Special Issue of Software Quality Journal on AI for Test Automation (TA) and TA for AI/ML Systems

Important Dates

July 31, 2018 Paper submission deadline

Background

Software testing is an integral part of the software engineering (SE) discipline. Effective testing with reduced costs can be achieved through automating the testing process. In the past decades, a great amount of research effort has been spent on automatic test case generation, automatic test selection, automatic test oracles, etc. and there has been a rapid growth of practices in using automated software testing tools. Work on this topic has long been published as an important part of the software engineering discipline, and in recent years testing is consistently among the top-most popular topics in submissions to SE conferences. In the past few years, a large number of software test tools have been developed and become available on the market. The practice of software test automation (TA) has also moved forward significantly in the past few years, from what was just recording manual testing activities and replaying recorded test scripts for regression testing to systematically (but still manually) developing test code that is executed in some framework of TA tools, such as JUnit. However, progress in TA is still required. Software systems have become more and more complicated with components developed by different vendors and using different techniques in different programming languages and even running on different platforms. Few software testing tools can support all testing tasks within one environment. The advent of cloud computing and mobile computing has also imposed grave new challenges to software TA. The recent progress in AI and ML autonomous systems, such as self-driving cars, added new challenges to TA. There is an urgent requirement to develop the technology of software TA for emerging software using AI/ML technologies. On the other hand, as the AI/ML technologies become more mature, the idea immediately follows that these can also be applied to support TA in intelligent way. For example, an interesting open research question is whether an ML agent can be trained to be a tester. TA is certainly important for the development of software testing methodologies for heterogeneous software and the progress of the software testing scientific discipline as a part of SE, and AI-based testing could further push smart automation. The special issue aims at bridging the gap between theory and practice in order to improve the current state of practice and to foster innovative research in the area. We target solid ongoing work that is already producing interesting results.

Topics

The general theme of the special issue is AI for Test Automation (TA) and TA for AI/ML systems. The topics cover all aspects related to software TA, including but not limited to:

1. **Methodology.** Software TA in the context of various software development methodologies, in particular AI/ML technologies.
2. **Technology.** Automation of various test techniques and methods for test-related activities, as well as for testing various types of software, including AI/ML enabled applications.
3. **Tools and Environments.** Issues in the development, operation, maintenance and evolution of software testing tools and environments, and their integration and inter-operation with other types of tools and runtime support
platforms.
4 Experiments, Empirical studies and Experience reports. Experiments, empirical studies of software TA, as well as reports on real experiences in using automated testing techniques, methods and tools in industry.
5 Identification of problems and Visions of the future. The identification of problems that hamper wider adoption of TA and the analysis and specification of the requirements on automated software testing.

We have identified AI for TA and TA for AI/ML systems as the special focus of the issue. AI/ML has recently gained much attention from both research and practice community with the heated talks on self-driving cars, robot controlled Amazon warehouse, as well as Microsoft’s AI programmer. TA has the need to catch up by developing technologies to test such human-machine heterogeneous systems, as well as applying such technologies in TA. To keep up with recent surge in research and practice interests in AI/ML, it is timely to review the current practices and understand the challenges confronting practitioners for the testing of AI/ML software. Reports on feasibility of teaching AI/ML agent to carry out testing autonomously are also welcome.

Submission Information

There are two types of submissions to this special issue. The first category includes the best papers relevant to the above topics selected from the 13th International Workshop on Automation of Software Test (AST 2018; http://ast2018.isti.cnr.it/), collocated with the 40th ACM/IEEE International Conference on Software Engineering which will be held in Gothenburg, Sweden in May 2018. Authors of selected papers are invited to submit an extended version with at least 30% difference in technical content. Second, we also solicit papers from the research community with an open call for papers. Every submission must be of high quality and original, not published or currently submitted elsewhere. Every submission will also be evaluated by at least three independent reviewers, using the same review process and standard for SQJ regular submissions.

The Editor-in-Chief, along with the guest editors, will make the final decision to accept or decline a submission based on the reviews. Submissions must be written in English and submitted in the PDF format via the Editorial Manager’s system at https://www.editorialmanager.com/sqjo/

When submitting in Editorial Manager, please choose article type:
SI: AI for Test Automation (TA) and TA for AI/ML Systems

Guest Editors

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