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ABSTRACT

The demand for images, video sequences and computer animations has increased during the last years. The image compression is becoming an important issue in reducing the cost of data storage and transmission. JPEG-2000 is a new international standard for still image compression. The codec of JPEG-2000 standard is based on wavelet coding techniques. The JPEG-2000 specification specifies two different formats: JP2 and code stream JPC. JP2 represents a visual image quite specifically, whereas JPC is a more or less arbitrary array of codes.

The aim of this Thesis is to analyze and measure the performance of the JPEG-2000 compressed images .jp2 by using a Jasper simulation program. Jasper measures the peak to noise ration PSNR, mean square error MSE, and peak absolute error PAE. Proposed one modification of Jasper library by adding a Correlation measure that gives a better view to the relation between the original and compressed image.

The used simulation program is a modified version of the so-called Jasper. This simulation program can measure the Peak signal to noise ratio, Mean square error of the JP2 compressed images (color & grayscale) at high and low bit rates. The simulation program gives better results than the other techniques.

Jasper library was used with a basic interface to allow the selection of operations (compression ration, code block, and number of resolution levels) and present the result numerically and graphically.

ملخص الرسالة

ازداد الطلب علي الصور و مقاطع الفيديو و الرسوم المتحركة في السنوات الاخيرة و تبعا لذلك زادت اهمية ضغط الصور من حيث خفض تكلفة نقل و تخزين البيانات.

JPEG-2000 هو المعيار العالمي الجديد لضغط الصور. الترميز في معيار JPEG-2000 يستند إلى تقنيات الترميز الموجية. قسمت مواصفات JPEG-2000 الي شكلين: JP2 و JPC. يمثل JP2 الصورة المرئية تحديدا بينما يمثل JPC مصفوفة شفرات عشوائية.

تهدف الرسالة إلى تقييم و قياس اداء تقنيات JPEG- 2000 والصور المضغوطة JP2 بإستخدام برنامج المحاكاة "جاسبر" والذى يقوم بقياس PNSR و MSE و PAE. مقترح في هذه الرسالة اضافة تعديل علي جاسبر باضافة مقياس جديد يقيس الارتباط الذي يعطي رؤية أفضل للعلاقة بين الصورة الأصلية والمضغوطة.

برنامج المحاكاة المستخدم هو نسخة معدلة من جاسبر. هذا البرنامج يمكن من قياس PNSR و MSE للصور المضغوطة JP2 (الملونة والرماديّ) بمعدلات مرتفعة ومنخفضة. البرنامج يعطي نتائج أفضل من الأساليب الأخرى

تم استخدام مكتبة جاسبر مع اضافة واجهة تطبيقية تمكن من اختيار العمليات (معدل الضغط، معدل التشفير، و عدد مستويات الوضوحية) ، وعرض النتائج عدديا وبيانيا

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List of Abbreviations, Acronyms and Symbols

BMP	Windows bit map format
BPC	Bit per component
CORR	Correlation
CMY	Cyan, Magenta, Yellow
CWT	Continuous Wavelet transform
DCT	Discrete cosine transform
DFT	Discrete Fourier transform
DPI	Dots per inch
DWT	Discrete wavelet transform
EBCOT	Embedded block coding with optimized truncation
EC	Entropy coding
EZW	Embedded zerotree wavelet
FB	Filter bank
FDCT	Forward Discrete Transform
FFT	Fast Fourier transform
FT	Fourier transform
GIF	Graphics Interchange Format
HVS	Human visual system
IDCT	Inverse Discrete Cosine Transform
ICC	International color consortium
ICT	Irreversible color transform
Imgcmp	Explicit Congestion Notification
Imginfo	Explicit Link Failure Notification
JBIG	Joint – Bi level image experts group
JFIF	JPEG File Interchange Format
JIV	Jasper image viewer
JPEG	Joint photographic experts group
JPEG-2000	A new standard for improved lossy still image compression
LZC	Layered zero coding
LZW	Lampel, Ziv and Welch
MR	Magnitude refinement
MSE	Mean square error
NTSC	National television system committee
PAE	Peak absolute error
PAL	Phase alternative line
PIFS	Partitioned iterated function system
PNG	Portable network graphics
PPI	Pixel per inch
PR	Perfect reconstruction
PSNR	Peak signal to noise ratio
QMF	Quadrature mirror filter
QT	Quantization table
RCT	Reversible color transform
RGB	Red, Green, and Blue
RLC	Run length coding
RLE	Run length encoding
ROI	Region of interest
SC	Sign coding
SNR	Signal to noise ratio
SPI	Sample per inch

SPIHT	Set partitioned hierarchical trees
SRGB	Standard RGB (Red Green Blue) color space, created for use on monitors, printers, and the Internet
STFT	Short term Fourier transform
SQ	Scalar quantization
TFR	Time frequency representation
TIFF	Tagged Image File Format
UMBFD	Uniformly maximally-decimated filter bank
WT	Wavelet transform
YCbCr	The color space used in CCIR-601 digital video specification
YIQ	The color space used in the NTSC analog television standard
YUV	The color space used in the PAL analog television standard
ZC	Zero Coding