

## Accepted Manuscript

DeepSim: Deep Similarity for Image Quality Assessment

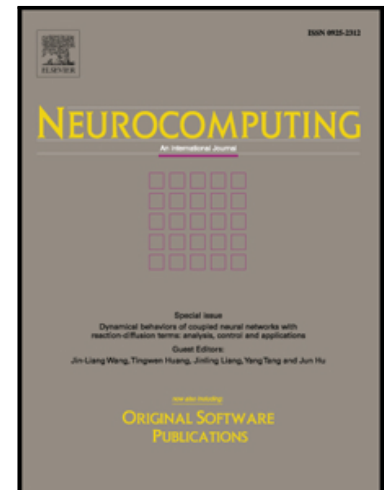
Fei Gao, Yi Wang, Panpeng Li, Min Tan, Jun Yu, Yani Zhu

PII: S0925-2312(17)30148-0  
DOI: [10.1016/j.neucom.2017.01.054](https://doi.org/10.1016/j.neucom.2017.01.054)  
Reference: NEUCOM 17960

To appear in: *Neurocomputing*

Received date: 14 June 2016  
Revised date: 18 September 2016  
Accepted date: 11 January 2017

Please cite this article as: Fei Gao, Yi Wang, Panpeng Li, Min Tan, Jun Yu, Yani Zhu, DeepSim: Deep Similarity for Image Quality Assessment, *Neurocomputing* (2017), doi: [10.1016/j.neucom.2017.01.054](https://doi.org/10.1016/j.neucom.2017.01.054)



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# DeepSim: Deep Similarity for Image Quality Assessment

Fei Gao<sup>a</sup>, Yi Wang<sup>b,\*</sup>, Panpeng Li<sup>a</sup>, Min Tan<sup>a</sup>, Jun Yu<sup>a</sup>, Yani Zhu<sup>c,d</sup>

<sup>a</sup>Key Laboratory of Complex Systems Modeling and Simulation,  
School of Computer Science and Technology, Hangzhou Dianzi University, Hangzhou, China

<sup>b</sup>Dept. Visual Communication Design, Artistic Design & Creation School,  
Zhejiang University City College, Hangzhou, China

<sup>c</sup>College of Information Engineering, Zhejiang University of Technology, Hangzhou, China

<sup>d</sup>Institute of Science and Technology, Hangzhou Dianzi University, Hangzhou Zhejiang, China

---

## Abstract

This paper studies one interesting problem: How does the deep neural network (DNN) architecture affect the image quality assessment (IQA) performance? In order to find the answer, we propose a novel full-reference IQA framework, codenamed deep similarity (DeepSim). In DeepSim, we first measure the local similarities between the features (produced by a DNN model) of the test image and those of the reference image; Afterwards, the local quality indices are gradually pooled together to estimate the overall quality score. In addition, various factors that may affect the IQA performance are investigated. Thorough experiments conducted on standard databases show that: 1) DeepSim can accurately predict human perceived image quality and outperforms previous state-of-the-art; 2) mid-level representations are most effective for quality prediction; and 3) preprocessing, the restricted linear units and max-pooling operations are beneficial for the IQA performance.

**Keywords:** Image Quality Assessment, Deep Learning, Pooling, Structural Similarity, Convolutional Neural Networks (CNN)

---

## 1. Introduction

The tremendous development of social networks and mobile phones lead to a dramatic increase in the number of images. Nowadays, images are playing significant roles in our

---

\*Corresponding authors: Fei Gao and Yi Wang.

URL: [gaofei@hdu.edu.cn](mailto:gaofei@hdu.edu.cn) (Fei Gao), [wangyi@zucc.edu.cn](mailto:wangyi@zucc.edu.cn) (Yi Wang)

Download English Version:

<https://daneshyari.com/en/article/4947287>

Download Persian Version:

<https://daneshyari.com/article/4947287>

[Daneshyari.com](https://daneshyari.com)