

Testing a non-deterministic program

1 Context

There is plenty of non-deterministic programs in the wild. One of the most well-known might be the k-means algorithm which is used in various different domains. The problem with this kind of programs is that, when executed twice with the same configuration (inputs, options, etc.), the output might be different. Because of that, it becomes difficult to know if the test case shows a bug or if the difference of two executions is simply minor and does not have real impacts of the behavior of the program. However, those programs still need to be tested.

2 Project description

The goal of this project is to make you think about a proper way to test this kind of programs. Because of some changes in the outcome of the execution, the traditional way to express an oracle (i.e., strict boolean decision) cannot be used.

For this project, you have to select one non-deterministic algorithm and produce a test suite that test different cases trying to highlight cases where there is a unwilling behavior. Among those tests, you will have to provide definition of oracles that can handle the specific behavior of non-deterministic programs.