作业2-2 报告

本次作业分为两部分：

1. 绘制两班成绩的直方图
    - "histo.py"脚本
2. 绘制两班成绩的分位数图
    - "qq.py"脚本

程序说明：

绘制直方图

1. 将两班的工数成绩填入两个数组内
2. 对数据做处理

    对成绩数据进行排序

    ```
    classAResults.sort()
    classBResults.sort()
    ```

    分别求得两个班中每个成绩出现的频数，存入字典内

    ```
    # 获得每个成绩出现的频数
    classAResultsCount = {}
    classBResultsCount = {}
    for ra in classAResults:
        classAResultsCount[ra] = classAResultsCount.get(ra,0)+1
    for rb in classBResults:
        classBResultsCount[rb] = classBResultsCount.get(rb,0)+1
    ```

3. 绘制直方图

    设置图例坐标、尺度等属性

```
maxPeople = 7
bins = np.arange(0,20)
plt.xticks(bins)
plt.xlim(minResult-1,maxResult+1)
plt.ylim(0,maxPeople)
```

为每个成绩绘制一个矩形，其宽度为一个单位长度，高为该成绩出现的次数。

将两组成绩的频数分布绘制在一个图中，用不同颜色表示：黄色为A班，蓝色为B班。

```
for rac in classAResultsCount.keys():
rap = plt.axvspan(rac - 0.5, rac + 0.5, ymin = 0, ymax = 1.0*classAResultsCoun
t[rac]/maxPeople, fc = 'yellow', ec = 'black', alpha = 0.3, label='classA')

for rbc in classBResultsCount.keys():
    rbp = plt.axvspan(rbc - 0.5, rbc + 0.5, ymin = 0, ymax = 1.0*classBResults
Count[rbc]/maxPeople, fc = 'blue', ec = 'black', alpha = 0.3, label='classB')
```

设置图题，图例等属性

```
plt.legend(handles=[rap,rbp], loc = 'upper right')
plt.title('Math-Midterm-Results')
plt.xlabel('Score')
plt.ylabel('Number of Students')
```

绘制分位数图

1. 将两班的工数成绩填入两个数组内
2. 对数据做处理

   对成绩数据进行排序

```
classAResults.sort()
classBResults.sort()
```

分别求得两个班中每个成绩出现的频数，存入字典内

```
# 获得每个成绩出现的频数
classAResultsCount = {}
classBResultsCount = {}
for ra in classAResults:
    classAResultsCount[ra] = classAResultsCount.get(ra,0)+1
for rb in classBResults:
    classBResultsCount[rb] = classBResultsCount.get(rb,0)+1
```

计算每个成绩对应的fi

```
classAResultsQuartile = {}
classBResultsQuartile = {}
temp = 0;
for rac in classAResultsCount.keys():
    theCount = classAResultsCount.get(rac)
    temp = temp + theCount
    classAResultsQuartile[rac] = (temp-0.5)/len(classAResults)
temp = 0
for rbc in classBResultsCount.keys():
    theCount = classBResultsCount.get(rbc)
    temp = temp + theCount
    classBResultsQuartile[rbc] = (temp-0.5)/len(classBResults)
```

求得分位数点

```
classAQ1 = getPercentageValue(classAResults,0.25)
classAMiddle = getPercentageValue(classAResults,0.5)
classAQ3 = getPercentageValue(classAResults,0.75)

classBQ1 = getPercentageValue(classBResults,0.25)
classBMiddle = getPercentageValue(classBResults,0.5)
classBQ3 = getPercentageValue(classBResults,0.75)
```

3. 绘制分位数图

设置图标大小，将图分为两个，分别绘制A班和B班的分位数图

```
plt.figure(figsize=(10,8))
classaFig = plt.subplot(211)
classaFig.set_xlim([0, 1])
classaFig.set_ylim([minResult-1, maxResult+1])
classbFig = plt.subplot(212)
classbFig.set_xlim([0, 1])
classbFig.set_ylim([minResult-1, maxResult+1])
```

绘制A班的分位数图

```
plt.sca(classaFig)
plt.title('class A')
plt.xlabel('f value')
plt.ylabel('Score')
plt.subplots_adjust(hspace = 0.3)
for x in classAResultsQuartile.keys():
    if x == classAQ1:
        classaFig.plot(classAResultsQuartile[x], x, 'r*')
    elif x == classAMiddle:
        classaFig.plot(classAResultsQuartile[x], x, 'r*')
    elif x == classAQ3:
        classaFig.plot(classAResultsQuartile[x], x, 'r*')
    else:
        classaFig.plot(classAResultsQuartile[x], x, 'co')
```

绘制B班的分位数图

```
plt.sca(classbFig)
plt.title('class B')
plt.xlabel('f value')
plt.ylabel('Score')
for x in classBResultsQuartile.keys():
    if x == classBQ1:
        classbFig.plot(classBResultsQuartile[x], x, 'r*')
    elif x == classBMiddle:
        classbFig.plot(classBResultsQuartile[x], x, 'r*')
    elif x == classBQ3:
        classbFig.plot(classBResultsQuartile[x], x, 'r*')
    else:
        classbFig.plot(classBResultsQuartile[x], x, 'co')
```

作业成果展示截图：

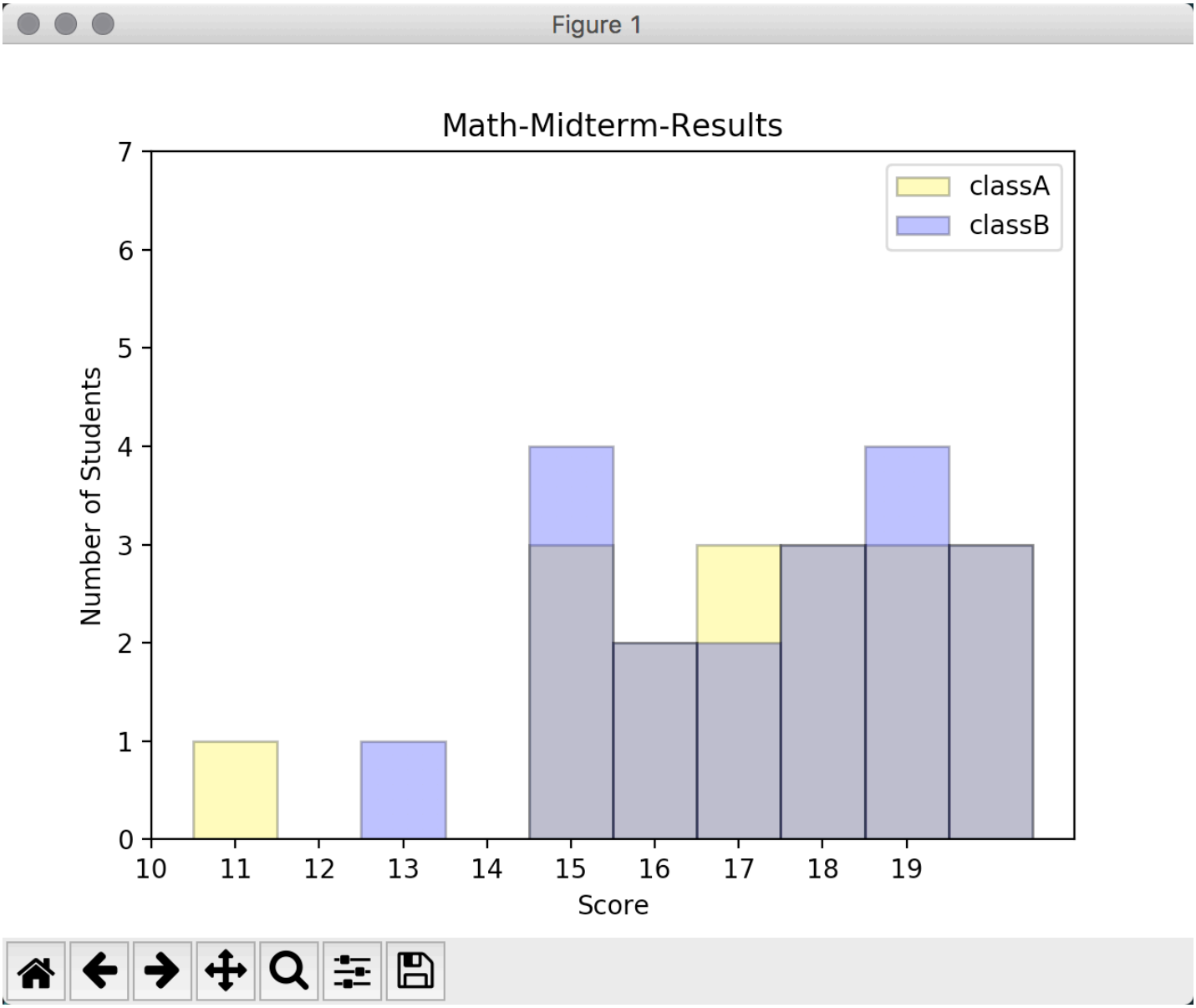
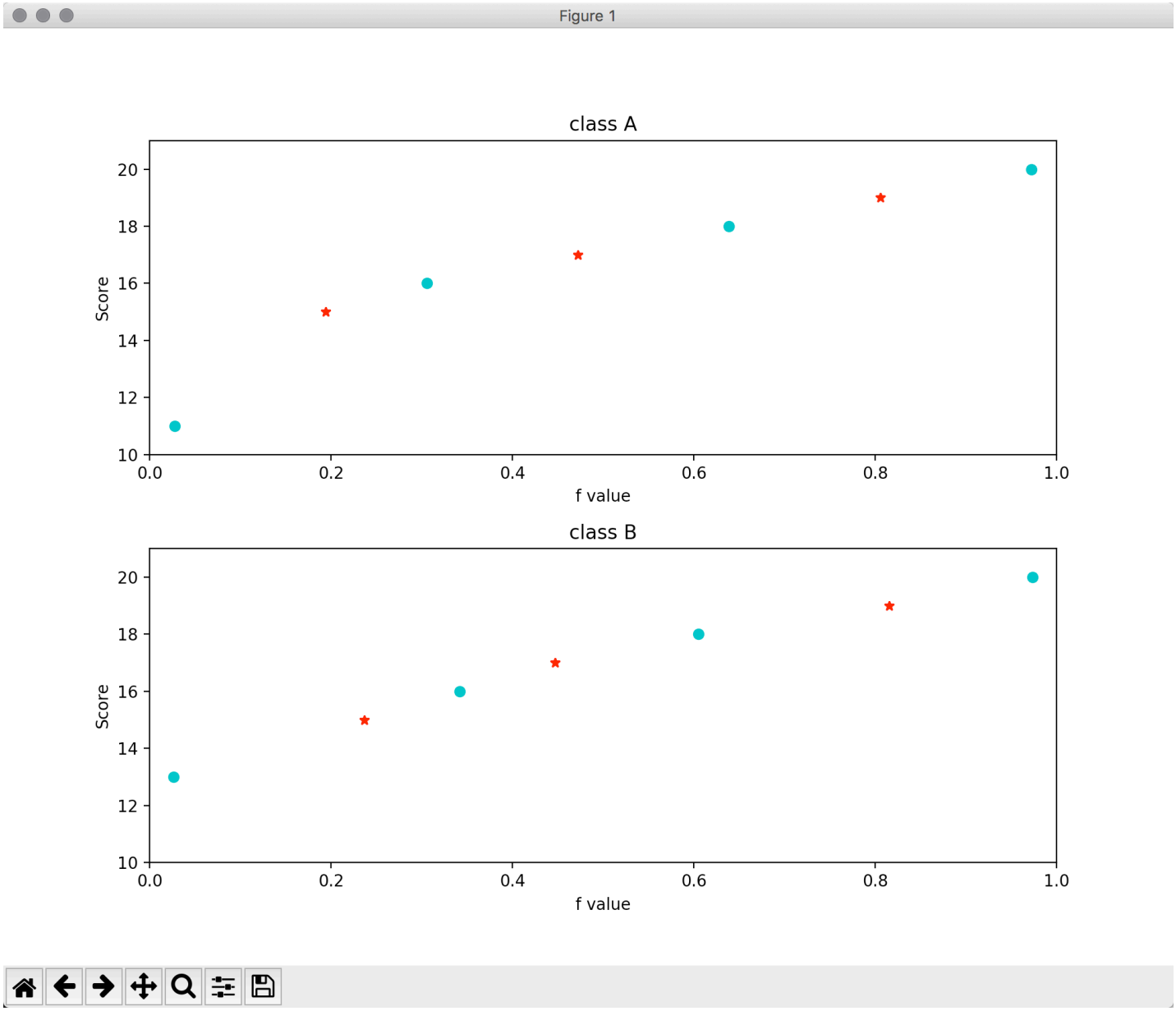


Figure 1
Math-Midterm-Results
classA
classB
Number of Students
Score
0
1
2
3
4
5
6
7
10
11
12
13
14
15
16
17
18
19

直方图绘制结果



分位数图绘制结果