

**REDUCED-REFERENCE HIGH DYNAMIC RANGE
IMAGE QUALITY ASSESSMENT USING FALSE
COUNTOUR INFORMATION**

UNDERGRADUATE THESIS



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Statement of Originality

The material in this Undergraduate Thesis is the result of my on work,
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Abstract

In recent times, various methods have been developed to produce high quality images that closely resemble real-world scenes as captured by the human eye. One such method is High Dynamic Range (HDR) technology, which has seen the development of many techniques over the past few decades, although each method still has its limitations. This study discusses an objective approach to evaluating the quality of HDR images using reference data. Generally, the image processing approach to HDR can be divided into two algorithms: Multi-exposure Fusion (MEF) and Inverse Tone Mapping Operator (ITMO). MEF involves combining multiple images with different exposure levels to create a more informative output image, while ITMO recovers HDR data from Low Dynamic Range (LDR) or Standard Dynamic Range (SDR) images, although this method may introduce artifacts that can affect the image quality. The focus of this research is to develop a Reduced-Reference (RR) data model for HDR-based image quality. The aim is to identify data overhead that can improve the predictability of the model using spatial data and information, specifically False Contours. Features are extracted from the original image and processed independently, then combined to obtain a single score that corresponds to the predicted subjective score. This approach can be evaluated using a publicly available HDR image quality rating database.

Index Terms : Image Quality Assessment (IQA) High Dynamic Range (HDR), Reduce-Reference (RR), Multi Exposure Fusion (MEF), Inverse Tone Mapping Operator (ITMO). High Dynamic Range.

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List Of Abbreviations

BIO-BLIND	: Biologically Inspired Blind Quality Assessment
BLIQUE	: BLInd QUality Evaluator
DRIM	: Dynamic Range Independent Quality Measure
EDAC	: Edge Detection by Adaptive Curvelet Transform
FCC	: False Contour Candidate
FCDR	: False Contour Detection and Removal
FR	: Full Reference
G-IQA	: Gradient Image Quality Assessment
GM	: Gradient Magnitude
GVF	: Gradient Vector Flow
HDR	: High Dynamic Range
HEVC	: High Efficiency Video Coding
HGVF	: Hessian-based Gradient Vector Flow
HVFC	: Hessian-based Vector Field Convolution
HVS	: Human Visual System
IQA	: Image Quality Assessment
ITMO	: Inverse Tone Mapping Operator
LDR	: Low Dynamic Range
LS	: Local Structure
MEF	: Multi Exposure Fusion
MHEC	: Harris For Edge and Corners
MS-SSIM	: Multi Scale Structural Similarity Index Measure
MSE	: Mean Squared Error
NR	: No Reference
NSS	: Natural Scene Statistics
PC	: Phase Congruence
gPb	: Global Detector
PLCC	: Pearson Liniear Correlation Coefficient
PSNR	: Peak Signal to Noise Ratio
RGB	: Red Green Blue
RR	: Reduce Reference
SDR	: Standard Dynamic Range
SRCC	: Spearman Rank Correlation Coefficient
SSIM	: Structural Similarity Index
STVFC	: Spatial-Temporal Vector Field Convolution
TMQI	: Tone-Mapped Images Quality Index
VFC	: Vector Field Convolution