The competition of data challenge 1 will be held online from 10/14/2014 11:55pm EDT to 10/15/2014 11:55pm EDT. During this competition time, you will run your program on your own computer and finish 40 test cases, 20 for each task. Everyone will get same set of test cases and you are not allowed to discuss test cases or exchange data with other students. After you finished all test cases, upload your source code and a README file explaining your solution to Courseworks. Students who get best results will be invited to briefly present their solutions in class.

The server interface in the competition will be slightly different from the training period. The server will no longer assign random tokens; instead you will use your UNI as your token. In addition /start now tells you which task you should do. The details are listed as follows (changes are in red)

• Start a test case
  Example Query: http://vienna.clic.cs.columbia.edu:8008/start?token=ab1234
  Example Return:
  {"task":1, "problem": ["7572", "4851"]}
  “task“ will be either 1 or 2.

• Query a user's friend list
  Address:
  &node=[userID]
  Example Query:
  http://vienna.clic.cs.columbia.edu:8008/neighbors?token=ab1234
  &node=7572
  Example Return:
  {"neighbors": [{"214": 311}, {"34651": 9}, {"3618": 40}, {"9451": 13}, {"37015": 2}, {"6620": 75}, {"26902": 9}, {"37009": 1}, {"16686": 4}, {"8715": 76}, {"9405":}
Again you can make at most $\text{QUERYLIMIT} = 100$ queries for each test case.

- Commit a path

Address: http://vienna.clic.cs.columbia.edu:8008/commit?token=YOUR_UNI, with POST parameter path=xxx,yyy,zzz,....

Example Query:
http://vienna.clic.cs.columbia.edu:8008/commit?token=abc1234, with POST parameter path=7572,4851

Example Return:
{"success":1,"queries":1,"cost":123.45,"target_distance":0}

After you committed a path, call /start again to get your next test case (if you have not finished all 20 yet). target_distance will be non-zero if and only if success = 0, which means you failed to find a complete path and committed an incomplete path. target_distance represents length(m,t) or distance(m,t) for task 1 and task 2 respectively (see blow)

Your score (out of 15 points) will be calculated as follows.

- **Phase I:**
If you commit a valid path (valid means /commit returns success:1) for at least one test case (no matter I or II), you get 20 points for Phase I, Otherwise 0.

- **Phase II - Task1:**
Let $Q_{i,you}$ donate number of queries you make for test case $i$ when you get a valid path, and $Q_{i,best}$ is the best result of test $i$ among all students. Your score for test $i$ is

$$S_{1,i} = \frac{2 \times \text{QUERYLIMIT} - Q_{i,you}}{2 \times \text{QUERYLIMIT} - Q_{i,best}} \times 100$$

If you fail to get a valid path for test case $i$, which requires a path from node $s$ to node $t$ within QUERYLIMIT queries, and you commit a path ending with last
node \( m, Q_{i,you} \) will be calculated as follows. Let length\((a,b)\) be the length of shortest path from \( a \) to \( b \),

\[ Q_{i,you} = \min \{ \text{QUERYLIMIT} + \frac{\text{length}(m,t)}{\text{length}(s,t)} \times \text{QUERYLIMIT}, 2 \times \text{QUERYLIMIT} \} \]

Here the shortest path from \( a \) to \( b \) is defined as the path from \( a \) to \( b \) in the graph with least number of nodes in middle.

If no one gets a valid path, \( Q_{i,best} \) will be set to \( \text{QUERYLIMIT} \) and \( S_i \) will be rescaled so that the best result gets 100.

- **Phase III - Task2:**

Let \( L_{i,you} \) donate the geographical length of your committed path for test case \( i \). Suppose the best result of test \( i \) among all students is \( L_{i,best} \). Your score is

\[ S_{2,i} = \left( \frac{3 \times L_{i,best}}{2 \times L_{i,best} + L_{i,you}} \right) \times 100 \]

If you fail to get a valid path for test case \( i \), which requires a path from node \( s \) to node \( t \), within \( \text{QUERYLIMIT} \), and you commit a path ending with last node \( m \), \( L_{i,you} \) will be calculate as follows. Let distance\((a, b)\) be the geographical distance from \( a \) to \( b \),

\[ L_{i,you} = \left( 1 + \frac{\text{distance}(m,t)}{\text{distance}(s,t)} \right) \times 4 \times L_{i,best} \]

If no one gets a valid path, \( L_{i,best} \) will be set to \( \text{distance}(s,t) \) and \( S_i \) will be rescaled so that the best result gets 100.

- **Total Score:**

\[ S_{total} = \frac{15}{100} \times \left( S_{phase1} + 0.4 \times \sum_{i=1}^{20} \frac{S_{1,i}}{20} + 0.4 \times \sum_{i=21}^{40} \frac{S_{2,i}}{20} \right) \]

This score may be re-scaled when necessary.