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Information technology — Artificial intelligence (AI) — Overview of computational approaches for AI systems

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Foreword

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Introduction

Artificial intelligence (AI)-related products, systems and solutions have become more common in recent years thanks to rapid software and hardware improvements that boost computational performance, data storage capabilities and network bandwidth. The intent of this document is to look at computational methods and approaches within AI systems. Based on ISO/IEC 22989[1)], ISO/IEC 23053[2)] and ISO/IEC TR 24030, this document provides a description of the characteristics of an AI system and its computational approaches. The illustration of computational approaches in AI systems includes both machine learning and non-machine learning methods. To reflect state-of-the-art methods used in AI, this document is structured as follows:

— Clause 5 provides an overall description of computational approaches in AI systems;

— Clause 6 discusses the main characteristics of AI systems;

— Clause 7 provides a general taxonomy of computational approaches, including knowledge-driven and data-driven approaches;

— Clause 8 discusses selected algorithms used in AI systems, including basic theories and techniques, main characteristics and typical applications.

By giving an overview of different technologies used by AI systems, this document is intended to help users understand computational characteristics and approaches used in AI.

1) Under preparation. Stage at the time of publication: ISO/IEC DIS 22989:2021.

2) Under preparation. Stage at the time of publication: ISO/IEC DIS 23053:2021.

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Information technology — Artificial intelligence (AI) — Overview of computational approaches for AI systems

1 Scope

This document provides an overview of the state of the art of computational approaches for AI systems, by describing: a) main computational characteristics of AI systems; b) main algorithms and approaches used in AI systems, referencing use cases contained in ISO/IEC TR 24030.

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*

ISO/IEC 23053, *Framework for artificial intelligence (AI) systems using machine learning (ML)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 22989 and ISO/IEC 23053 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
heuristic search
search, based on experience and judgment, used to obtain acceptable results without guarantee of success

[SOURCE: ISO/IEC 2382:2015, 2123854, modified — Notes to entry removed.]

3.2
fuzzy logic
fuzzy-set logic
nonclassical logic in which facts, inference rules and quantifiers are given certainty factors

[SOURCE: ISO/IEC 2382:2015, 2123795, modified — Notes to entry removed.]

3.3
generator
neural network that produces samples usually to be classified by a discriminator

Note 1 to entry: Generators primarily appear in the context of generative adversarial networks.

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