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Information technology — Artificial intelligence (AI) — Use cases

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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 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

This document provides a collection of use cases of artificial intelligence (AI) applications in a variety of domains.

In total, 132 AI use cases were submitted by experts between July 2018 and the end of November 2019. In this document, the term “use cases” means “collection of submitted use cases”.

The rationale for this document is as follows:

— illustrating the applicability of the AI standardization work across a variety of application domains;

— input to and reference for AI standardization work;

— sharing the collected use cases in support of AI standardization work with external organizations and internal entities to foster collaboration;

— reach out to new stakeholders interested in AI applicability;

— establishment of liaison organizations to collect requirements for AI via use cases;

— by investigating use cases, it is possible to find the new technical requirements (standardized demand) from the market, accelerating the transformation of science and technology achievements.

While a bottom-up approach was used to collect use cases, a top-down approach is used in this document to identify AI applications, and their deployment models, and their application domains., which is shown in Clause 5.

The first step taken to collect use cases was to identify application domains of AI systems (described in Clause 5) and to provide a use case template (described in 6.4 and Annex B). Contributors were requested to submit use cases using the provided template.

For improving the quality of use cases, a guidance was provided for contributors. The guidance included identified acceptable sources (described in 6.3) and AI characteristics (described in 6.4) for preparing use cases.

In this document, subclause 6.5 includes basic statistics of use cases. Subclause 6.6 and Annex C describe the findings from use case analysis.

The use cases were grouped and categorized according to the identified application domains. In this document, use cases are summarized and grouped according to the application domains in Clause 7. Readers of this document can find use cases of specific application domains and their original submissions at https://standards.iso.org/iso-iec/tr/24030/ed-1/en.

AI is an emerging field with use cases and solutions with a wide range of maturity and success. The descriptions are given for the convenience of users of this document and does not constitute an endorsement by ISO.

Information technology — Artificial intelligence (AI) — Use cases

1 Scope

This document provides a collection of representative use cases of AI applications in a variety of domains.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
artificial intelligence
AI
<system> capability to acquire, process, create and apply knowledge, held in the form of a model, to conduct one or more given tasks

3.2
artificial intelligence
AI
<engineering discipline> discipline of developing and studying *artificial intelligence* (3.1)

3.3
quality
conformance to specified requirements

[SOURCE: ISO 13628-2:2006, 3.33]

3.4
machine learning
process using computational techniques to enable systems to learn from data or experience

3.5
deep learning
approach to creating rich hierarchical representations through the training of neural networks with many hidden layers

3.6
service
performance of activities, work, or duties

Note 1 to entry: A service is self-contained, coherent, discrete, and can be composed of other services.

Note 2 to entry: A service is generally an intangible product.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.50]

3.7
classification
task of assigning collected data to target categories or classes.

Note 1 to entry: Machine learning (ML) models can be designed/created either for binary classification, where they can learn to predict one of two different categories/classes; or for multiclass classification, where ML models learn to predict one of many different categories/classes.

Note 2 to entry: An example of classification is to predict if a photograph of an animal is a cat or a dog or even a different species. Classification employs supervised learning. Classification can employ supervised, semi-supervised, or unsupervised learning.

3.8
application
software or a program that is specific to the solution of an application problem

[SOURCE: ISO/IEC 11801:2002, 3.1.2]

3.9
neural network
network of primitive processing elements connected by weighted links with adjustable weights, in which each element produces a value by applying a nonlinear function to its input values, and transmits it to other elements or presents it as an output value

Note 1 to entry: Whereas some neural networks are intended to simulate the functioning of neurons in the nervous system, most neural networks are used in artificial intelligence as realizations of the connectionist model.

Note 2 to entry: Examples of nonlinear functions are a threshold function, a sigmoid function, and a polynomial function.

[SOURCE: ISO/IEC 2382: 2015, 2120625]

3.10
task
set of activities undertaken in order to achieve a specific goal

Note 1 to entry: These activities can be physical, perceptual and/or cognitive.

Note 2 to entry: While goals are independent of the means used to achieve them, tasks describe particular means of achieving goals.

Note 3 to entry: Examples of tasks include classification, regression, ranking, clustering and dimensionality reduction.

[SOURCE: ISO 9241-11:2018, 3.1.11, modified — Note 3 to entry has been added.]

3.11
parameter
<machine learning> variable of the model that affects its output any characteristic that can help in defining or classifying a particular system

3.12
artificial intelligence system
AI system
engineered information processing system featuring artificial intelligence

Note 1 to entry: AI systems are designed to operate with varying levels of autonomy.

3.13
training data
samples for training used to fit a machine learning model

3.14
cloud service
one or more capabilities offered through cloud computing invoked using a defined interface

[SOURCE: ISO/IEC 17788:2014, 3.2.8]

3.15
cloud computing
paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand

Note 1 to entry: Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

[SOURCE: ISO/IEC 17788:2014, 3.2.5]

3.16
automation
characteristic of a system where work is performed that might previously have been done by a living being and that is governed by rules determined outside of the system

Note 1 to entry: Such systems are subject to external control and oversight.

Note 2 to entry: Automation implies the (revocable) delegation to a machine of a specific and defined set of "skills", operations, processes, or procedures.

3.17
bias
systematic difference between true (or accepted) value and measured value

[SOURCE: ISO 14488:2007, 3.1]

3.18
data set
identifiable collection of data available for access or download in one or more formats

[SOURCE: ISO/IEC 20546:2019, 3.1.11]

3.19
natural language processing
<system> information processing based upon natural-language understanding

3.20
natural language processing
<engineering discipline> field of study within computer science and linguistics concerning automated processing, in whole or in part, of natural language

3.21
retraining
updating a trained model by training with different training data

3.22
computer vision
capability of a functional unit to acquire, process, and interpret visual data

Note 1 to entry: Computer vision involves the use of visual sensors to create an electronic or digital image of a visual scene.

Note 2 to entry: Not to be confused with machine vision.

Note 3 to entry: computer vision; artificial vision: terms and definition standardized by ISO/IEC [ISO/IEC 2382-28:1995].

Note 4 to entry: 28.01.19 (2382)

[SOURCE: ISO/IEC 2382:2015, 2123787]

3.23
trained model
result of model training

3.24
robot
automation system with actuators that performs intended tasks in the physical world, by means of sensing its environment and a software control system

Note 1 to entry: A robot includes a control system and interface of a control system.

Note 2 to entry: The classification of robot into industrial robot or service robot is done according to its intended application.

Note 3 to entry: In order to properly perform its tasks, a robot makes use of different kinds of sensors to confirm its current state and perceive the elements composing the environment in which it operates.

[SOURCE: ISO 18646-2:2019, 3.1, modified — Note 3 to entry has been added]

3.25
big data
extensive datasets — primarily in the data characteristics of volume, variety, velocity, and/or variability — that require a scalable technology for efficient storage, manipulation, management, and analysis

Note 1 to entry: Big data is commonly used in many different ways, for example as the name of the scalable technology used to handle big data extensive datasets.

[SOURCE: ISO/IEC 20546:2019, 3.1.2]

3.26
end user
individual person who ultimately benefits from the outcomes of the system

Note 1 to entry: The end user may be a regular operator of the software product or a casual user such as a member of the public.

[SOURCE: ISO/IEC 25000:2014, 4.7]

3.27
data analysis
systematic investigation of the data and their flow in a real or planned system

[SOURCE: ISO/IEC 2382:2015, 2122686]

3.28
pattern recognition
identification, by a functional unit, of physical or abstract patterns, and of structures and configurations

Note 1 to entry: This is an improved version of the definition in ISO/IEC 2382-12:1988.

Note 2 to entry: Pattern recognition: term and definition standardized by ISO/IEC 2382-28:1995.

Note 3 to entry: 28.01.13 (2382)

[SOURCE: ISO/IEC 2382:2015, 2123781]