

## 摘要

在数字图像处理的采集、显示、存储、传输、压缩等多个领域中都需要对图像质量进行评价。因此，图像质量评价算法的研究既有重要的理论意义，同时具有广泛的应用背景，并已经成为图像处理领域重要的基础研究课题之一。在很多实际应用条件下，无法获得原始图像作为参考源。因此，本文致力于图像的无参考质量评价方法研究。

考虑到除非在图像处理的过程中引入了人工效应，否则所有的图像都可视为无失真的。由此，可以将无参考质量评价的研究任务简化为对所引入效应的无参考评价。图像处理过程中，最常见的人工效应包括：块效应，模糊效应，振铃效应等，而且这些人工效应经常会出现伴生现象。本文在分别分析了这三种人工效应的基础上，提出了一个完整的无参考图像质量评价模型。

具体来说，本文的主要研究工作包括：

1. 提出基于梯度和平坦性选择的无参考块效应评价方法。
2. 提出基于梯度剖面锐度直方图分析的无参考模糊效应评价方法。
3. 提出基于边界过零点选择的无参考振铃效应评价方法。
4. 提出新的无参考图像质量评价方法。

实验结果表明，本文提出的无参考图像质量评价方法对主观感知质量保持了很好的预测准确性、单调性和一致性。

**关键词：**质量评价，块效应评价，模糊效应评价，振铃效应评价，无参考质量评价

# Research on Image Quality Assessment

Jianhua Chen (Computer Application)

Directed By Wen Gao

Image quality assessment is required in various fields of digital image processing, such as capture, display, storage, transmission and compression. Research on image quality assessment algorithm is not only important in theory, but also in wide applications. Therefore it has become one of the most important fundamental topics in the area of image processing. In many practical applications, it is hard to get the original image as a reference. Therefore, we focus on the NR (No-Reference) image quality assessment methods in our study.

Considering the artifacts are introduced only in image processing, or else all of the images can be regarded as no distortion, therefore, the research task of NR image quality assessment can be simplified as the NR assessment of such artifacts. In image processing, the most popular artifacts are blocking artifacts, blurring artifacts, ringing artifacts, etc, and these artifacts are often associated together. In this paper, we analyze these artifacts and propose a model to combine them together.

Specifically, the main contributions of the thesis include:

1. Proposed a new NR blocking metric using selective gradient and plainness.
2. Proposed a new NR blurring metric using gradient profile sharpness histogram.
3. Proposed a new NR ringing metric using selective zero crossing pixels.
4. Proposed a new overall NR image quality assessment metric.

Experimental results in public image database show that the proposed NR image quality assessment metric can achieve good prediction accuracy, monotonicity and consistency with the subjective scores.

**Keywords:** quality assessment, blocking metric, blurring metric, ringing metric, No-Reference quality assessment