TECHNICAL REPORT

ISO/IEC TR 29119-11

First edition
2020-11

Software and systems engineering — Software testing —

Part 11: Guidelines on the testing of AI-based systems

Reference number
ISO/IEC TR 29119-11:2020(E)

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Published in Switzerland

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

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Introduction

The testing of traditional systems is well-understood, but AI-based systems, which are becoming more prevalent and critical to our daily lives, introduce new challenges. This document has been created to introduce AI-based systems and provide guidelines on how they might be tested.

Annex A provides an introduction to machine learning.

This document is primarily provided for those testers who are new to AI-based systems, but it can also be useful for more experienced testers and other stakeholders working on the development and testing of AI-based systems.

As a Technical Report, this document contains data of a different kind from that normally published as an International Standard or Technical Specification, such as data on the “state of the art”.

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1 Scope

This document provides an introduction to AI-based systems. These systems are typically complex (e.g. deep neural nets), are sometimes based on big data, can be poorly specified and can be non-deterministic, which creates new challenges and opportunities for testing them.

This document explains those characteristics which are specific to AI-based systems and explains the corresponding difficulties of specifying the acceptance criteria for such systems.

This document presents the challenges of testing AI-based systems, the main challenge being the test oracle problem, whereby testers find it difficult to determine expected results for testing and therefore whether tests have passed or failed. It covers testing of these systems across the life cycle and gives guidelines on how AI-based systems in general can be tested using black-box approaches and introduces white-box testing specifically for neural networks. It describes options for the test environments and test scenarios used for testing AI-based systems.

In this document an AI-based system is a system that includes at least one AI component.

2 Normative references

There are no normative references in this document.