Group Name : Evaluators

Automated Evaluation of Programming Assignments (Java)

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Description:

Our aim is to build a system which verifies the solutions for assignment using test cases, which are automated using automatic generation and categorise the correct approaches and style of programming.

Approach:

Given a reference solution for any problem statement, we implemented an automatic test case generator. The test case generator generates the required inputs randomly and also generates the expected outputs by executing the reference solution with the generated inputs.The code for this is written in aut_gen.py in auto_gen directory.

Followed by the generation of test cases, compile the given solutions and if the program throws any compilation error then it is categorised as incorrect solution.If the program compiles successfully then execute the program for all the generated test cases. Then check the output of the program with the expected outputs. Count the number of test cases, for which the outputs match. This code is implemented in RunTimeEvaluator.java in code directory.

For each test case calculate the Run time and Memory for the program. Then find the averages of the both parameters i.e, runtime and memory for only the test cases, for which the program gives correct output.

Now, Create clusters of solutions by using the Average Runtime and Memory as features by using k-means Algorithm. This part is implemented using cluster.java which is an k-means algorithm for creating clusters. Next, for finding the number of unused variables in a program go through the byte code of each solution. This part is implemented in UnusedVariables.java in code directory.

After finding all the required parameters, we implemented a marking scheme which evaluates assignments (or) solutions based upon these parameters. This function is implemented in main.java

To Compile the project :-

- Go to the eval directory in the terminal
- Type the command 'make' in the terminal to compile the project.

To run the project :-

- Place the reference solution in the Reference directory and the assignment solutions in the Solutions/src directory.
- Then type the command 'make run' in the terminal to run the project.

Note :-

- auto_gen directory contains the code for automatic generation of test cases.

- Code directory contains the source code for the project.

- Reference directory contains the correct solution to a problem taken as reference solution.

- org,lib directory contains the 'bcel.jar' libraries required for the project to run.

- TestCases directory will contain the test cases generated for a given solution.