METHOD AND DEVICE FOR DIGITAL IMAGE RESTORATION

Technological advantages

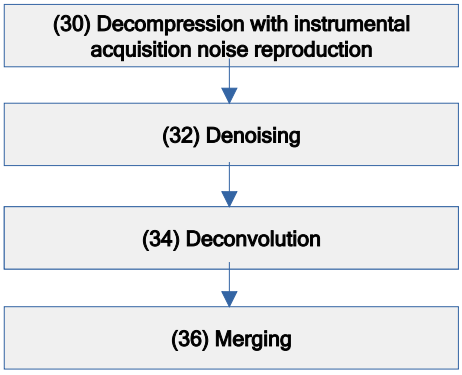
- Restores instrumental noise, improving overall image quality.
- Combines restoration and decompression.
- Uses a parameterized noise model allowing for precise restoration.
- Applies variance stabilization.
- Modular and adaptable: suited to different image types (monospectral, multispectral, hyperspectral).

Invention synthesis

This invention presents a method and device for restoring digital images degraded by both acquisition noise and compression artifacts (particularly in fields like satellite imagery). Instead of simply denoising and de-blurring a compressed image, the invention first restitutes the original instrumental noise during or after decompression. This step effectively transforms the complex, structured artifacts from compression into a more predictable noise type. A key innovation is the use of a variance stabilization transformation, like the Anscombe transform, which makes the re-introduced noise behave like a "stationary" noise. This allows the application of highly effective, standard stationary denoising algorithms. Finally, the image is deconvoluted to improve sharpness. By handling the noise in this specific order, the quality of the final restored image is improved.

Potential applications

- Satellite and aerial imagery: for mapping, environmental monitoring, or military purposes.
- Medical imaging: X-rays, MRIs, or ultrasounds that may suffer from both sensor noise and compression.
- Digital photography: Enhancing photos taken with consumer cameras (especially in low-light conditions).
- Video surveillance: Improving the resolution and quality of compressed video feeds.
- Forensic image analysis: Restoring and analyzing noisy or compressed images for evidence.



Process description:

(30) obtaining an intermediate digital image with restoration of the acquisition instrumental noise

(32) denoising the intermediate digital image

(34) deconvolution of the denoised digital image to obtain a restored digital image

Commercial benefits

- Enhanced product quality: delivers superior restored images compared to conventional methods.
- Increased data value: recover high-quality details from compressed, noisy data (information more valuable).
- Broader market appeal: Applicable to a wide range of industries, from aerospace to healthcare.
- Cost savings: Reduces the need for re-acquisition of images by making existing data more usable.
- Competitive advantage through a unique and effective restoration process.

Patented invention - under license.

For more information :

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