

Programming Assignment 11

due November 26:

Implement the **disjoint set data structure**. You can choose any programming language that the grader can understand, but you might have to change the mandatory unit test and adapt the following layout.

```
class Element:
    def __init__(self, nr):
        self.id = nr
        self.ptr = self
        self.length = 1

    def __str__(self):
        return f'{self.id}({self.length})->{self.ptr.id}'

    def lookup(self):
        """returns the leader of the set self is in. The set is
        compacted, meaning that all nodes on the path to the
        leader now point directly to the leader."""

    def join(self, other):
        """ joins the leader of the smaller set with the leader of the
        larger set.
        The length of the leader of the smaller set is 0."""
```

The unit test is as follows:

```
def show(eles):
    for ele in eles:
        print(ele)
    print()

eles = [Element(i) for i in range(20)]
eles[0].join(eles[1])
eles[2].join(eles[3])
eles[0].join(eles[2])
eles[5].join(eles[6])
eles[7].join(eles[6])
eles[3].join(eles[7])
eles[4].join(eles[2])
eles[8].join(eles[9])
eles[9].join(eles[6])

eles[10].join(eles[11])
eles[10].join(eles[12])
eles[14].join(eles[12])
eles[13].join(eles[10])
eles[15].join(eles[14])
eles[16].join(eles[15])
eles[17].join(eles[18])
```

```
eles[19].join(eles[18])
eles[17].join(eles[14])
show(eles)
```

and should give you the following output:

```
0(10) -> 0
1( 0) -> 0
2( 0) -> 0
3( 0) -> 0
4( 0) -> 0
5( 0) -> 0
6( 0) -> 0
7( 0) -> 5
8( 0) -> 0
9( 0) -> 8
10(10) -> 10
11( 0) -> 10
12( 0) -> 10
13( 0) -> 10
14( 0) -> 10
15( 0) -> 10
16( 0) -> 10
17( 0) -> 10
18( 0) -> 17
19( 0) -> 17
```

Hand In:

Code

Result of unit test