Error Analysis in Lossy Compressed Image Transmission Algorithms

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Introduction

Compression in a digital image can facilitate its processing, storage and transmission. As the Departments of large Companies become more and more digitalized and distributed, multimedia data quantity dealt with (particularly images) obliges the consideration of its compression for its storage and transmission.

The general objective of compression consists in representing an image with the smallest possible bits quantity with the less possible quality loss, thus accelerating transmission and minimizing storage requirements. As an alternative, the objective consists in attaining the best possible fidelity for a limited available storage capacity.

In the communications field, much work has been dedicated to digital image codification, aimed at reducing the requirements of the bitrate for image transmission. Experience has showed that each codification scheme is subject to its own and unique set of loss causes, which are often difficult to characterize [Gonzáles 1996]. This is due to the way in which codification schemes are designed in order to vary selectively the display precision; the observer can be insensitive to errors in some parts of the images, but in some others cannot. A considerable compression can be attained only by means of lossy algorithms, which do not allow an exact recovery of original images. This data loss makes the compression and other images processing algorithms have some reliability problems due to the quality potential loss [Cosman, 1994].

There is a need of counting on precise measurements of subjective losses that can be used for predicting the quality of an image. The objective of the present work is to determine these distortion measurements and test the use of different objective measurements in order to forecast an image subjective quality.

The need of this type of measurements is particularly known in digital image codification fields. The existence of subjectively relevant distortion measurements that reflect an image quality assessment made by an observer would make the task of designing and optimizing codification schemes considerably easier.

These distortions are compared and contrasted with a set of representative images of several application domains, and the distortion measurements that can be easily obtained are checked in order to forecast subjective assessments, more expensive in time. The examples are traditional images used in the area of processing and compression of compressed images using JPEG standard [Wallace 1991] [Russo 1998].