



Université Lille Nord de France
Pôle de Recherche
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Ecole doctorale régionale Sciences Pour l'Ingénieur Lille Nord-de-France - 072



Titre : Taking into account aesthetics in HDR tone retargeting

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Description

HDR imaging is nowadays widely used in broadcast and cinematography [Dufaux 2016]. HDR images can represent a greater range of luminance levels than can be achieved using legacy methods, such as many real-world scenes containing very bright, direct sunlight, specular reflections to very dark shadows. Many coding standards such as HDR10 and HLG that describe how to encode and display HDR stream. Nevertheless, due to display features, it remains necessary to map dynamic range of input image onto display dynamic range and related bit depth.

Most works related to tone retargeting have focused on artifact free Tone Mapping Operator (i.e. objective image quality) leaving out image aesthetics. The goal of tone mapping operator is to map the colors of an HDR image into the color gamut of a display while preserving bright and dark image details, image global appearance.

First Bist and al. [Bist 2016] pointed out that image aesthetics can be changed when tone mapping legacy images in HDR domain. More generally tone targeting method does not account for aesthetics and does not preserve image aesthetics.

Context

The IMAP research group has a strong background in HDR (High Dynamic Range) imaging and learning-based method related to imaging [Chambre 2020] and rendering. IMAP group is about to start a collaborative project with a major phone manufacturer on next-generation camera modules. This PhD is part of this collaboration.

PhD objectives

Consequently, color grading of HDR content for different dynamic range and bit depths remains most of the time a manual task. The main goal of this PhD is to tackle aesthetics aware tone retargeting. This consists of:

1. Building HDR (natural and computer generated) content database with aesthetics annotations that covers real HDR imaging use cases (such as real estate photography).



2. Designing aesthetics analysis tools that account for human visual system, and more especially, HDR image appearance [Fairchild 2013]. The main goals of aesthetics analysis tool are to be able to: (1) give robust features that describes image aesthetics, (2) compare images in term of style. The compared image could be different tone mapped versions of HDR images.
3. Proposal of aesthetics aware tone retargeting methods that can compute tone-mapped versions of HDR original images according display features while preserving the original image aesthetics.

References

- [Chambre 2020] Mathieu Chambe, Rémi Cozot and Olivier Le Meur: **Behaviour of Recent Aesthetics Assessment Models with Professional Photography**, in ICIAAP 2020: International Conference on Image Analysis and Processing, 2020
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- [Fairchild 2013] Mark D. Fairchild: **Color Appearance Models**, 3rd Ed. Wiley-IS&T, Chichester, UK (2013). ISBN 978-1-119-96703-3
- [Bist 2016] Cambodge Bist, Rémi Cozot, Gérard Madec, and Xavier Ducloux: **Tone Compatibility between HDR Displays**, SPIE 2016

Contact, important dates, and research group

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