

ТЕХНИЧЕСКИЕ НАУКИ

THE RESULTS OF THE PROBABILISTIC ASSESSMENT OF BLOCKING ARTIFACTS IN RASTER IMAGES

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Abstract: Bitmap images can contain various types of artifacts. A compression artifact (or artifact) is a noticeable distortion of media (including images, audio, and video) caused by the application of lossy compression. In the new era of information technology, the use of visual aids in teaching and learning process is inevitable. Image processing is an interesting field that studies about various processing techniques for digital images, which is the backbone of the emerging visual communication. Teaching the image processing has been a challenge since it requires imagination and creativity to some extent for the students to understand the concepts of image processing.

Keyword: and learning, MATLAB, Graphical User Interface, blocking artifacts, RGB color model, probabilistic metric

1. Introduction & Literature Survey: Teaching is the process of educating or instructing who are ignorant of particular phenomena. Teaching has always been considered as service, so like any other service, when one is not competent is probably unethical. There are three main types of learning styles: auditory, visual, and kinesthetic. Practically, a class of students is a group of people having a combination of these three learning styles. In this information technology age, the students are no more auditory, but with a learning style of visual and kinesthetic styles. So, when a teacher teaches especially science or engineering, mere lectures alone could not help the students to understand and appreciate the concepts. This stands as a challenge for higher education teachers and motivates them to adapt visual and experimentation based teaching. Digital image processing is the process of processing digital images with various techniques such as restoration, denoising, segmentation, edge detection etc... Now a days, digital image processing plays a vital role in day-to-day life including (not limited to) multimedia communication, medical diagnostics, astronomy, weather forecasting, pattern matching and recognition (Vehicle number plate recognition, finger print and palm print recognition) for security applications, forensics, geographical information systems, human computer interfaces, industrial inspection, document processing, remote sensing and satellite imageprocessing. Teaching digital image processing is a challenge for the young teachers who are handling students of all learning styles. It is worth mentioning the avowal of Confucius, the great Chinese philosopher that «I hear and I forget. I see and I remember. I do and I understand». Hence, Visual and experimental learning methods can influence the students much better than mere lecturing. Digital image processing concepts can easily be understood if they are taught using visual, experimental and interactive methods.

We can definition is a structure or an appearance that is not normally present on the radiograph and is produced by artificial means. Artifacts may occur as a

result of improper handling of the film packet, and accidents incidental to processing of the films and from defects of the film and film packet - rare. We have many kinds of artifact (blocking artifact, the stroboscopic effect, the compression artifact, artifact of the scattering of the image, artifacts of a damaged-contaminated magnetic head... ect).

The blocking artifact is data loss artifacts are characterized as rectangular areas that are significantly outlined on the frame by a sharp transition to another color, with the edges of the transition falling into a grid of 8x8 pixels. Can be perforated with vertical and / or horizontal stripes. The stroboscopic effect is a visual phenomenon caused by aliasing that occurs when continuous motion is represented by a series of short or instantaneous samples. compression artifact Lossy data compression involves discarding some of the media's data so that it becomes simplified enough to be stored within the desired disk space or be transmitted (or streamed) within the bandwidth limitations (known as a data rate or bit rate for media that is streamed). Artifact of the scattering of the image it appears with partial damage to the video stream is characterized by an error in the data on the color component of the image and / or the presence of parts of other frames (usually lines / blocks of different sizes, while they can only be partially replaced by data from other frames). Artifacts of a damaged-contaminated magnetic head we can definition this artifact it is a hard-disk failure that occurs when a read-write head of a hard disk drive comes in contact with its rotating platter, resulting in permanent and usually irreparable damage to the magnetic media on the platter surface. It is most commonly caused by a sudden severe motion of the disk, for example the jolt caused by dropping a laptop to the ground while it is operating or physically shocking a computer. But in this article we will discuss the blocking artifact kinds [1].

The results of processing test images from the database are presented in [2].

The method called NPBM [3], which considers the Perceptual Blockiness Metric, was adopted as a basis.

Features of image processing with artifacts were considered in [3].

In contrast to the work [4], it is proposed to use a probabilistic image quality assessment. As a measure of assessing the quality of images can be used complementary value: the probability of the presence of artifacts of the blocking, or the probabilistic metric. Both values are enclosed in an interval [0; 1]. The probability estimate is determined at the stage of comparing the pixels of images on the so-called gradient map (G), which is obtained as a result of numerical differentiation of a two-dimensional array of halftone image, and pixels on the matrix LPBM (Local Perceptual Blockiness Metric). Pixels (elements) included in both the LPBM and the G are defined. After that is the sample

probability of having non-zero elements in LPBM relative to all values of the matrix LPBM. Nonzero elements correspond to image artifacts, so the probability of nonzero elements is suggested to be used as the probability of presence of image artifacts. Accordingly, the probabilistic metric for evaluating the quality of bitmaps is the addition of the probability of artifacts to one. As shown by numerical experiments, the proposed approach has a positive result only for blocking artifacts. Testing of the proposed approach was carried out on the pictures from the base [2], which are presented in Fig.1 – Fig.6, for which there are results of experts' assessment of their quality [2].



Fig. 1. Im1

Fig. 2. Im89

Fig. 3. Im107

Fig. 4. Im138

Fig. 5. Im154

Fig. 6. Im160

The picture in Fig.4 with explicit blocking artifacts. The picture on Fig.6 of the best quality.

Metrics of experts on the images presented in

Fig. 1 – Fig. 6, are shown in the table 1.

Table 1 – The metric experts

Metric experts	ImageFileName (*.bmp)					
	Im1	Im89	Im107	Im138	Im154	Im168
The quality metric	0.3263	0.45313	0.60102	0.15771	0.16225	1.4703

The results of calculations on the proposed probability metric are presented in table 2.

Table 2 – Numerical metric estimates of test images

Experimental data	ImageFileName (*.bmp)					
	Im1	Im89	Im107	Im138	Im154	Im168
Metric of quality	Red: 0.569241	Red: 0.694399	Red: 0.763325	Red: 0.101445	Red: 0.124096	Red: 0.859208
	Green: 0.569335	Green: 0.690435	Green: 0.759607	Green: 0.111951	Green: 0.134220	Green: 0.858458
	Blue: 0.545537	Blue: 0.678686	Blue: 0.751409	Blue: 0.089633	Blue: 0.112554	Blue: 0.858128
The mean value	0.561371	0.687840	0.758114	0.101010	0.123624	0.858598
Probability of artifacts	Red: 0.430759	Red: 0.430759	Red: 0.305602	Red: 0.236674	Red: 0.898554	Red: 0.875903
	Green: 0.430665	Green: 0.430665	Green: 0.309564	Green: 0.240392	Green: 0.888048	Green: 0.865779
	Blue: 0.454462	Blue: 0.454462	Blue: 0.321313	Blue: 0.248590	Blue: 0.910366	Blue: 0.887445
The average value	0.438629	0.312160	0.241886	0.898990	0.876376	0.141402

Conclusion:

The results from table 1 and table 2 were verified by the rank correlation of Spearman and Kendall. They gave the same results, which showed that between the proposed probability metric and the expert metrics

there is a practically linear positive dependence: 1,000000 with a confidence probability of 0,997222.

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**A METHOD FOR CONTROLLING THE ABNORMAL MODES OF THE SYNCHRONOUS DRIVE MOTOR OF THE ORE-GRINDING MILL
СПОСОБ КОНТРОЛЯ АНОРМАЛЬНЫХ РЕЖИМОВ СИНХРОННОГО ПРИВОДНОГО ДВИГАТЕЛЯ РУДОРАЗМОЛЬНОЙ МЕЛЬНИЦЫ**

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Summary: The necessity of developing a method for comprehensive control of the operating modes of the ore-grinding mill drive motor is substantiated. The difficulties and the main features of controlling the operating modes of the synchronous drive motor of the ore-grinding mill are highlighted. An algorithm and a structure of the system for controlling the abnormal modes of the synchronous drive motor of the ore-grinding mill aimed at preventing premature failure of the motor under different technological conditions are proposed. The proposed algorithm can be used to develop a system of detection and prevention of emergency regimes.

Keywords: abnormal mode, drive motor, algorithm, emergency prevention.

Аннотация: Обоснована необходимость разработки способа всестороннего контроля рабочих режимов приводного двигателя рудоразмольной мельницы. Отмечены трудности и основные особенности контроля рабочих режимов приводного синхронного двигателя рудоразмольной мельницы. Предложены алгоритм и структура системы для контроля аномальных режимов синхронного приводного двигателя рудоразмольной мельницы, направленные для предотвращения преждевременного выхода из строя двигателя при разных технологических условиях. Предлагаемый алгоритм можно использовать для разработки системы обнаружения и предотвращения аварийных режимов.

Ключевые слова: аномальный режим, приводной двигатель, алгоритм, предотвращение аварий.

Введение. Всесторонний анализ методов мониторинга и диагностики показывает, что ни один из практических способов не дает возможность абсолютно достоверно выявить и предотвратить аномальные состояния приводного синхронного двигателя рудоразмольной мельницы [1-5].

Учитывая, что производства, использующие процесс измельчения руды, выделяются значительной энергоемкостью, что, в основном, обусловлено применением мощных синхронных двигателей а также имея в виду, что данный процесс является основополагающим в деле повышения эффективности производства металлических концентратов, особое значение имеют своевременное выявление и

контроль аномальных режимов используемых синхронных двигателей.

Допустимый интервал безаварийной работы приводного синхронного двигателя во многом определяется всесторонним контролем рабочих режимов. Основные трудности контроля рабочих режимов приводного синхронного двигателя рудоразмольной мельницы заключаются в следующем [6]:

- рабочие режимы электродвигателей, используемые в процессе измельчения руды, обусловлены различными технологическими и энергетическими показателями,