REDUCED-REFERENCE HIGH DYNAMIC RANGE IMAGE QUALITY ASSESSMENT BASED ON MULTI EXPOSURE FUSION ALGORITHM

UNDERGRADUATE THESIS

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FACULTY OF ENGINEERING AND COMPUTER SCIENCE
BAKRIE UNIVERSITY
JAKARTA

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Submitted as one of requirements to obtain bachelor degree (S1)

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STATEMENT OF ORIGINALITY

The material in this Undergraduate Thesis is the result of my own work, and all sources are quoted and cited properly.

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Finally, I truly hope that this Undergraduate Thesis can be used as reference in the future and brings benefit to the other parties who need.

Jakarta, August 21st, 2019
Author

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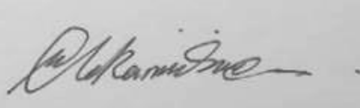

(Ocarina Cloramidina)

REDUCED-REFERENCE HIGH DYNAMIC RANGE IMAGE QUALITY ASSESSMENT BASED ON MULTI EXPOSURE FUSION ALGORITHM

Ocarina Cloramidina [1]

ABSTRACT

This thesis presents objective image quality measurements for High Dynamic Range (HDR) images without complete reference information based on the Multi Exposure Fusion (MEF) Algorithm. It focuses on developing HDR Reduced-Reference (RR) image quality models, and especially on investigating overhead data that can improve the predictive ability of the model. Overhead data used previously have been processed by the MEF algorithm as a basis for this research. In addition, variations and combinations of edge strength and lighting features are extracted from the original image and its quality is measured by a complete reference model modified for the RR model for HDR images. Some of them aim to find out whether the complete reference matrix can be modified for the reduced reference model. These features are then combined to get a single value, which corresponds to the predicted subjective score. This method will be evaluated using variations in Quality Evaluation 1 (QE1), Quality Evaluation 2 (QE2), and Quality Evaluation 3 (QE3). The results show that the proposed average edge strength feature extraction method and the average luminance feature are the best methods where QE3 is close to 1.

Keywords : Image Quality Assessment (IQA), Objective Quality Assessment, High Dynamic Range (HDR), Reduce-Reference (RR), Multi Exposure Fusion (MEF).

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[1]Undergraduate Student of Informatics Study Program, Bakrie University

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LIST OF ABBREVIATIONS

Abbr.	Explanation
CNN	Convolutionary Neural Network
DMOS	Difference Mean Opinion Score
$DMOS_p$	Difference Mean Opinion Score Prediction
DS	Double Stimulus
EV	Exposure Value
FR	Full-Reference
HDR	High Dynmic Range
HDRI	High Dynamic Range Imaging
HDR-VDP	HDR-Visual Difference Predictor
HIGRADE	HDR Image GRADient Evaluator
HSV	Hue, Saturation, and Value
HVS	Human Visual System
IQA	Image Quality Assessment
ITMO	Inverse Tone Mapping Operator
JPEG	Joint Photographic Experts Group
KRCC	Kendall's Rank-order Correlation Coefficient
LAB	Lightness, A, and B
LCC	Linear Correlation Coefficient
LDR/SDR	Low/Standard Dynamic Range
MEF	Multi Exposure Frame
MPEG	Moving Pictures Experts Group
MSCN	Mean Ssubtracted Contrast Normalized
MSE	Mean Square Error
M-SSIM	Mean Structural Similarity Index
NR	No-Reference
NSS	Natural Scene Statistics
PLCC	Pearson's Linear Correlation Coefficient
PSNR	Peak Signal to Noise Ratio
QE1	Quality Evaluation 1
QE1_Sqrt	Quality Evaluation$1^{1/2}$

QE1_1	Quality Evaluation1^{1}
QE1_Square	Quality Evaluation1^{2}
QE1_Cubed	Quality Evaluation1^{3}
QE2	Quality Evaluation 2
QE2_Sqrt	Quality Evaluation$2^{1/2}$
QE2_1	Quality Evaluation2^{1}
QE2_Square	Quality Evaluation2^{2}
QE2_Cubed	Quality Evaluation2^{3}
QE3	Quality Evaluation 3
QoE	Quality of Experience
QoS	Quality of Service
RGB	Red, Green, and Blue
RR	Reduced-Reference
RMSE	Root Mean Square Error
SD	Standard Deviation
SS	Single Stimulus
SSIM	Structural Similarity Index
SRCC	Spearman's Rank-order Correlation Coefficient
SVR	Support Vectors Regression
TMQI	Time Mapping Quality Index
UHD	Ultra High Definition