International Standard

ISO/IEC 15938-18

Information technology — Multimedia content description interface —

Part 18: Conformance and reference software for compression of neural networks

Technologies de l'information — Interface de description du contenu multimédia —

Partie 18: Conformité et logiciel de référence pour la compression des réseaux neuronaux

Second edition
2025-02

Reference number
ISO/IEC 15938-18:2025(en)

© ISO/IEC 2025



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Conformance testing ... **1**
4.1 General ... 1
4.2 Conformance testing for decoder ... 2
4.3 Conformance testing for bitstreams ... 2
4.4 Models and reference bitstreams ... 2
4.5 Procedure to test decoders ... 10
4.5.1 General ... 10
4.5.2 Complete model ... 10
4.5.3 Incremental model ... 11
4.5.4 Decoding self-contained NNC bitstreams ... 11
4.5.5 Decoding NNC bitstreams using out-of-band parameters ... 11
4.6 Procedure to test bitstreams ... 11
5 Reference software ... **11**
5.1 General ... 11
5.2 Software location and license ... 12
5.3 Software installation ... 12
5.4 Software architecture ... 12
5.4.1 General ... 12
5.4.2 Parameter reduction methods ... 13
5.4.3 Parameter approximation ... 14
5.4.4 Reconstruction ... 14
5.4.5 Encode ... 14
5.4.6 Decode ... 14
5.5 Data structures and interfaces ... 14
5.5.1 model_info: Shared model information ... 14
5.5.2 approx_data – Data structure ... 16
5.5.3 nnc_core – Main module ... 18
5.5.4 nnc_core.nnr_model – Module for handling model related functionalities ... 22
Annex A (informative) **Implementation in Python®** ... **25**
Bibliography ... **26**

© ISO/IEC 2025 – All rights reserved

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).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and https://patents.iec.ch. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 15938-18:2023), which has been technically revised.

The main changes are:

— additional conformance bitstreams and an extension of the reference software to cover the features added in ISO/IEC 15938-17:2024.

A list of all parts in the ISO/IEC 15938 series can be found on the ISO website and IEC websites.

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.

© ISO/IEC 2025 – All rights reserved

Introduction

This document describes conformance testing and the reference software for ISO/IEC 15938-17. The reference software includes both encoder and decoder functionality.

The reference software is useful in aiding users of a standard for coding neural networks to establish and test conformance and interoperability, and to educate users and demonstrate the capabilities of the standard. For these purposes, the accompanying software is provided as an aid for the study and implementation of ISO/IEC 15938-17.

The purpose of this document is to provide the following:

— A set of reference bitstreams conforming to ISO/IEC 15938-17.

— Description of procedures to test conformance of bitstreams and decoders to ISO/IEC 15938-17.

— Reference decoder software capable of decoding bitstreams that conform to ISO/IEC 15938-17 in a manner that conforms to the decoding process specified in ISO/IEC 15938-17.

— Reference encoder software capable of producing bitstreams that conform to ISO/IEC 15938-17.

© ISO/IEC 2025 – All rights reserved

Information technology — Multimedia content description interface —

Part 18: Conformance and reference software for compression of neural networks

1 Scope

This document specifies conformance testing procedures for implementations of ISO/IEC 15938-17 and provides conformance bitstreams. It also provides the reference software for ISO/IEC 15938-17 which is an integral part of this document.

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 15938-17:2024, *Information technology — Multimedia content description interface — Part 17: Compression of neural networks for multimedia content description and analysis*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 15938-17 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
array
ordered list of elements where all elements are of the same type

3.2
dictionary
ordered list of key/value pairs where each key/value pair is a list of two elements with the first element being denoted ‘key’ and with the second element being denoted ‘value’

4 Conformance testing

4.1 General

Subclauses 4.2 through 4.6 specify tests for verifying the conformance of bitstreams as well as decoders. These tests make use of test data (bitstreams and related models) available at https://standards.iso.org/iso-iec/15938/-18/ed-2/en (described in detail in 4.4) and follow the procedure described in 4.5.

© ISO/IEC 2025 – All rights reserved