

**REDUCED REFERENCE IMAGE QUALITY ASSESSMENT  
FOR HIGH DYNAMIC RANGE BASED ON TONE-MAPPING  
OPERATOR**

**UNDERGRADUATE THESIS**



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**INFORMATICS STUDY PROGRAM  
FACULTY OF ENGINEERING AND COMPUTER SCIENCE  
BAKRIE UNIVERSITY  
JAKARTA  
2019**

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**Submitted as a partial fulfillment to obtain Bachelor Degree (S1) in  
Informatics Study Program, Bakrie University**



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**STATEMENT OF ORIGINALITY**

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

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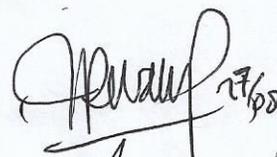
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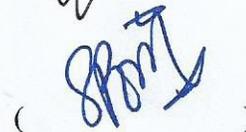
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There is no perfection in every composing of a report. Therefore, some critics and feedbacks from readers are needed for the sake of report completion. Hopefully, this thesis report can bring benefits for readers.

Jakarta, August 21<sup>th</sup>, 2019

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# **REDUCED REFERENCE IMAGE QUALITY ASSESSMENT FOR HIGH DYNAMIC RANGE BASED ON TONE-MAPPING OPERATOR**

**Salmaa Badriatu Syafaah <sup>1</sup>**

## **Abstract**

This thesis propose an objective image quality assessment for High Dynamic Range (HDR) images with reduced reference based on Tone Mapping Operator (TMO). As we know, HDR images can now be displayed on a standard device such as a smartphone. The valuation method here is classified as the Reduce-Reference (RR) method as only partial reference information is available. First, the TMO images and the reference images is extracted. Then, the images quality score is measured with the features extracted. This study use three main models i.e. Quality Assessment 1 (QA1), Quality Assessment 2 (QA2), and Quality Assessment 3 (QA3). To know how well this model, Pearson and Spearman correlation is applied. As the ground thruth data, public subjective score is utilized. The result show that feature combine is the best feature with QA1\_Cubed as the highest correlation.

**Keywords : Objective Quality Assessment, Tone Mapping Operator (TMO), Reduce-Reference (RR), High Dynamic Range (HDR)**

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<sup>1</sup>Undergraduate Student of Informatics Study Program, Bakrie University

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## List of Abbreviations

**3D** 3 Dimensional

**BSQ** Best subjective quality

**DMOS** Difference Mean Opinion Score

**DSCQS** Double-Stimulus Continuous Quality Scale

**DSIS** Double-Stimulus Impairment Scale

**FR** Full-Reference

**FSIM** Feature Similarity Index

**HDR** High Dynamic Range

**HDRI** High Dynamic Range Imaging

**HIGRADE** HDR Image GRADient Evaluator

**HVS** Human Visual System

**JPEG** Joint Photographic Experts Group

**KRCC** Kendall's Rank-order Correlation Coefficient

**LIVE** Laboratory for Image & Video Engineering

**MAD** Most Apparent Distortion

**MEF** Multi-Exposure Image Fusion

**MOS** Mean Opinion Score

**MPEG** Moving Pictures Experts Group

**MS-SSIM** Multiscale Structural Similarity Index

**MSCN** Mean-Subtracted-Contrast

**MSE** Mean Squared Error

**NR** No-Reference

**NSS** Natural Scene Statistics

**PU** Perceptually Uniform

**QoE** Quality of Experience

**QoS** Quality of Service

**RR** Reduce-Reference

**SDR** Standard Dynamic Range

**SLR** Single-Lens Reflects

**SRCC** Spearman's Rank-order Correlation Coefficient

**SRP** Scene Reproduction

**SSIM** Structural Similarity Index

**TMO** Tone Mapping Operator

**TMQI** Tone Mapped image Quality Index

**UHD** Ultra High Definition

**VIF** Visual Information Fidelity

**VSS** Visual System Simulator