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An GPS Based Face Recognition Using DWT Algorithm

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ABSTRACT

The aim of single image super-resolution is to construct a high resolution (HR) image from a low resolution (LR) image input. In the existing system**,** a novel image super resolution algorithm is proposed based on gradient profile sharpness (GPS). GPS is an edge sharpness metric, which is extracted from two models i.e, triangular model and gradient Gaussian mixture models. However recovered high-resolution image has little observable limitations. The proposed work is based on, considering an motion image and extract the image using segmentation process. The segmented image is compared with the stored image which is in database. It is mainly used for security purpose. The DWT-Based Adaptive Edge Map algorithm is used to overcome the limitation of the existing system. The location of edges can be accurately estimated using wavelet representation. The experimental results showed that the Points to Signal Ratio (PSNR) value of the proposed system is more accurate when compared to the existing system.

Index Terms— *Single image super-resolution, gradient profile sharpness, gradient profile transformation, discrete wavelet transform.*

I. INTRODUCTION

An image is a rectangular grid of pixels. It has a definite height and a definite width counted in pixels. Each pixel is square and has a fixed size on a given display. However different computer monitors may use different sized pixels.
There are two parts to the image formation process:
The geometry of image formation, which determines where in the image plane the projection of a point in the scene, will be located, and also the physics of light, which determines the brightness of a point in the image plane as a function of illumination and surface properties. Image Processing is a technique to enhance raw images received from cameras/sensors placed on satellites, space probes and aircrafts or pictures taken in normal day-to-day life for various applications.
Various techniques have been developed in Image Processing during the last four to five decades. Most of the techniques are developed for enhancing images obtained from unmanned spacecrafts, space probes and military reconnaissance flights. Image Processing systems are becoming popular due to easy availability of powerful personnel computers, large size memory devices, graphics software etc.
This is the first step or process of the fundamental steps of digital image processing. Image acquisition could be as simple as being given an image that is already in digital form. Generally, the image acquisition stage involves pre-processing, such as scaling etc. Image restoration is an area that also deals with improving the appearance of an image. However, unlike enhancement, which is subjective, image restoration is objective, in the sense that restoration techniques tend to be based on mathematical or probabilistic models of image degradation.
Segmentation procedures partition an image into its constituent parts or objects. In general, autonomous segmentation is one of the most difficult tasks in digital image processing. A rugged segmentation procedure brings the process a long way toward successful solution of imaging problems that require objects to be identified individually.
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II. RELATED WORK

A literature review is a description of a scholarly paper, which gives a current knowledge about the various techniques. The following is the survey of the related papers to this project which explains the technology along with its merits and demerits.
Xiangjun Zhang.,et al [1] suggested that one of the most important quality metrics of digital images is spatial resolution. Despite steady increase of native sensor resolutions of digital cameras and scanners, new applications will always emerge that demand even higher spatial resolution. Image interpolation is an algorithmic means to increase the native resolution of an input image. An obvious application of image interpolation is the reproduction of images captured by digital cameras for high quality prints in magazines, catalogs, wall posters, or even home use. Another important application is up conversion of standard-definition video frames for playback

on high-definition television receivers and computer monitors. Besides consumer electronics, image interpolation is beneficial and in some cases even necessary in computer vision, surveillance, medical imaging, remote sensing, and other fields. we propose a soft-decision interpolation technique that estimates missing pixels in groups rather than one at a time. The new technique learns and adapts to varying scene structures using a 2-D piecewise autoregressive model. The model parameters are estimated in a moving window in the input low-resolution image.. This new image interpolation approach preserves spatial coherence of interpolated images better than the existing methods, and it produces the best results so far over a wide range of scenes in both PSNR measure and subjective visual quality. Edges and textures are well preserved, and common interpolation artifacts (blurring, ringing, jaggies, zippering, etc.) are greatly reduced .The merits of this paper are it provides more optimization results and takes less time for computation .The demerit of this paper is it also tends to blur some sharp edges.

Fei Zhou,.et al[2] suggested that image super-resolution (SR) has been extensively studied to solve the problem of limited resolution in imaging devices for decades. It has wide applications in video surveillance, remote imaging, medical imaging, etc. The idea of SR is to reconstruct a high-resolution (HR) image from aliased low-resolution (LR) images. There are four main classes of methods to estimate the pixel values in HR grids, i.e., frequency-domain approaches, learning-based approaches, iterative HR image reconstruction techniques and interpolation-based approaches. Some literature works consider the filtering approaches as a separate class, but in this paper, they are included in interpolation-based approaches since both interpolation and filtering can be expressed in the form of a weighted sum.
With this method, the reconstructed high-resolution images preserve image details effectively without any hypothesis on image prior. Furthermore, we extend our method to a more general noise model. Experimental results on the simulated and real-world data show the superiority of the proposed method in both quantitative and visual comparisons .The merits of this paper are it reduces the redundancy values significantly and we can achieve the high order information effectively .The demerit of this paper is some cases the model parameters are still unsolved.

Xinwei Gao,.et al[3] suggested that in this scenario, we propose a novel image interpolation algorithm, which is formulated via combining both the local autoregressive (AR) model and the nonlocal adaptive 3-D sparse model as regularized constraints under the regularization framework. Estimating the high-resolution image by the local AR regularization is different from these conventional AR models, which weighted calculates the interpolation coefficients without considering the rough structural similarity between the low-resolution (LR) and high-resolution (HR) images. Then the nonlocal adaptive 3-D sparse model is formulated to regularize the interpolated HR image, which provides a way to modify these pixels with the problem of numerical stability caused by AR model. In addition, a new Split-Bergman based iterative algorithm is developed to solve the above optimization problem iteratively. Experiment results demonstrate that the proposed algorithm achieves significant performance improvements over the traditional algorithms in terms of both objective quality and visual perception. The merits of this paper are it provides high consistency values and produces better visual quality. The demerit of this paper is that it has issue with accuracy metrics.

Gilad Freedman,.et al [4]suggested that we propose a new high-quality and efficient single-image up scaling technique that extends existing example-based super-resolution frameworks. In our approach we do not rely on an external example database or use the whole input image as a source for example patches. Instead, we follow a local self-similarity assumption on natural images and extract patches from extremely localized regions in the input image. This allows us to reduce considerably the nearest-patch search time without compromising quality in most images. Moreover, the new filters are nearly-bi orthogonal and hence produce high-resolution images that are highly consistent with the input image without solving implicit back-projection equations. The local and explicit nature of our algorithm makes it simple, efficient and allows a trivial parallel implementation on a GPU. We demonstrate the new method ability to produce high-quality resolution enhancement, its application to video sequences with no algorithmic modification, and its efficiency to perform real-time enhancement of low resolution video standard into recent high-definition formats. The merits of this paper are it produces high quality results and also increases the system performance in superior. The demerit of this paper is that has issue with noisy result.

G. Yu,.et al [5] suggested that recently, very impressive image restoration results have been obtained with local patch-based sparse representations calculated with dictionaries learned from natural images. Relative to pre-fixed dictionaries such as wavelets, curve lets, and band lets, learned dictionaries enjoy the advantage of being better adapted to the images, thereby enhancing the sparsely. However, dictionary learning is a large-scale and highly non-convex problem. It requires high computational complexity, and its mathematical behavior is not yet well understood. In the dictionaries aforementioned, the actual sparse image representation is calculated with relatively expensive non-linear estimations, such as l1 or matching pursuits. More importantly, as will be reviewed in Section III-A, with a full degree of freedom in selecting the approximation space (atoms of the dictionary), non-linear sparse inverse problem estimation may be unstable and imprecise due to the coherence of the dictionary. A general framework for solving image inverse problems is introduced in this paper. The approach is based on Gaussian mixture models, estimated via a computationally efficient MAP-EM algorithm. A dual mathematical interpretation of the proposed framework with structured sparse estimation is described, which shows that the resulting piecewise linear estimate stabilizes the estimation when compared to traditional sparse inverse problem techniques. This interpretation also suggests an effective dictionary motivated initialization for the MAP-

EM algorithm. We demonstrate that in a number of image inverse problems, including in painting, zooming, and deblurring, the same algorithm produces either equal, often significantly better, or very small margin worse results than the best published ones, at a lower computational cost. The merits of this paper are, it increases the efficiency and accuracy of the scenario and also reduces the error rate prominently. The demerit of this paper is it has issue with time complexities.

Wei Xu,.et al[6] suggested that image super-resolution (SR) is the problem of recovering high resolution (HR) images from low resolution (LR) inputs. This problem is of great practical interest, especially to video communication, object recognition, HDTV, image compression, etc. This is a very challenging task, especially when only one single low resolution input image is available as is very often the case. This paper mainly focuses on this case.Designing effective image priors is of great interest to image super-resolution, which is a severely under-determined problem. Edge smoothness prior is favored since it is able to suppress the jagged edge artifact effectively. However, for soft image edges with gradual intensity transitions, it is generally difficult to obtain analytical forms for evaluating their smoothness. This paper characterizes soft edge smoothness based on a novel Soft Cuts metric by generalizing the Geocuts method. The proposed soft edge smoothness measure can approximate the average length of all level lines in an intensity image. Thus the total length of all level lines can be minimized effectively by integrating this new form of prior. In addition, this paper presents a novel combination of this soft edge smoothness prior and the alpha matting technique for color image super-resolution, by adaptively normalizing image edges according to their α-channel description. This leads to the adaptive Soft Cuts algorithm, which represents a unified treatment of edges with different contrasts and scales. Experimental results are presented which demonstrate the effectiveness of the proposed method .The merits of this paper are it is fast for execution and the quality of image is improved significantly .The demerit of this paper is that it has issue with inaccuracy results.

J. Yang,.et al[7] suggested that conventional approaches to generating a super resolution (SR) image require multiple low-resolution images of the same scene, typically aligned with sub-pixel accuracy. The SR task is cast as the inverse problem of recovering the original high-resolution image by fusing the low-resolution images, based on assumptions or prior knowledge about the generation model from the high-resolution image to the low-resolution images. The basic reconstruction constraint is that applying the image formation model to the recovered image should produce the same low-resolution images. However, because much information is lost in the high-to-low generation process, the reconstruction problem is severely underdetermined, and the solution is not unique. This proposed system address the problem of generating a super resolution (SR) image from a single low-resolution input image. The low-resolution image is viewed as down sampled version of a high-resolution image, whose patches are assumed to have a sparse representation with respect to an over-complete dictionary of prototype signal atoms. The principle of compressed sensing ensures that under mild conditions, the sparse representation can be correctly recovered from the down sampled signal. We will demonstrate the effectiveness of sparsely as a prior for regularizing the otherwise ill-posed super-resolution problem. We further show that a small set of randomly chosen raw patches from training images of similar statistical nature to the input image generally serve as a good dictionary, in the sense that the computed representation is sparse and the recovered high-resolution image is competitive or even superior in quality to images produced by other SR methods. The merit of this paper is that it gives high image quality. The demerits of this paper are, does not properly investigate e within-category variation, the number of raw sample patches.

Oisin Mac Aodha,.et al[8]suggested that the system introduced an algorithm to synthetically increase the resolution of a solitary depth image using only a generic database of local patches. Modern range sensors measure depths with non-Gaussian noise and at lower starting resolutions than typical visible-light cameras. While patch based approaches for up sampling intensity images continue to improve, this is the first exploration of patching for depth images. We match against the height field of each low resolution input depth patch, and search our database for a list of appropriate high resolution candidate patches. Selecting the right candidate at each location in the depth image is then posed as a Markov random field labelling problem. Four factors enabled our algorithm to produce attractive depth reconstructions. Critically, we saw an improvement when we switched to low resolution searches for our unary potentials, unlike almost all other algorithms. Second, special depth-rendering of clean computer graphics models depicting generic scenes outperforms training on noisy laser scan data. It is important that these depths are altered and down sampled for training, along with a pre-selection stage that favours areas near gradients. Third, the normalization based on min/max values in the low resolution input allows the same training patch pair to be applied at various depths. Finally, we have the option for reining our high resolution depth output using a targeted noise removal algorithm. The merit of this paper is better accuracy. The demerit of this paper is that if has low local signal to noise ratio.

J. Sun, Z. Xu,.et al[9] suggested that the goal of single image super-resolution is to estimate a hi-resolution (HR) image from a low-resolution (LR) input. There are mainly three categories of approach for this problem: interpolation based methods, reconstruction based methods, and learning based methods. The proposed system introduced an image super-resolution approach using a novel generic image prior – gradient profile prior, which is a parametric prior describing the shape and the sharpness of the image gradients. Using the gradient profile prior learned from a large number of natural images, we can provide a constraint on image gradients when we estimate a hi-resolution image from a low-resolution image. The gradient constraint helps to sharpen the details and suppress ringing or jaggy artifacts along edges. Encouraging results are obtained on a variety of natural and synthetic images. For noisy input LR image, estimating the gradient profile might be inaccurate due to the noise. One possible solution is to denies the LR image first, and then add the up-sampled noises back after the image super-resolution.the merit of are paper is High quality reconstruction images. The demerit of this paper is, that it does not suitable for video super-resolution.

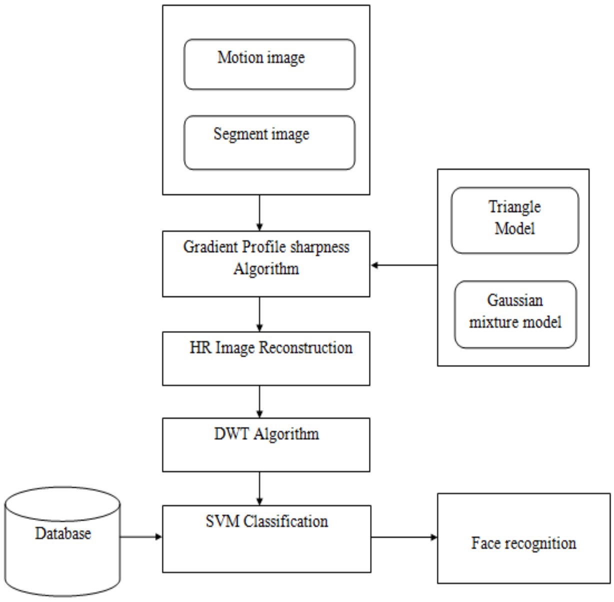
III. SYSTEM DESIGN

EXISTING SYSTEM

In this system, a novel image super resolution algorithm is proposed based on gradient profile sharpness (GPS). GPS is an edge sharpness metric, which is extracted from two gradient description models, i.e., a triangle model and a Gaussian mixture model for the description of different kinds of gradient profiles. Then, the transformation relationship of GPSs in different image resolutions is studied statistically, and the parameter of the relationship is estimated automatically. Based on the estimated GPS transformation relationship, two gradient profile transformation models are proposed for two profile description models, which can keep profile shape and profile gradient magnitude sum consistent during profile transformation. Finally, the target gradient field of HR image is generated from the transformed gradient profiles, which is added as the image prior in HR image reconstruction model.
The limitations are artifacts occurred in recovered images and also with Low accuracy.

PROPOSED SYSTEM

There is a large demand for improving the perceptual quality of web image/video, among which the resolution enhancement, also known as super-resolution (SR), is an especially important issue and attracts a lot of attention. SR refers to the techniques achieving high-resolution (HR) enlargements of pixel based low-resolution (LR) image/video. The proposed system presents a novel approach to reducing artifact in digitally restored images by using DWT-Based Adaptive Edge Map. The performance of reduce the artifacts depends on the accurate classification of the local features in the image. The discrete wavelet transform (DWT) provides effective insight into both spatial and frequency characteristics of an image. Here the artifacts regions are marked both by the occurrence of high frequency entailed in the description of the sharp edge together with smooth regions on both sides of the edge. Artifact-prone regions are detected by a series of morphological operations. The edge map is dilated to indicate the r1egion around the major edges. Then the actual edges are excluded. Through the DWT analysis, to show that the artifacts can be suppressed to a great extent by using multiple-level edge maps, which provide enhanced matching to local edges. Its shows with high accuracy.



1.1 System Achitecture

IV. SYSTEM IMPLEMENTATION

GRADIENT PROFILE DESCRIPTION MODELS AND GPS METRIC

As initially proposed gradient profile is a feature describing the spatial layouts of edge gradients. It is defined as a 1D profile of gradient magnitudes along the gradient direction of an edge pixel, which is extracted by starting from an edge pixel and tracing along the edge pixel's gradient direction m(both sides) until the gradient magnitude does not decrease. To realize a better description of gradient profiles, a triangle model and a mixed Gaussian model are proposed respectively, where the triangle model is for gradient profiles with short length, and the mixed Gaussian model is for gradient profiles with heavy tails.

Triangle Model

When edges are sharp or unnoticeable with small intensity changes, the extracted gradient profiles are always short with no tails. For this kind of gradient profiles, a triangle model is most suitable for the profile description. To flexibly represent a gradient profile, the two sides of the triangle model are fitted separately using the extracted gradient profile points of each side.

The parameters of and are the mixing rates of each Gaussian model, which can be two positive numbers or a positive value and a negative one. For each gradient profile, if there are less than 8 extracted profile points, the triangle model is applied; Otherwise, both the mixed Gaussian model and the triangle model are applied, and only the one with smaller fitting error is adopted in the gradient profile description. In this way, the wrongly estimated mixed Gaussian models can be well removed.

ESTIMATION OF GPS TRANSFORMATION RELATIONSHIP

To obtain the target gradient field for HR image reconstruction, the gradient profiles in LR image should be transformed into the ones in HR image.

Since an LR image is obtained by down-sampling its HR image, sharp edges and smooth edges suffer from the same degree of attenuation during the down-sampling. Thus the percentage that sharp edge pixels account for the total image pixels is almost unchanged after down-sampling. It is reasonable to represent the unknown GPS histogram.

GRADIENT PROFILE TRANSFORMATION AND HR IMAGE RECONSTRUCTION

The two gradient profile transformation models are proposed corresponding to the triangle model and the mixed Gaussian model respectively. After gradient profile transformation, the target gradient field of HR image can be obtained as the prior constraints for HR image reconstruction.

Three constraints are proposed to preserve the total energy and the shape of original gradient profile consistent during gradient profile transformation.

• The shape of the transformed gradient profile should be consistent with its original gradient profile, e.g. if the left side is sharper than the right side in the original gradient profile, such sharpness difference should be kept in the transformed gradient profile.

• To avoid edge shifting, the transformed gradient profile should keep its peak position unchanged.

Based on the three constraints, gradient profile transformation models can be proposed for the triangle model and the mixed Gaussian model.

Gradient Profile Transformation for Triangle Model

For the triangle model, its shape has been fixed, so its gradient profile transformation is simplified as the transformation between two triangle models. Since the sum of gradient magnitude is unchanged during the transformation, the triangle area should remain unchanged.

Gradient Profile Transformation for Mixed Gaussian Model

For mixed Gaussian model, its shape is not as regular as the triangle model, thus its transformation is more complicated.

It can be observed that the original profile shape (the red curve in the left image) is well preserved in its transformed profile (the magenta dotted curve in the right image), where the right side is sharper than the left side. Moreover, the transformed gradient profile are more concentrated in the central region, which makes the edge sharper in the generated HR images.

To evaluate the performance of the proposed gradient profile transformation model, a statistical analyze is made on the fitting errors between the transformed gradient profiles and their corresponding gradient profiles in HR image. Since the HR image contains more high frequency information, it is hard to make the transformed gradient. The Profiles are exactly same with the gradient profiles extracted in HR image.

HR Image Reconstruction

Based on the gradient profile transformation models , gradients in UR image can be transformed to generate the target gradient field for HR image. When the prior is added in the HR image reconstruction model, HR image can be obtained by minimizing the sum of reconstruction error in image domain and gradient domain

The down-sampled version of HR image should be consistent with its LR image

DWT-BASED ADAPTIVE EDGE MAP

The proposed system presents a novel approach to reducing artifact in digitally restored images by using DWT-Based Adaptive Edge Map. The performance of reducing artifacts depends on the accurate classification of the local features in the image. The discrete wavelet transform (DWT) provides effective insight into both spatial and frequency characteristics of an image.

Here the artifacts regions are marked both by the occurrence of high frequency entailed in the description of the sharp edge together with smooth regions on both sides of the edge. Artifact-prone regions are detected by a series of morphological operations. Therefore the average variance of the pixel values in the DWT domain can be used to quantify the degradation. The edge map is dilated to indicate the region around the major edges. Then the actual edges are excluded. Through the DWT analysis, we show that artifacts can be suppressed to a great extent by using multiple-level edge maps, which provide enhanced matching to local edges.

FACE RECOGNITION

Face recognition is of great importance in many computer vision applications, such as human-computer interactions, Security systems, Military and Homeland Security. In videos or image, due to the distance between people and cameras, people are pictured very small and hence challenge face recognition algorithms. To solve this problem the proposed system introduced an efficient Face recognition scheme.

FEATURE EXTRACTION

Eigenface Computatio1n Using PCA, The Eigenface computation using PCA technique is briefly presented in this stage. The steps include preparing the data, subtracting the mean, calculating the covariance matrix, calculating the eigen vectors and eigen values of the covariance matrix and finally selecting the principal components. The sample faces for training and testing are taken from database for further processingIf the number of sample images taken for training and testing is increased then the size of the feature set will be high and the training time will also be higher. To avoid this eigenvectors with high Eigenvalues (i.e) the principal components are selected. Characteristics of a individual face than the eigenvectors with less eigenvalue.

Classification using SVM classifier

The classification problem can be restricted to consideration of the two-class problem without loss of generality. This linear classifier is termed the optimal separating hyperplane.

Intuitively, we would expect this boundary to generalise well as opposed to the other possible boundaries.
Classification is the problem of identifying which of a set of class a new observation belongs, on the basis of a training set of data containing observations (or instances) whose class is known. In this study the classification of the known faces from the unknown faces is implemented using SVM.
The SVM is a non probabilistic binary linear classifier which classifies the test face input in to either known or unknown face.

V. CONCLUSION

The proposed system introduced a Single Image Super resolution based on Gradient Profile Sharpness which is enhanced by using DWT-Based Adaptive Edge Map. The two gradient profile description models are introduced for representing gradient profiles with different lengths and different complicated shapes. After the completion of GPS transformation relationship computation process, the parameter of GPS transformation relationships is estimated automatically. The transformed gradients are utilized as priors in the high resolution image reconstruction. By using DWT-Based Adaptive Edge Map is used to remove the artifacts efficiently. The experimental results shows that the proposed system having high accuracy in my future work.

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