HDR/WCG Content Characterization Methodology

Extension of an existing method towards WCG

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Motivation

- Subjective studies should be conducted on a representative content
  - Diverse content -> high generalizability
- High number of possible contents to choose from
  - Subjective selection is impractical (and can be biased)
  - Objective way to characterize the content is highly desirable
- Simple characteristics are not sufficient in HDR/WCG applications
  - E.g. dynamic range does not sufficiently represent the content properties

Method proposed by Narwaria et al.

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- Create the difference matrix ***DM*** = {..., D_i , ...}
- Analyze matrix ***DM*** using a clustering algorithm

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- Rank the source images according to the probability of membership in the more challenging cluster

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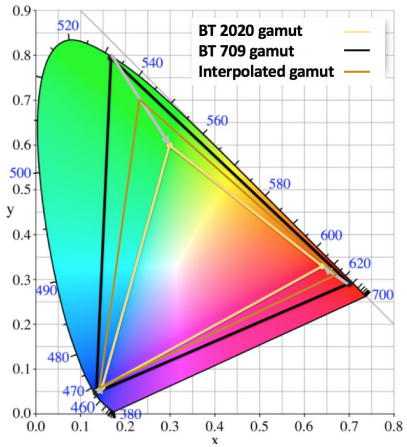
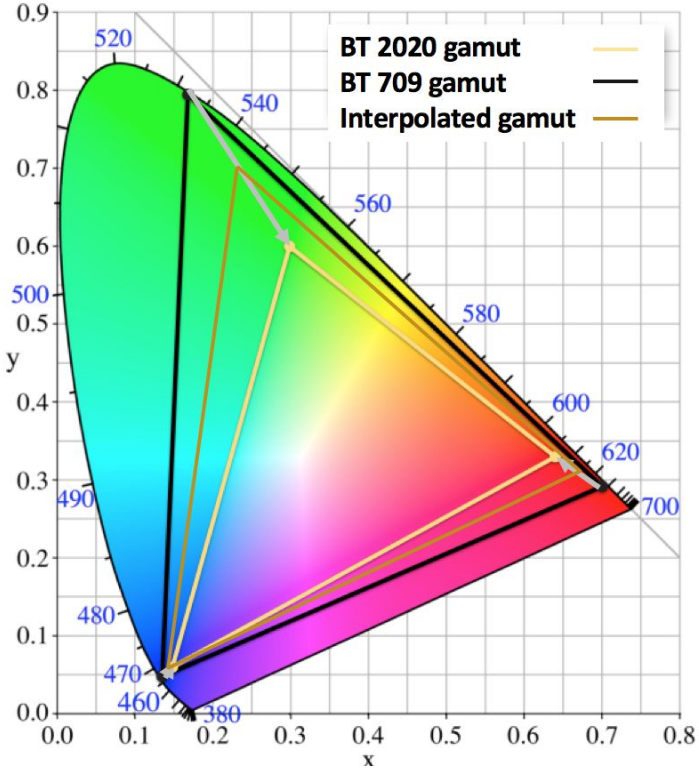
  - Determine perceptual changes when gradually reducing the gamut



Gradual reduction of the gamut



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- It is desirable to incorporate the color information as well
- Basic principle
  - Determine perceptual changes when gradually reducing the gamut
  - Color analysis can be done separately from luminance analysis
    - Decreasing complexity
    - Applications mainly use two step approach - tone-mapping -> gamut mapping

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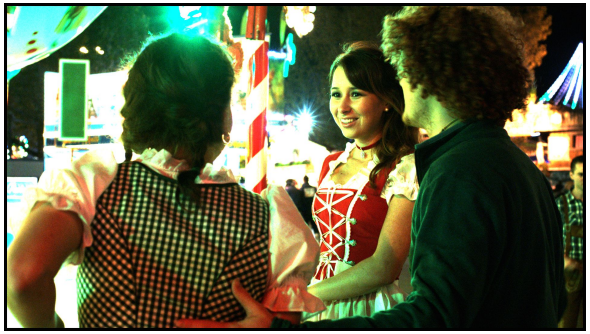
The whole framework

- For each HDR/WCG image $I_{REF,i}$ in the pool:
  - Luminance analysis (Narwaria method)
    - Distance vector D^L_i
  - Color analysis
    - Distance vector D^C_i
  - Concatenate D^L_i and D^C_i into D_i
- Create the difference matrix ***DM*** = {..., D_i , ...}
- Analyze matrix ***DM*** using a clustering algorithm

Results

- 63 images (HdM-HDR-2014 database)
- Two clusters
  - Challenging vs. less challenging content
  - Output - probability of belonging to each cluster (for each image)

$P_{cluster1}>0.9$



$P_{cluster2}>0.9$

Future Work

- Investigation of possibilities of using higher number of clusters

- Validation by the dedicated subjective experiment(s)

Thank you for your attention!