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Noise Model in Digital Image Processing

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Abstract: *Noise is usually presents in digital images during image acquisition, coding, transmission, and processing steps. Noise is extremely difficult to get rid of it from the digital images without the prior knowledge of noise model. That's why, review of noise models are essential within the study of image denoising techniques. In this paper, we express a quick overview of varied noise models. These noise models are often selected by analysis of their origin. During this way, we present an entire and quantitative chemical analysis of noise models available in digital images.*
Keywords: *Noise Model, fractal, Salt and noise paper, periodic noise, photon Noise.*

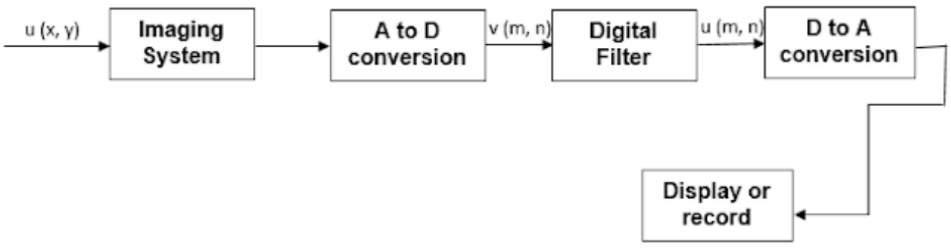
I. Introduction:

Time to time we've to wish the reinforcement learning of theoretical and practical ideas of entilt noises present in digital images. Here, we try to present the answer of all these problems through the review of noise models. In this paper, the literature survey is predicated on statistical concepts of noise theory. We start with noise and therefore the roll of noise in image distortion. Noise is random signal. It's wont to destroy most of the part of image information. Image distortion is most pleasance problems in image processing. Image distorted thanks to various sorts of noise like Gaussian noise, Poisson noise, Speckle noise, Salt and Pepper noise and lots of more are fundamental noise types just in case of digital images. These noises could also be came from a noise sources present within the vicinity of image capturing devices, faulty memory location or could also be introduced thanks to imperfection/inaccuracy in the image capturing devices like cameras, misaligned lenses, weak focal distance, scattering and other adverse conditions could also be present within the atmosphere. This makes careful and in-depth study of noise and noise models are essential ingredient in image denoising. This results in selection of proper noise model for image denoising systems.

II. Noise Models:

Noise tells unwanted information in digital images. Noise produces undesirable effects like artifacts, unrealistic edges, unseen lines, corners, blurred objects and disturbs background scenes. To reduce these undesirable effects, prior learning of noise models is important for further processing. Digital noise may arise from various sorts of sources like Charge Coupled Device (CCD) and Complementary Metal Oxide Semiconductor (CMOS) sensors. In some sense, points spreading function (PSF) and modulation transfer function (MTF) are used for timely, complete and quantitative chemical analysis of noise models. Probability density function (PDF) or Histogram is additionally wont to design and characterize the noise models. Here we'll discuss few noise models, their types and categories in digital images.

DIAGRAM



(Figure: - Digital Image Restoration System)

FRACTAL NOISE

Colored noise has many names inclusive of Brownian noise or crimson noise or flicker noise or 1/f noise. However this noise follows non desk bound stochastic technique. This technique follows normal distribution. Statistically fractional Brownian noise is referred to as fractal noise. Fractal noise is due to natural process.

SALT AND PEPPER NOISE

This is likewise called statistics drop noise due to the fact statistically its drop the original statistics values. This noise is likewise referred as salt and pepper noise. However the image is not absolutely corrupted by salt and pepper noise rather than a few pixel values are changed inside the image.

PERIODIC NOISE

This noise is generated from electronics interferences, especially in energy signal for the duration of image acquisition.

This noise has special characteristics like spatially based and sinusoidal in nature at multiples of particular frequency. It's appears in shape of conjugate spots in frequency domain. It may be effectively eliminated by the usage of a narrow band reject filter or notch filter.

PHOTON NOISE (POISSON NOISE)

The appearance of this noise is seen because of the statistical nature of electromagnetic waves such as x-rays, seen lighting and gamma rays. The x-ray and gamma ray resources emitted number of photons in step with unit time. These rays are injected in patient's frame from its source, in scientific x rays and gamma rays imaging systems. These assets are having random fluctuation of photons.

Result gathered picture has spatial and temporal randomness. This noise is also known as quantum (photon) noise or shot noise.

III. Conclusion

During image acquisition and transmission, noise is visible in images. This is characterized by means of noise version. So observe of noise version is very critical component in photo processing.

On the other hand, Image denoising is necessary motion in image processing operation. Without the previous knowledge of noise model we can't complex and perform denoising actions.

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