International Journal of advancement in electronics and computer engineering (IJAECE)
Volume 6, Issue 1, January 2017, pp.101-104, ISSN 2278 -1412

Review of Edge-Guided Single Depth Image Super Resolution

Priya Pandey[1], Maneela Jain[2]
[1]*M.tech Scholar, Adina Institute of Science And Technology, Sagar, erpriyapandey10@gmail.com, India;*
[2], *Asst. Prof., Adina Institute of Science and Technology, Sagar, maneelajain.adina@gmail.com, India;*

Abstract – *In this paper a review of develop a spatially adaptive total variation model. At first, the spatial information is extracted supported each and every pixel, and at that point 2 filtering process are added to restrain the impact of pseudo edges. In addition of this, the spatial info weight is built and classified with k-means clustering, and also the regularization strength in every region is controlled by center value of the cluster. The exploratory results, on both simulated and genuine datasets, demonstrate that the proposed methodology can adequately diminish the pseudo edges of the total variation regularization in the flat areas, and keep up the partial smoothness of the HR images.*

***Keywords**: Single depth image, super resolution, edge-guided, joint bilateral up-sampling, Markov random field,*

I. Introduction

Resolution symbolism plays a key part in numerous different ranges of use, for example restorative imaging, video surveillance and remote sensing. On the other hand, in light of the fact that there are various constraints with both the hypothetical and practical viewpoints, for example, the sensor resolution and high cost, among different things, it's obviously harder to acquire a HR image than a low-resolution image. Thus, scientists have investigated approaches to get a HR image from the image processing aspects and recently the super-resolution (SR) technology which produces a High resolution image from single or multi frame Low resolution has been proposed. Our examination is principally centered on the multiframe image SR issue, the methodology of reconstruct a HR image from the sequence of LR image.

The word image resolution can be defined as the smallest visible or measurable detail in a visual presentation which refers the spacing of pixels in an image. The greater the number of pixels in an image the higher the spatial resolution of an image. In imaging applications, high resolution images are required. A high resolution image can only be obtained by decreasing the pixel size and if the pixel size reduces than the amount of light available also reduces which results in shot noise and degrades an image, so the pixel size can decrease to a certain extent.

Hence we need post processing that enable us to produce high resolution image. To obtain high resolution image from one or more observed low resolution images by using some signal processing techniques. Super resolution is therefore the problem of producing high resolution image from one or more low resolution images. Restoration methods increase pixel resolution by correcting artifacts like blurring, aliasing, noise etc. Reconstruction and restoration process in super resolution can produce high resolution and high fidelity images than the lower resolution images.The super resolution process involves three main tasks: aliasing free up sampling of an image which increases the maximum spatial frequency and removes degradation that comes during an image capturing .i.e. blur and noise. Even the super resolution process tries to produce the missed high frequency component and minimizing aliasing, blurring and noise. Therefore, this has been a field of extreme research and to obtain high resolution image lot of different methods have been proposed

II. Literature Survey

Rogerio Schmidt Feris et. al. [1] "Edge-Guided Single Depth Image Super Resolution" In this paper, a completely unique framework for the one depth image super resolution is projected. In our framework, the up scaling of a single depth image is guided by a high-resolution edge map, that is made from the edges of the low-resolution depth image through a Markov random field optimization in an exceedingly patch synthesis based mostly manner. We additionally discover the self-similarity of patch in the edge structure stage, once limited training information are available. With the guidance of the high-resolution edge map, we tend to propose up sampling the high-resolution depth image through an adapted shared bilateral filter. The edge based management not only helps avoiding artifacts introduced by direct texture calculation, but also decrease jagged object and conserve the sharp edges. Experimental results demonstrate the effectiveness of our methodology both qualitatively and quantitatively compared with the state-of-the-art ways. We present a completely unique framework for single depth image super resolution guided by a created high resolution edge map. Motivated by the concept that edges are of specific importance within the texture less depth image, we tend to convert the super resolution difficulty from high resolution texture prediction to high resolution edge prediction. We tend to construct the high resolution edge map by transmit it as a MRF labeling difficulty. Moreover, we additionally propose incorporating self-similarity edge patch match during the edge prediction process, when an external training dataset isn't available. Then guided by means of the edge map, we recommend interpolating the high resolution depth image employing a modified joint bilateral filter.

Kwang In Kim et. al. [2] “Single-Image Super-resolution Using Sparse Regression and Natural Image Prior” This paper proposes a framework for single-image super-resolution. The underlying plan is to find out a map from input low-resolution images to focus on high-resolution photos based on example pairs of input and output pictures. Kernel ridge regression (KRR) is adopted for this purpose. To reduce the time complexity of training and testing for KRR, a sparse solution is found by combining the ideas of kernel matching pursuit and gradient descent. As a regularized solution, KRR results in a better robust an improved generalization than simply storing the examples as it has been done in existing example-based algorithms and leads to much less noisy images. However, this may introduce blurring and ringing artifacts around major edges as sharp changes are penalized severely. A prior model of a generic image class which takes into account the discontinuity property of images is adopted to resolve this drawback. Except for the preprocessing part (interpolation and thus the calculation of Laplacian), the projected methodology is application agnostic, i.e., the training half is independent of specific drawback at hand. In principle, this generic learning part is applied to any downside when suitable examples of input and target output images are available. Consequently, future work will include exploring the potential of learning-based approaches, including the projected methodology, for various image enhancement and understanding applications.

Shenlong Wang et. al. [3] “Semi-Coupled Dictionary Learning with Applications to Image Super-Resolution and Photo-Sketch Synthesis” In various computer vision applications, usually we want to convert an image in one style into another style for better visual image, interpretation and recognition; for examples, up-convert a low resolution image to a high resolution one, and convert a face sketch into a photo for matching, etc. A semi-coupled dictionary learning (SCDL) model is projected in this paper to solve such cross-style image synthesis issues. Under SCDL, a pair of dictionaries and a mapping function are going to be simultaneously learned. The dictionary pair can well characterize the structural domains of the 2 types of images, while the mapping function can reveal the intrinsic relationship between the 2 styles’ domains. In SCDL, the 2 dictionaries won't be fully coupled, and thus much flexibility are often given to the mapping function for an accurate conversion across styles. Moreover, clustering and image nonlocal redundancy are introduced to enhance the robustness of SCDL. In this paper, we tend to project a completely unique semi-coupled dictionary learning (SCDL) framework for cross-style image synthesis. SCDL jointly optimizes the dictionary pair and therefore the mapping function in the sparse domain. The learned dictionary pair can't only make sure the style-specific data fidelity but also span the hidden spaces for stable mapping between image styles. The projected SCDL is adapted to applications of image super-resolution and photo-sketch synthesis, and shows very competitive performance with state-of-the arts.

Jian Sun et. al. [4] “Context-Constrained Hallucination for Image Super-Resolution” This paper proposes a context-constrained hallucination approach for image super-resolution. Through building a training set of high-resolution/low-resolution image segment pairs, the high-resolution pixel is hallucinated from its texturally similar segments that are retrieved from the training set by texture similarity. Given the discrete hal-lucinated examples, a continuous energy function is de-signed to enforce the fidelity of high-resolution image to low-resolution input and therefore the constraints imposed by the hal-lucinated examples and therefore the edge smoothness previous. The re- constructed high-resolution image is sharp with minimal artifacts both along the edges and in the textural regions. This paper projected a context-constrained hallucination approach by learning high-resolution examples from the texturally similar training segments. This hallucination approach helps to introduce reasonable high frequency details in results. Then an easily-optimized energy function combining the hallucinated examples, edge smoothness constraint and high-resolution image reconstruction constraint was projected. We’ve got shown that our methodology produces better textures and comparable sharp edges compared with the other state-of-the-art super-resolution methodology.

Wenhan Yang et. al. [5] “Deep Edge Guided Recurrent Residual Learning for Image Super-Resolution” In this work, we tend to consider the image super-resolution (SR) problem. The main challenge of image SR is to recover high-frequency details of a low-resolution (LR) image that are necessary for human perception. To address this primarily ill-posed downside, we tend to introduce a Deep Edge radio-controlled perennial residual (DEGREE) network to increasingly recover the high frequency details. Different from most of existing strategies that aim at predicting high-resolution (HR) pictures directly, DEGREE investigates an alternate route to recover the difference between a pair of LR and hr images by recurrent residual learning. DEGREE additional augments the SR method with edge-preserving capability, specifically the LR image and its edge map will jointly infer the sharp edge details of the hr image during the recurrent recovery process. To speed up its training convergence rate, by-pass connections across multiple layers of DEGREE are created. in this paper, we projected a deep edge guided recurrent residual network for image SR. the edge info is separated out from the image signal to guide the recovery of the hr image. The extracted LR edge maps are used as components of the input features and therefore the hr edge maps are utilized to constrain the training of components of feature maps for image reconstruction. The recurrent residual learning structure with by-pass connections permits the training of deeper networks. Extensive experiments have validated the effectiveness of our methodology for producing hr pictures with richer details. Furthermore, this paper presented a general framework for embedding various natural image priors into image process tasks.

III. Method

III .1. Super-resolution

Please Methods for super-resolution are often broadly speaking classified into 2 families of methods: (i) The classical multi-image super-resolution (combining images obtained at sub pixel misalignments), and (ii) Example-Based super-resolution (learning correspondence between low and high resolution image patches from a database). During this paper we tend to propose a unified framework for combining these 2 families of methods. We tend to further show how this combined approach is often applied to obtain super resolution from as very little as a single image (with no info or prior examples). Our approach is based on the observation that patches in a natural image tend to redundantly recur many times inside the image, both inside an equivalent scale, as well as across completely different scales. Recurrence of patches within the same image scale (at sub pixel misalignments) provides rise to the classical super-resolution, whereas recurrence of patches across completely different scales of a similar image provides rise to example-based super-resolution. Our approach attempts to recover at each pixel its best possible resolution increase based on its patch redundancy inside and across scales. The goal of Super-Resolution (SR) methods is to recover a high resolution image from one or more low resolution input images. Methods for SR are often generally classified into 2 families of methods: (i) The classical multi-image super-resolution, and (ii) Example-Based super-resolution. Within the classical multi-image SR a set of low-resolution images of an equivalent scene are taken (at sub pixel misalignment). Each low resolution image imposes a set of linear constraints on the unknown high resolution intensity values. If enough low-resolution images are available (at sub pixel shifts), then the set of equations becomes determined and might be solved to recover the high-resolution image. Practically, however, this approach is numerically limited only to small will increase in resolution (by factors smaller than 2). These limitations have caused the development of Source patches in I are found in several locations and in different image scales of I (solid-marked squares). The high-res corresponding parent patches (dashed-marked squares) give an indication of what the (unknown) high-res parents of the source patches may seem like. "Example-Based Super-Resolution" additionally termed "image hallucination" In example-based SR, correspondences between low and high resolution image patches are learned from a information of low and high resolution image pairs (usually with a relative scale factor of 2), then applied to a brand new low-resolution image to recover its possibly high-resolution version. Higher SR factors have typically been obtained by repeated applications of this method.

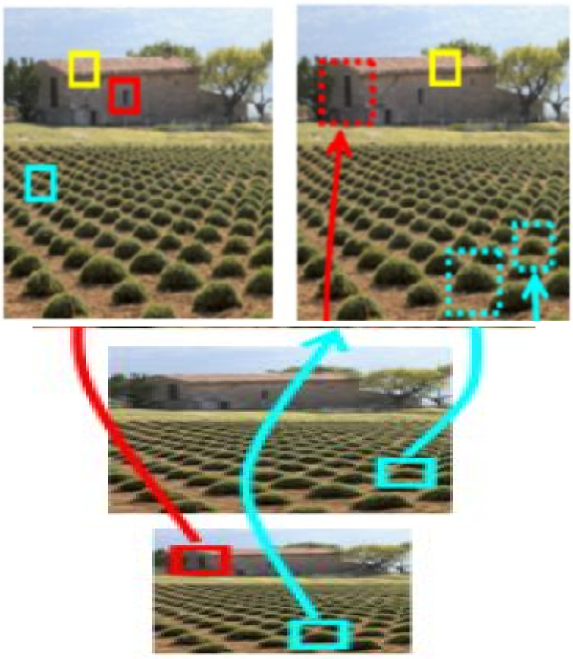

Fig.1 (a): Input Image I (b): Various Scales of I (c): Patch Recurrence Within and Across Scales of a Single Image

Digital image processing is an area characterized by the need for extensive experimental work to establish the viability of proposed solutions to a given problem. An important characteristic underlying the design of image processing systems is the significant level of testing &

experimentation that normally is required before arriving at an acceptable solution. This characteristic implies that the ability to formulate approaches &quickly prototype candidate solutions generally plays a major role in reducing the cost & time required to arrive at a viable system implementation.

IV. Conclusion

This paper has reviewed the mainly latest research trends and proposed the Regional spatially adaptive (RSATV) super-resolution calculation with spatial data filtering and clustering. The spatial data is initially extricated for every pixel, and after that the spatial data filtering procedure and spatial weight clustering methodology are included. In this paper review of different techniques of image super resolution.

References

[1] Xie, Jun, Rogerio Schmidt Feris, and Ming-Ting Sun. "Edge-guided single depth image super resolution." IEEE Transactions on Image Processing 25.1 (2016): 428-438.

[2] Kim, Kwang In, and Younghee Kwon. "Single-image super-resolution using sparse regression and natural image prior." IEEE transactions on pattern analysis and machine intelligence 32.6 (2010): 1127-1133.).

[3] Wang, Shenlong, et al. "Semi-coupled dictionary learning with applications to image super-resolution and photo-sketch synthesis." Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on. IEEE, 2012.).

[4] Sun, Jian, Jiejie Zhu, and Marshall F. Tappen. "Context-constrained hallucination for image super-resolution." Computer Vision and Pattern Recognition (CVPR), 2010 IEEE Conference on. IEEE, 2010.

[5] Yang, Wenhan, et al. "Deep Edge Guided Recurrent Residual Learning for Image Super-Resolution." arXiv preprint arXiv:1604.08671 (2016).

[6] H. Greenspan, “Super-resolution in medical imaging” Comput. J,ol. 52, no. 1, page No. 43–63, Jan. 2009.

[7] Huang X., Zhang L., and P. Li, “Classifi. and extrac. of spatial features in urban areas using high-res. multispectral imagery” IEEE Trans. Geo sci. Remote Sens. Lett., vol. 4, no. 2, pp. 260–264,Apr. 2007.

[8] X. Huang and L. Zhang, “An adaptive mean-shift analysis approach for object extraction and classification from urban hyper spectral imagery” IEEE Trans. Geo sci. Remote Sens., vol. 46, no. 12, pp. 4173–4185,Dec. 2008.

[9] L. Zhang, H. Zhang, H. Sheen, and P. Li, “A super-resolution reconstruction algorithm for surveillance images” Signal Process. vol. 90, no. 3, pp. 848–859, 2010.

[10] R. Tsai and T. Huang, “Multiple frame image restoration and registration” Adv. Comput. Vis. Image Process., vol. 1, no. 2, pp. 317–339, 1984.