
**Health informatics — Applications
of machine learning technologies
in imaging and other medical
applications**

*Informatique de santé — Applications de technologies
d'apprentissage automatique en imagerie et autres applications
médicales*



This document is a preview generated by EKO



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

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 Abbreviated terms	4
5 Categories for defining use cases of machine learning in medicine	4
5.1 Categories based on technology	4
5.1.1 General	4
5.1.2 Robotics	5
5.1.3 Continuous monitoring	5
5.1.4 Machine learning	5
5.1.5 Deep learning	5
5.1.6 Image processing	5
5.1.7 Natural language processing	5
5.1.8 Audio recognition	6
5.1.9 Bigdata analysis	6
5.1.10 Prediction modeling	6
5.2 Categories based on medical specialty	6
5.2.1 General	6
5.2.2 Radiology and Pathology	6
5.2.3 Dermatology	6
5.2.4 Ophthalmology	6
5.2.5 Internal Medicine	7
5.2.6 Cardiology	7
5.2.7 Neurology, Urology, Surgery	7
5.2.8 Anaesthesiologist, Intensive Care Unit	7
5.2.9 Emergency	7
5.3 Categories based on medical usage	7
5.3.1 General	7
5.3.2 Clinical trials	8
5.3.3 Clinical assistance	8
5.3.4 Data-based precision medicine	8
5.3.5 Medical Imaging and Diagnostic	8
5.3.6 Hospital Management	9
5.3.7 Robot surgery	9
5.3.8 Drug development	9
6 Use cases of artificial intelligence in medicine	10
6.1 General	10
6.2 AI Platform for Lung Cancer Screening and Reporting	10
6.3 AI based text to speech services with personal voices for speech impaired people	11
6.4 AI Platform for Chest CT-Scan Analysis	11
6.5 Support system for optimization and personification of drug therapy	11
6.6 WebioMed Clinical Decision Support System	12
Bibliography	14

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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.

This document was prepared by Technical Committee ISO/TC 215, *Health informatics*.

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.

Introduction

Due to the rapid advancement of artificial intelligence, especially machine learning and deep learning, defining categories of use cases in the clinical setting have started to be adopted to enhance healthcare system and patients' outputs. Therefore, it is crucial to define the categories of use cases for artificial intelligence in the clinical setting to focus on application of artificial intelligence in medicine.

This document proposes categories of use cases of machine learning technologies for artificial intelligence in medicine considering the property of artificial intelligence technology including machine learning and deep learning and clinical settings especially requiring repeated detection and/or diagnosis, real-time monitoring, and treatment prediction with images and continuous signals, etc. This document will assist the health IT companies by reviewing the current status of machine learning technologies for artificial intelligence in medicine and then by proposing a gap for a new application. This document can be used to further develop the applications or the necessary standards of machine learning technologies for artificial intelligence in medicine.

Health informatics — Applications of machine learning technologies in imaging and other medical applications

1 Scope

This document lists examples of and defines categories of use cases for machine learning in medicine for clinical practice.

The developments and applications of machine learning technologies for artificial intelligence consist of 1) data collection and curation, 2) pre-processing, 3) model training and validation, and 4) medicine depending on various kinds of specialty including radiology, pathology, emergency medicine, dermatology, ophthalmology, anaesthesia, surgery, etc., and clinical settings including repeated detection and/or diagnosis, real-time monitoring, and treatment prediction.

This document covers categories applications of medicine in (4). It also defines the clinical usages and necessities of the artificial intelligence in medicine.

(1) to (3) are not the scope of this document

This document also excludes

- basic research and other scientific areas,
- use cases related to artificial intelligence methods other than machine learning (for example, symbolic artificial intelligence, expert systems), and
- non-human results such as veterinary medicine.

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

branch of computer science devoted to developing data processing systems that perform functions normally associated with human intelligence, such as reasoning, learning, and self-improvement

[SOURCE: ISO/IEC/IEEE 24765:2017, 3.234]