INTERNATIONAL STANDARD

ISO/IEC 21794-2

First edition
2021-04

Information technology — Plenoptic image coding system (JPEG Pleno) —

Part 2: Light field coding

Technologies de l'information — Système de codage d'images plénoptiques (JPEG Pleno) —

Partie 2: Codages des champs de lumière



Reference number
ISO/IEC 21794-2:2021(E)

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Published in Switzerland

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Foreword

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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*.

A list of all parts in the ISO/IEC 21794 series can be found on the ISO website.

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.

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Introduction

This document is part of a series of standards for a system known as JPEG Pleno. This document defines the JPEG Pleno framework. It facilitates the capture, representation, exchange and visualization of plenoptic imaging modalities. A plenoptic image modality can be a light field, point cloud or hologram, which are sampled representations of the plenoptic function in the form of, respectively, a vector function that represents the radiance of a discretized set of light rays, a collection of points with position and attribute information, or a complex wavefront. The plenoptic function describes the radiance in time and in space obtained by positioning a pinhole camera at every viewpoint in 3D spatial coordinates, every viewing angle and every wavelength, resulting in a 7D function.

JPEG Pleno specifies tools for coding these modalities while providing advanced functionality at system level, such as support for data and metadata manipulation, editing, random access and interaction, protection of privacy and ownership rights.

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Information technology — Plenoptic image coding system (JPEG Pleno) —

Part 2: Light field coding

1 Scope

This document specifies a coded codestream format for storage of light field modalities as well as associated metadata descriptors that are light field modality specific. This document also provides information on the encoding tools.

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.

ITU-T Rec. T.800 | ISO/IEC 15444-1, *Information technology — JPEG 2000 image coding system — Part 1: Core coding system*

ITU-T Rec. T.801 | ISO/IEC 15444-2, *Information technology — JPEG 2000 image coding system — Part 2: Extensions*

ISO/IEC 21794-1:2020, *Information technology — Plenoptic image coding system (JPEG Pleno) — Part 1: Framework*

ISO/IEC 60559, *Information technology — Microprocessor Systems — Floating-Point arithmetic*

3 Terms and definitions

For the purposes of this document the terms and definitions given in ISO/IEC 21794-1 and the following 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
arithmetic coder
entropy coder that converts variable length strings to variable length codes (encoding) and vice versa (decoding)

3.2
bit-plane
two-dimensional array of bits

3.3
4D bit-plane
four-dimensional array of bits

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3.4
coefficient
numerical value that is the result of a transformation or linear regression

3.5
compression
reduction in the number of bits used to represent source image data

3.6
depth
distance of a point in 3D space to the camera plane

3.7
disparity view
image that for each pixel of the subaperture view contains the apparent pixel shift between two subaperture views along either horizontal or vertical axis

3.8
hexadeca-tree
division of a 4D region into 16 (sixteen) 4D subregions

3.9
pixel
collection of sample values in the spatial image domain having all the same sample coordinates

EXAMPLE A pixel may consist of three samples describing its red, green and blue value.

3.10
plenoptic function
amount of radiance in time and in space by positioning a pinhole camera at every viewpoint in 3D spatial coordinates, every viewing angle and every wavelength, resulting in a 7D representation

3.11
reference view
subaperture view that is used as one of the references to generate the intermediate views

3.12
subaperture view
subaperture image
image taken of the 3D scene by a pinhole camera positioned at a particular viewpoint and viewing angle

3.13
texture
pixel attributes

EXAMPLE Colour information, opacity, etc.

3.14
transform
transformation
mathematical mapping from one signal space to another

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