

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

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TELECOMMUNICATION
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OF ITU

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SERIES F: NON-TELEPHONE TELECOMMUNICATION
SERVICES

Multimedia services

Requirements for applications and services in smart manufacturing based on machine vision

Recommendation ITU-T F.748.16

ITU-T

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Recommendation ITU-T F.748.16

Requirements for applications and services in smart manufacturing based on machine vision

Summary

Recommendation ITU-T F.748.16 presents the overview and requirements for applications and services in smart manufacturing based on machine vision (MV). It describes the basic concept, scenario and ecosystem of machine vision, and identifies several typical requirements, such as data acquisition, data preprocessing and data processing. This Recommendation also gives a reference model for MV-based applications and services in smart manufacturing. The general goals of standardization for the MV service are:

- Defining the requirements of MV-based services and applications;
- Helping end users and providers to specify the MV tasks and solutions;
- Enhancing confidence in the MV ecosystem and opening new applications for MV systems.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Machine vision, requirement, smart manufacturing.

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Recommendation ITU-T F.748.16

Requirements for applications and services in smart manufacturing based on machine vision

1 Scope

This Recommendation presents the basic concept of machine vision (MV) and identifies requirements for MV-based applications in smart manufacturing. This Recommendation also specifies a reference model of MV-based applications and services in smart manufacturing.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Y.2060] Recommendation ITU-T Y.2060 (2012), *Overview of the Internet of things*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 algorithm [b-ISO/IEC 11557]: Set of rules for transforming the logical representation of data.

3.1.2 application [b-ITU-T Y.101]: A structured set of capabilities, which provide value-added functionality supported by one or more services.

3.1.3 endpoint [b-ITU-T H.350]: A logical device that provides video and/or voice media encoding/decoding, and signalling functions.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 machine vision: Signal processing to acquire, process and interpret an image or video to support visual analysis for applications, such as automatic inspection, process control and guidance.

3.2.2 machine vision platform: A set of capabilities integrated in a platform that provides basic and common functions for machine vision applications.

3.2.3 model: An output created by an algorithm running on training data that can generate an inference or prediction, based on input data.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

5G Fifth-Generation mobile networks

AI Artificial Intelligence

LAN	Local Area Network
MV	Machine Vision
MVAS	Machine Vision Application and Service
OBS	Object Sorting
OM	Object Measurement
ONVIF	Open Network Video Interface Forum
QoS	Quality of Service
QV	Quality Verification
RG	Robot Guidance
ResNet	Residual Networks
RTSP	Real Time Streaming Protocol
SDK	Software Development Kit
SSD	Solid State Disk
VSSNet	Video Scale Selection Network
YOLO	You Only Look Once

5 Conventions

In this Recommendation:

- The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.
- The keywords "is recommended" indicate a specification which is recommended but which is not absolutely required. Thus it need not be present to claim conformance.
- The keyword "can" indicate an optional specification which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator or service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

6 Overview of machine vision

6.1 Basic concept of machine vision

Machine vision traditionally refers to the use of computer vision for object recognition and classification by extracting useful information about an object from images or video, in an industrial or practical application or in a process where it is necessary to execute a certain function or outcome. It is a branch of the combination of artificial intelligence (AI), image-processing and pattern-recognition techniques, the purpose of which is to replace human eyes for measurement and judgement by adding a set of vision systems to machines or automatic production lines. MV encompasses all industrial and non-industrial applications in which a combination of hardware and software provide operational guidance to devices in the execution of their functions based on the capture and processing of images. The major tasks performed by an MV system can be grouped into three processes: data acquisition, processing or analysis, and recognition or measurement. Various features of the objects are extracted, and final decisions are made using different image-processing algorithms and pattern-recognition techniques, respectively.