

# CSC148 Worksheet 7 Solution

Hyungmo Gu

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## Question 1

- Noticed that there are 11 students in total.
- Students should be grouped by year as closest as possible.

Notes:

- 형모 해낼 뚝 있쥬!
- 형모 화이팅!

## Question 2

Name	Year	College	
Priya	3	Victoria	Group 1
Alain	2	New	
Zoe	3	Woodsworth	
Francesco	3	Victoria	
Mohammed	4	Woodsworth	Group 2
Xiaoyuan	5	New	
Rohit	2	New	
Yimin	3	Trinity	
Grace	5	Woodsworth	Group 3
Claire	1	Woodsworth	
Kai	1	Woodsworth	

## Question 3

- First, we need to find the group as homogenous as possible in terms of year students are in.

The definition tells us group needs to be in 4, and the following table tell us there are 4 3<sup>rd</sup> year students.

Student Year	Number of Students
1	2
2	2
3	4
4	1
5	2

It follows from these facts that the group of 3<sup>rd</sup> year students best satisfy this criterion.

Next, we need to find the group as not homogenous as possible in terms of year students are in.

The same table tells us with 2 5<sup>th</sup> year students, 1 4<sup>th</sup> year students and 1 3<sup>rd</sup> year student, a group spanning 3 years can be created.

Since we know there can't be a group spanning 4 years, we can conclude the group of 3 years (2 5<sup>th</sup> year students, 1 4<sup>th</sup> year students and 1 3<sup>rd</sup> year student) best satisfy this criterion.

## Question 4

- We will calculate the group score based on the code below. The code is also included in *worksheet\_7\_q4\_solution.py*

```
1  def get_group_score(group):
2      """Evaluates the group score
3
4          Precondition: len(group) == 4
5      """
6      n = 4
7
8      max_year = get_max_year(group)
9      min_year = get_min_year(group)
10     similarity_list = []
11
12     i = 0
13
14     while i < 4:
15         j = 0
16         while j < 4:
17             # find the scaled distance
18             scaled_distance = 0
```

```

19         if max_year != min_year:
20             scaled_distance = abs(group[i]['year'] - group[j][
'year']) / float(max_year - min_year)
21
22             # find the similarity
23             similarity = 1 - scaled_distance
24
25             # add to list
26             similarity_list.append(similarity)
27
28             j += 1
29             i += 1
30
31         # find the average
32         average = float(sum(similarity_list))/len(similarity_list)
33         return average.as_integer_ratio()
34
35     def get_max_year(group):
36         """returns max value of year in group"""
37
38         max_value = -1
39
40         for student in group:
41             max_value = max(student['year'], max_value)
42
43         return max_value
44
45     def get_min_year(group):
46         """returns min value of year in group"""
47
48         min_value = 100 # this is impossible value
49
50         for student in group:
51             min_value = min(student['year'], min_value)
52
53         return min_value
54
55
56     if __name__ == '__main__':
57         group_1 = [{'name': 'Primya', 'year': 3},
58 {'name': 'Zoe', 'year': 3},
59 {'name': 'Francesco', 'year': 3},
60 {'name': 'Yimin', 'year': 3}]
61
62         group_2 = [{'name': 'Primya', 'year': 5},
63 {'name': 'Zoe', 'year': 5},
64 {'name': 'Francesco', 'year': 4},
65 {'name': 'Yimin', 'year': 3}]
66
67
68         score_1 = get_group_score(group_1)
69         print(score_1)
70
71         score_2 = get_group_score(group_2)

```

```
72     print(score_2)
73
74
75
```

For the most homogeneous group, the group score is 1.

For the least homogeneous group, the group score is  $\frac{9}{16}$ .

**Question 5**

**Question 6**

**Question 7**

**Question 8**

**Question 9**

**Question 10**