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Article

A Review on Single Image Super Resolution

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A B S T R A C T

An important vision application is rebuilding single low-Resolution (LR) image from High-Resolution (HR) image. Many algorithms successfully planned in recent years shows efficient and robust single-image Super-Resolution (SR) rebuilding but it still seemsinspiring by several factors, such ascomputational load, necessary huge exemplar images, inherent ambiguous mapping between the HR-LR images, etc. Inspired by simple mapping functions method, a mapping matrix table of HR-LR feature patches is calculated in the training phase. The objective of SR is to enhance the resolution of a given LR image, which is anunremitting ongoing process in image technology, using up-sampling, de-blurring, de-noising, etc. To rebuildan image into a HR image correctly, it is necessary to inject high frequency components of a low-resolution image. In requests like,medical diagnosis, satellite imaging, video surveillance, face recognition,forensic investigationand pattern recognition, it develops essential to extract the important information from the images. During such process, zooming the image after a certain limit results in a blurred image with no useful information. Hardware limitations of sensors is one of the main causes behind this problem. Also, main objective behind achieving HR images is not to hamper the observable quality of the image.

Keywords: Super Resolution, High Resolution, Low Resolution

Introduction

In utmost of the electronic imaging uses, images with HR are obligatory. HR depicts that pixel density within an image is high, and consequently a High-Resolution image can show more details that can be significant in various uses. E.g. High-Resolution medical images are critical for doctors to make a correct diagnosis by distinguishing an entity from alike ones, HR satellite images and in various uses which requires pattern recognition. Since 1970's Charge Couple Devices (CCD) and CMOS image sensors have been widely used to capture digital images. With increasing picture resolution level these methods will not content future demands.[1] At the present time, customers demand low-costHigh-Resolution camera/camcorder with no visible artifacts when an image is exaggerated. The Information transferred using imaging system is very useful in surveillance, forensic, satellite, medical and scientific backgrounds. Accuracy of the images plays a vital role in uses where severity is critical. This can be achieved using Super resolution practice. Hence to develop software which will take LR images as input and produce its HR image as output.[2] SR image rebuilding is one of the utmost spotlighted research areas, because it can give better solution to the inherent resolution restraint of the imaging system andprogress the act of digital image processing uses.[3]

Literature Survey

- Anchored Neighborhood Regression Based Single Image Super-Resolution from Self Instances

Resultplanned in [1] shows an anchored neighborhood regression built single image SR technique which produces training samples from input image deprived of using external images.

- Robust Single Image Super-Resolution via Deep Networks with Sparse Prior

Resultstated in [2] shows a method combining the strength of both sparse coding and deep network making considerable development in the result of deep and shallow SR models.

- Learning a Deep Convolutional Network for Image Super-Resolution

Resultplanned in [3] introduces SCRNN which has an end to end mapping between low- and high-resolution images along with extra per/post processing after optimization. The average achieved gains are 0.51 dB, 0.47 dB, 0.40 dB.

- Single Image Super Resolution via Locally Regularized Anchored Neighborhood Regression and Nonlocal Means

Resultstated in [4] refers locally regularized anchor neighborhood referred as LANR-NLM. It selects similar dictionaries atoms by applying locality constraint and assigns different freedom to each atom depending upon its correlation with the input LR patch.

- Fusion of hyperspectral and multispectral images using spectral unmixing and sparse coding.

Resultstated in [5] shows technique to improve spatial resolution using spectral un-mixing and sparse coding (SUSC). This technique tries to lessening spectral distortions from a dictionary of dissimilarhigh spatial resolution images using amalgamation of spectral mixing model.

- Learning-Based Joint Super-Resolution and Deblocking for a Highly Compressed Image.

Consequencestated in [6] shows learning built SR framework to realize de-blocking and joint single image SR using sparse depiction for modeling relationship between HR and LR patches (with and without blocking artifacts).

- Learning-Based Joint Super-Resolution and Deblocking for a Highly Compressed Image grounded on MCA based image decomposition.

Consequencestated in [7] shows learning built SR framework

Table I.Results in Terms of Test Time (SEC) and PSNR (DB)

Title of the paper	Comparison Parameters		
	Method	Enhance ment	Metric
Anchored Neighborhood Regression Based Single Image Super-Resolution from Self Examples	SR ALGORITHM	Visual quality improvement	PSNR (36.89) SSIM (0.9629)
Robust Single Image Super-Resolution via Deep Networks With Sparse Prior	CSCN	Visual quality improvement	PSNR (37.00)
Learning a Deep Convolutional Network for Image Super-Resolution	SRCNN	Visual quality improvement	PSNR (40.64) Execution time(0.10)
Single Image Super Resolution via Locally Regularized Anchored Neighborhood Regression and Nonlocal Means	LANRNLM	Visual quality improvement	PSNR (31.93) SSIM (0.8958)
Fusion of hyperspectral and multispectral images using spectral unmixing and sparse coding.	SUSC	Visual quality improvement and fast execution time	PSNR (32.3) TIME (551.36)
Learning-Based Joint Super-Resolution and Deblocking for a Highly Compressed Image	Stated Sparse coding super resolution (SCSR)	Fast execution time	Execution time (121.9 s)
Learning-Based joint Super-Resolution and Deblocking for a Highly Compressed Image	Sparse representation and MCA based image decomposition	Visual quality improvement	Time (153.74)
Hyper spectral image super-resolution via nonnegative structured sparse representation	NSSR	Fast execution time	PSNR (42.26) RMSE (2.21) SAM(4.33) ERGAS (0.30)

to achieve de-blocking and joint single image SR using sparse depiction for modeling relationship between HR and LR patches.

- Hyper spectral image super-resolution via nonnegative organized sparse illustration.

Consequencestated in [8] designates sparse based hyper-spectral image super resolution method. To accomplish this,non-negative dictionary learning algorithm is castoff with block-coordinate algorithm.

Conclusion

This paper brings out a review about the need of single image super resolution. The SISR that is single-image super-resolution helps in reconstruction of poor resolution image. This reconstruction of image is deeply depending on many factors. It improves the poor resolution of low-resolution image. For the same it injects high frequency components in it which improves visible quality of the image.

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