Software Testing, Lab 4, March 19, 2022.

**Tasks:**

1. Install Major Mutation Framework. The instruction of how to install and use Major can be seen in http://mutation-testing.org/doc/major.pdf
2. Coding a program named ‘UpgradedTriangle’. Given the length value (integer) of 3 sides of a triangle. Finish 2 functions respectively, (1) classifying the triangle and (2) calculating the area of valid triangle.

In function (1), given 3 length of sides(integers), output the shape of triangle made up by given sides. (Output a String, the shape could be “SCALENE”,“EQUILATERAL”,“ISOSCELES”,“INVALID”.)

In function (2), given 3 length of sides(integers), if these 3 sides can make up a valid triangle, output the area of the triangle (double or float), otherwise, return 0. (reference : Heron's formula)

1. Write testing cases for 2 functions with Junit according to your previous study (MC/DC, boundary value, equivalence partitioning, etc.), guarantee the sufficiency and diversity of your test set. Each function should have at least 10 test cases. Then run mutants on the test sets with Major Mutation Framework.
2. Analyzing the report provided by Major. Calculate these values:

- The number of mutants generated

- The number of mutants covered by the test suite

- The number of mutants killed by the test suite

- The number of live mutants

- The overall mutation score / adequacy of the test suite

Discuss and explain your results: (Here are some Viewpoints you could discuss)

- What do the results tell you about your test suite?

- Does the test suite exhibit weaknesses? How can it be improved?

- Does the test suite exhibit strengths? How do you recognize them?

- Do you have any other interesting insights or opinions on the experience?

- Among the generated mutants, If both killed and unkilled mutants were generated, what was the type of operator used? How was it applied to the code (how did the code change)?

- According to your mutation analysis result, which part of the source code need to be strengthened in further coding? Which test case in your suite are more important compared with others.

**Requirements for the experiment:**

1. Finish the tasks above individually.
2. Post your experiment report to “智慧树” , the following information should be included in your report:
   1. The brief description that you install Major and its configuring process.
   2. Steps for generating Mutants
   3. Steps for making test sets and running mutants.
   4. Your mutants results listed in task 4 (The number of live mutants, killed mutants, etc.)
   5. Your discussion based on provided report. (It is listed in Task4)

**Submission deadline:**

23:59 March 31, 2022.