

Dear Editor-in-Chief of IEEE Transactions on Services Computing,

We are pleased to submit a paper titled “Dynamic Random Testing of Web Services: A Methodology and Evaluation” for your consideration.

We would like to point out that some of the results in this submission were previously reported in our earlier paper published in the 36th IEEE International Conference on Computer Software and Applications (COMPSAC 2012), which is referred to as reference [1] in this submission.

The conference paper had three major contributions: (i) it proposed a framework for Dynamic Random Testing (DRT) of Web services; (ii) it described a prototype that partially automated the framework; and (iii) it presented two case studies to demonstrate the effectiveness of the approach, in terms of the F-measure and T-measure.

The current submission significantly extends the contributions of the conference paper, including as follows:

- (i) The conference paper briefly introduced the concepts of Service Oriented Architecture (SOA) and Random Testing (RT). The current submission more thoroughly examines the challenges and practical situations related to testing Web services. It also extensively discusses the limitations of RT, Partition Testing (PT), and Random Partition Testing (RPT), when they are used for testing Web services.
- (ii) The current submission adds an extensive discussion of the features of testing Web services (Section 2.2), which was not covered in the conference paper.
- (iii) The conference paper provided a coarse-grained framework for DRT of Web services. PT was not studied in the conference paper. In contrast, the current submission provides a comprehensive solution based on partitioning (Section 4.4.1).
- (iv) The current submission provides guidelines for setting the DRT parameters, based on a theoretical analysis (Section 3.2). Such guidelines, which were not covered in the conference paper, are crucial to enhance the practical application of DRT.
- (v) To evaluate the fault detection effectiveness of the proposed approach (DRT), in terms of the F-measure and T-measure, the conference paper used only two small Web services (ATM Service and Warehouse Service), comparing the performance with RT. The current submission, in contrast, contains a more comprehensive evaluation that not only evaluates the fault detection effectiveness of the proposed approach in terms of the F-measure, F2-measure, and T-measure (Section 5.1), but also evaluates its execution overheads in terms of F-time, F2-time, and T-time (Section 5.3). The current submission uses three real-life Web services as subjects, and compares the fault detection effectiveness and execution overhead of the proposed approach with those of both RT and RPT. The current submission includes statistical analyses verifying the significance of the empirical evaluations and comparisons (Sections 5.1 and 5.3), which were not covered in the conference paper. The current submission also analyzes the relationship between the number of partitions and the optimal control parameter settings for DRT, evaluating the usefulness of guidance provided by the theoretical analysis (Section 5.2), which was not covered in the conference paper. The comprehensive evaluations are described in Sections 4 and 5.
- (vi) The literature review and the conclusion in the conference paper have been substantially extended and revised in the current submission.

Thank you for your kind attention.

Yours faithfully,

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