i] < k):
21                fn = fn + 1
22            elif (tt[a][i] == 0) and (pp[a][i] >= k):
23                fp = fp + 1
24            elif (tt[a][i] == 0) and (pp[a][i] < k):
25                tn = tn + 1
26        x = float(tp) / (tp + fn)
27        fpr = float(fp) / (tn + fp)
28        TPR.append(x)
29        FPR.append(fpr)
```

```

30 plt.figure(figsize=(5, 5))
31 filename = f'Class {i+1} ROC curve.jpg'
32 plt.title(filename, fontsize=16)
33 plt.plot(FPR, TPR)
34 plt.plot(FPR, TPR, 'ro')
35 plt.xlabel("FPR", fontsize=16)
36 plt.ylabel('TPR', fontsize=16)
37
38 plt.savefig(filename) # 保存为JPG格式
39 plt.show()
40
41 tt=np.array(tt).reshape(1,-1)[0]
42 pp=np.array(pp).reshape(1,-1)[0]
43 pp.sort()
44 pp = pp[::-1]
45 TPR = []
46 FPR = []
47 for k in pp:
48     tp = 0
49     fn = 0
50     fp = 0
51     tn = 0
52     for a in range(len(pp)):
53         if (tt[a]== 1) and (pp[a] >= k):
54             tp = tp + 1
55         elif (tt[a] == 1) and (pp[a] < k):
56             fn = fn + 1
57         elif (tt[a]== 0) and (pp[a] >= k):
58             fp = fp + 1
59         elif (tt[a] == 0) and (pp[a] < k):
60             tn = tn + 1
61     x = float(tp) / (tp + fn)
62     fpr = float(fp) / (tn + fp)
63     TPR.append(x)
64     FPR.append(fpr)
65 plt.figure(figsize=(5, 5))
66 plt.title('Micro ROC curve', fontsize=16)
67 plt.plot(FPR, TPR)
68 plt.plot(FPR, TPR, 'ro')
69 plt.xlabel("FPR", fontsize=16)
70 plt.ylabel('TPR', fontsize=16)
71 plt.savefig('Micro ROC curve.jpg') # 保存为JPG格式
72 plt.show()

```

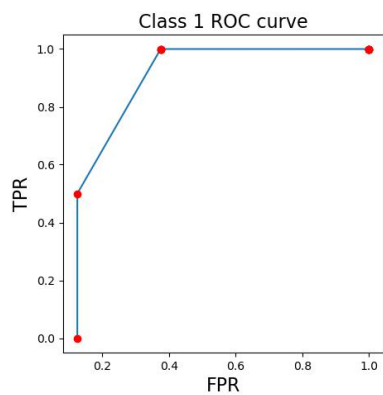


图 1: Class 1 ROC curve

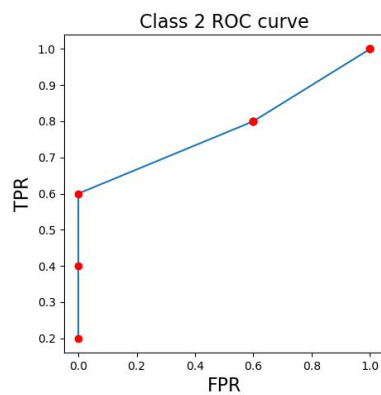


图 2: Class 2 ROC curve

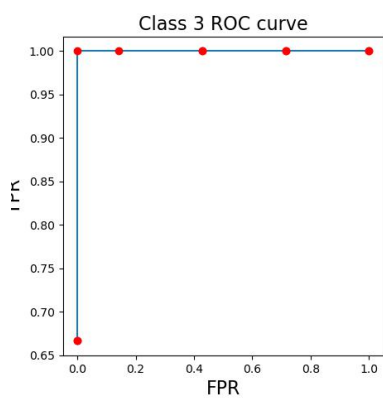


图 3: Class 3 ROC curve

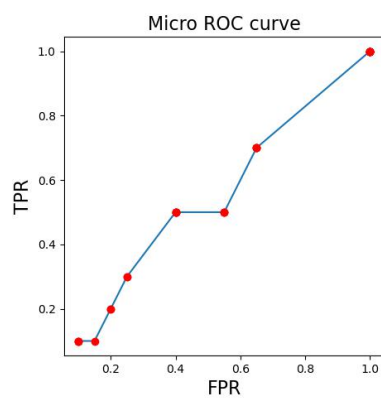


图 4: Micro ROC curve