

1 | Background

RESTful APIs are widely used, often deployed as a Docker container.

System tests are necessary, but cumbersome to create.

The objective is to automatically generate system tests for systems under test (SUT) that contain RESTful APIs.

2 | EvoMaster

Open-source tool that uses an evolutionary algorithm [1].

To evaluate the fitness of a test, there are two modes:

- Black box uses only the result of the HTTP request.
- White box also uses byte-code analysis, but limited to java-based language.

3 | Container mode

We hypothesize that log statements can also be used.

A container mode was implemented* that parses the logs and maximizes the amount of unique log messages.

```
2020-06-03 07:42:25.57 INFO 1 --- [main]
o.t.s.e.news.app: Started app in 6.33 seconds
```

Figure 1. Example of an unstructured log statement

Research question | Is the effectiveness of EvoMaster significantly improved by the inclusion of the log output of the system under test?

4 | Empirical evaluation

3 SUTs were subjected to EvoMaster in different modes.

Effectiveness – line code coverage of resulting test suite.

Performance – evaluated actions in given search budget.

Each SUT was run 20 times for 5 minutes per mode.

Statistical analysis with Wilcoxon Rank Sum ($\alpha = 0.05$)

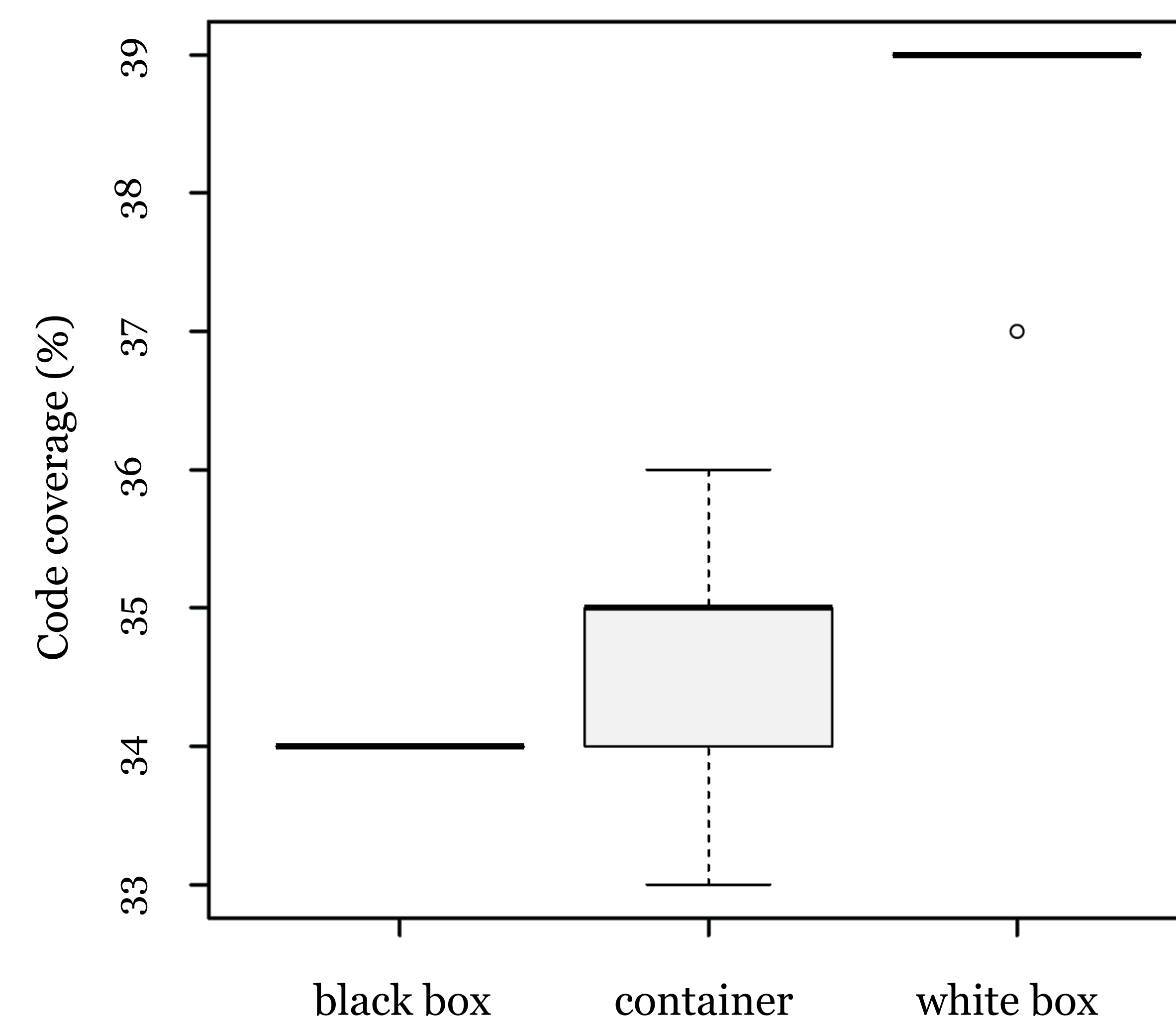


Figure 2. Boxplot result from 20 runs on the news SUT

5 | Conclusion

The container mode is more effective than black box mode in all evaluated SUTs ($p < 0.001$, $p < 0.001$ and $p = 0.054$).

Due to the overhead of Docker, it is significantly less performant than the other modes.

The container mode can be applied to any Docker container and is not limited to a specific language.