Artificial neural networks as multi-networks automated test oracle

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Abstract One of the important issues in software testing is to provide an automated test oracle. Test oracles are reliable sources of how the software under test must operate. In particular, they are used to evaluate the actual results produced by the software. However, in order to generate an automated test oracle, it is necessary to map the input domain to the output domain automatically. In this paper, Multi-Networks Oracles based on Artificial Neural Networks are introduced to handle the mapping automatically. They are an enhanced version of previous ANN-Based Oracles. The proposed model was evaluated by a framework provided by mutation testing and applied to test two industry-sized case studies. In particular, a mutated version of each case study was provided and injected with some faults. Then, a fault-free version of it was developed as a Golden Version to evaluate the capability of the proposed oracle finding the injected faults. Meanwhile, the quality of the proposed oracle is measured by assessing its accuracy, precision, misclassification error and recall. Furthermore, the results of the proposed oracle are compared with former ANN-based Oracles. Accuracy of the proposed oracle was up to 98.93%, and the oracle detected up to 98% of the injected faults. The results of the study show the proposed oracle has better quality and applicability than the previous model.

Keywords Automated software testing · Software test oracle · Artificial neural networks · Mutation testing

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