Assignment 3 (WQUPC)

Renqiu Chen

Step 1:  
(a) Implement height-weighted Quick Union with Path Compression. For this, you will flesh out the class UF\_HWQUPC. All you have to do is to fill in the sections marked with // TO BE IMPLEMENTED ... // ...END IMPLEMENTATION.

(b) Check that the unit tests for this class all work. You must show "green" test results in your submission (screenshot is OK).

Step 2:  
Using your implementation of UF\_HWQUPC, develop a UF ("union-find") client that takes an integer value n from the command line to determine the number of "sites." Then generates random pairs of integers between 0 and n-1, calling connected() to determine if they are connected and union() if not. Loop until all sites are connected then print the number of connections generated. Package your program as a static method count() that takes n as the argument and returns the number of connections; and a main() that takes n from the command line, calls count() and prints the returned value. If you prefer, you can create a main program that doesn't require any input and runs the experiment for a fixed set of n values. Show evidence of your run(s).

Step 3:  
Determine the relationship between the number of objects (n) and the number of pairs (m) generated to accomplish this (i.e. to reduce the number of components from n to 1). Justify your conclusion in terms of your observations and what you think might be going on.

NOTE: although I'm not going to tell you in advance what the relationship is, I can assure you that it is a simple relationship.

Don't forget to follow the submission guidelines. And to use sufficient (and sufficiently large) different values of n.

1. <https://github.com/SuzukiAina/INFO6205-master/tree/master/src/main/java/edu/neu/coe/info6205/union_find>

The main function is located at UF\_Client.java

1. Screenshot below

电脑萤幕的截图

描述已自动生成

文本

描述已自动生成

1. Screenshot below

图表, 折线图

描述已自动生成

According to the data collected, we can find that the connection count(M) is very close to 0.5\*N\*ln(N).