SMPTE ST 2094-20:2016

SMPTE STANDARD

Dynamic Metadata for Color Volume Transform — Application #2

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Foreword

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SMPTE Engineering Documents are drafted in accordance with the rules given in its Standards Operations Manual.

SMPTE ST 2094-20 was prepared by Technology Committee 10E.

Intellectual Property

SMPTE draws attention to the fact that it is claimed that compliance with this Standard may involve the use of one or more patents or other intellectual property rights (collectively, "IPR"). The Society takes no position concerning the evidence, validity, or scope of this IPR.

Each holder of claimed IPR has assured the Society that it is willing to License all IPR it owns, and any third party IPR it has the right to sublicense, that is essential to the implementation of this Standard to those (Members and non-Members alike) desiring to implement this Standard under reasonable terms and conditions, demonstrably free of discrimination. Each holder of claimed IPR has filed a statement to such effect with SMPTE. Information may be obtained from the Director, Standards & Engineering at SMPTE Headquarters.

Attention is also drawn to the possibility that elements of this Standard may be subject to IPR other than those identified above. The Society shall not be responsible for identifying any or all such IPR.

Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

The color volume transform Application #2 uses content-dependent dynamic metadata to reproduce the artistic intent of High Dynamic Range and Wide Color Gamut content as accurately as possible on displays having a smaller color volume than that of the display with which that content was mastered.

This dynamic metadata is typically generated in a trim pass, either starting from automatically-generated dynamic metadata or from automatically-derived dynamic metadata using a numerical optimization process when both an HDR and an SDR image are available.

A colorist could add corrections to the transform, typically on a scene by scene basis but also on an image by image basis if desired. The transform is captured in parameters. The parameters consist of: a group that defines a region-based tone mapping curve that operates on image data in a perceptually-uniform domain; a fine-tuning adjustment to the region-based tone mapping curve; and parameters that specify luminance-dependent color saturation correction.

In some cases, it could be desirable to limit the number of parameters used. This could be the case, for example, in a live broadcast scenario. Typically, only one or two of the parameters that define the region-based tone mapping curve will be used. These parameters could be set by an operator, or could be automatically generated on the basis of a scene analysis.

1 Scope

This standard specifies the content-dependent Color Volume Transform metadata set for Application #2, a specialized model of the color volume transform defined by the core components document SMPTE ST 2094-1.

The Color Volume Transform is based on a tone mapping curve that operates on image data in a perceptually-uniform domain and a luminance-dependent saturation gain curve. Both the tone mapping curve and the saturation gain curve are fully characterized by a set of parameters.

2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword “reserved” indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword “forbidden” indicates “reserved” and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

Unless otherwise specified, the order of precedence of the types of normative information in this document shall be as follows: Normative prose shall be the authoritative definition; Tables shall be next; then formal languages; then figures; and then any other language forms.

3 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this engineering document. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this engineering document are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

SMPTE ST 2086:2014, Mastering Display Color Volume Metadata Supporting High Luminance and Wide Color Gamut Images

SMPTE ST 2094-1:2016, Dynamic Metadata for Color Volume Transform — Core Components