



BSI Standards Publication

Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ART/1, Artificial Intelligence.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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Published by BSI Standards Limited 2023

ISBN 978 0 539 25363 4
ICS 35.020

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2022.

Amendments/corrigenda issued since publication

Date	Text affected
31 July 2023	This corrigendum renumbers BS ISO/IEC 23053:2022 as BS EN ISO/IEC 23053:2023

EUROPÄISCHE NORM

June 2023

ICS 35.020

English version

**Framework for Artificial Intelligence (AI) Systems Using
Machine Learning (ML) (ISO/IEC 23053:2022)**

Cadre méthodologique pour les systèmes d'intelligence
artificielle (IA) utilisant l'apprentissage machine
(ISO/IEC 23053:2022)

Framework für Systeme der Künstlichen Intelligenz
(KI) basierend auf maschinellem Lernen (ML) (ISO/IEC
23053:2022)

This European Standard was approved by CEN on 26 June 2023.

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Rue de la Science 23, B-1040 Brussels**

European foreword

The text of ISO/IEC 23053:2022 has been prepared by Technical Committee ISO/IEC JTC 1 "Information technology" of the International Organization for Standardization (ISO) and has been taken over as EN ISO/IEC 23053:2023 by Technical Committee CEN-CENELEC/ JTC 21 "Artificial Intelligence" the secretariat of which is held by DS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2023, and conflicting national standards shall be withdrawn at the latest by December 2023.

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The text of ISO/IEC 23053:2022 has been approved by CEN-CENELEC as EN ISO/IEC 23053:2023 without any modification.

First edition
2022-06

Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)

*Cadre méthodologique pour les systèmes d'intelligence artificielle (IA)
utilisant l'apprentissage machine*



Reference number
ISO/IEC 23053:2022(E)

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Published in Switzerland

This is a preview of BS EN ISO/IEC 23053:2023. [Click here to purchase the full version from the ANSI store.](#)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 42, *Artificial Intelligence*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

Artificial intelligence (AI) systems, in general, are engineered systems that generate outputs such as content, forecasts, recommendations or decisions for a given set of human-defined objectives. AI covers a wide range of technologies that reflect different approaches to dealing with these complex problems.

ML is a branch of AI that employs computational techniques to enable systems to learn from data or experiences. In other words, ML systems are developed through the optimisation of algorithms to fit to training data, or improve their performance based through maximizing a reward. ML methods include deep learning, which is also addressed in this document.

Terms such as knowledge, learning and decisions are used throughout the document. However, it is not the intent to anthropomorphize machine learning (ML).

This document aims to provide a framework for the description of AI systems that use ML. By establishing a common terminology and a common set of concepts for such systems, this document provides a basis for the clear explanation of the systems and various considerations that apply to their engineering and to their use. This document is intended for a wide audience including experts and non-practitioners. However, some of the clauses (identified in the overview in [Clause 5](#)), include more in-depth technical descriptions.

This document also provides the basis for other standards directed at specific aspects of ML systems and their components.

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Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)

1 Scope

This document establishes an Artificial Intelligence (AI) and Machine Learning (ML) framework for describing a generic AI system using ML technology. The framework describes the system components and their functions in the AI ecosystem. This document is applicable to all types and sizes of organizations, including public and private companies, government entities, and not-for-profit organizations, that are implementing or using AI systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 22989, *Information technology—Artificial intelligence — Artificial intelligence concepts and terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 22989 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 Model development and use

3.1.1

classification model

<machine learning> machine learning model whose expected output for a given input is one or more classes

3.1.2

regression model

<machine learning> machine learning model whose expected output for a given input is a continuous variable

3.1.3

generalization

<machine learning> ability of a trained model to make correct predictions on previously unseen input data

Note 1 to entry: A machine learning model that generalizes well is one that has acceptable prediction accuracies using previously unseen input data.

Note 2 to entry: Generalization is closely related to overfitting. An overfit machine learning model will not generalize well as the model fits the training data too precisely.