Different Methods of Face Hallucinations

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Abstract— In this paper brief description on various methods of face hallucination problem. Baker and Kanade first exploit the face hallucination. In face hallucination getting high resolution image by taking low-resolution image as an input value. Mostly in face images have different sub-parts (eyes, nose...), curves and smooth areas. By comparing results of previously applied existing methods which one uses patch similarity methods to exploit the face image to extract the missing information in it. Resulting values of previous experiments on patch similarity or holistic constraints not to be cleared the face image from the point of view of face recognition for humans in identification area. Face appearance plays an important in face recognition system. By remembering face appearance recognize easily. Face hallucination improves the face features efficiently by improving its resolution using different methods. In this also studied various techniques which can be used in face hallucination.

Key words: PCA, NMF, HR, LR

I. INTRODUCTION

Face hallucination is a super resolution of high-resolution images. Face images is a unique part in a body system. By the appearance of face, identify to others easily. But due to similarity regions of interest such as eyes, nose, mouth, etc. Faces are of different shapes like round, egg or may be in oval shape also but some features or maybe say pattern of nose, eyes, ear, mouth, chin same. On the basis of these features model the face hallucination. By using different techniques likes PCA (Principal Component Analysis), NMF (Non-negative Matrix Factorization) etc. Face hallucination is a method or maybe say technique for getting high-resolution or high-pixel image by using low-resolution or low-pixel face image. It gives the missing parts information of high -resolution face images from low-resolution ones. This problem was introduced by Baker and Kanade. This method has many uses in the area of image enhancement, image compression as well as face recognition.

Face Hallucination algorithm mainly based three requirements or maybe say three constraints as explained below:-

A. Data Constraint

The output image result always nearly to the input image taken, when it is smoothed or down-sampled.

B. Global Constraint

The output image always contains some common in both input and output i.e. eyes, nose, mouth etc. The facial features must be coherent.

C. Local constraint

The output image always have specific features of face image having resemblance with photorealistic local features.

The first constraints met easily, but second and third are more difficult to formulate. All three constraints are required to fulfill the conditions of face hallucination. Without second constraint output could be too noisy, in the absence of third constraint the resulting image could be too smooth.

Face hallucination is super-resolution of face images, or easier to understand the small print of a face from a low-resolution image. This could be describe the face structures, Non negative matrix resolution (NMF) is at first utilized to be learn localized part based mostly mathematical space. The various basis decomposition methods are often typically used like nonnegative matrix factorization (NMF) and Principal component Analysis (PCA).Compared to NMF, the reconstruction results of PCA are not intuitive and troublesome to interpret. PCA is subtractive of images combination of images whereas NMF is additive combination of local features like eyes, eyebrows, nose and chin. Because of the importance of face image in many face recognizes systems and other applications, face hallucination has become an vast area space for research worker.

In case of video imaging system face images looks to be too small due to a large distance between the cameras and the face image motions and also say lots of obstacles in the way while capturing motion by camera. Super-resolution restoration is a process in which set of images combined and can be checked by applying learnt image model by generative framework. Super-resolution restoration aimed to achieve set of observed images which can be estimated the image at high-pixel value. Maximum Likelihood (ML) estimated the super-resolution of image when it can be reprojected back into the set of images by using generative imaging model which can be reduces the difference between the actual and predicted observations. It also works for both real and synthetic images of text as well as face ones.

Eigen transformation method is used for facial sketch recognition system. In this by choosing a number of Eigen faces and getting maximum data from low-resolution face image and also remove the noise in the facial structure obtained after processing. In this first applied PCA (Principal Component Analysis) for getting as much useful data from low-resolution face image as possible and getting a high-resolution image by eigentransformation. If we want to be a resolve the one picture using resolution problem be solved with producing a high-resolution image by using single low-resolution image with the help of similar or distinctive types of images. This problem is called real world application in which include by increasing the resolution of an image while enlarging it using a digital imaging software, one is occur in web pages with images.

Super resolution is that the method of blending a several low resolution images to create high resolution ones. Recent work has been done on the generic super-resolution problem; less attention is being paid to face hallucination. So, a face hallucination is that exploits domain-specific image structures to come up with unit of time results with high accuracy. As compared with various procurable

strategies i.e. Patch similarity or holistic constraints within the image area, it's required to take advantage of local image structures for face hallucination. Face hallucination may be a domain-specific higher resolution drawback having goal to come up with high-resolution (HR) picture from low-resolution (LR) inputs which will be able to realize kind of applications. But a LR image area unit typically made public from a HR image by a linear convolution method with down sampling, the hallucination drawback area unit typically viewed as an opposite work to reconstruct the high-frequency details.

A face hallucination method is the enforcement of linear constraints for high-resolution (HR) face images using a sub-space that can be got from a particular set of training images via Principal Component Analysis (PCA). For again storing the high-pixel values in details not included in the PCA subspace, a patch-based Markov Random Field model is useful for reconstruction the residues. Because of some of the limitation of linear subspace representations, this method is not performing well only when the images are precisely aligned at fixed poses and expressions.

II. Related Work

In this paper [1] which shows that the study of face hallucination in which for getting High-Resolution (HR) face images by using input Low-Resolution (LR) image, with the help of large collection of other ones high-resolution face images. Two-step statistical modeling approach which integrates both types of parameters global parametric and local non-parametric model. In first step, learn the relationship between the high resolution image and their smoothed & down-sampled. In second step, model the residue between an original high-resolution and reconstructed high-resolution image after applying learned linear model by a patch-based non-parametric Markov network, to capture high pixel content. By collectively work with both global and local models, can be generated photorealistic face images. Experimental results show that this can be applied in real application to enhance the resolution of face for both face recognition and face editing also.

In this paper [2] they have described that the problem facing in hallucinating of High-Resolution (HR) face image by taking Low-Resolution (LR) input value. This problem can be solved through sparse coding. First of all exploited the facial features by using NMF (Non negative Matrix factorization) approach to learn localized part-based subspace. That subspace is effective for super-resolving the incoming low-resolution face under reconstruction constraints. For further enhance the detailed facial structure by using a local patch method based on sparse representation. With coupled over complete patch dictionaries which can be solved through linear programming. This method reveals the better results for face hallucination.

In this paper [3] shows the objective work of super-resolution restoration of observed set of images and estimated the use learnt image model within a generative Bayesian framework. It can be exploited that restoration of far high quality set of images which can be determined by classical Maximum Likelihood (ML).ML estimation can be achieved by either constraining the solution to lie on restricted sub-space or by using sub-space to define a spatially varying prior. This subspace can be learnt from learnt image examples. In real image examples, registration is obtained from the images using automatic methods.

In this paper [4] describes the method for treating input texture images as probability density estimators from which new text image, with same images lookness and makeover properties can be sampled. It is a two-phase process, in which first one can be analyzed by measuring the joint occurrence of texture discrimination features at multiple resolutions. In second one, a new texture is exploited by sampling successive spatial frequency bands from the input text images, set on the same joint occurrence features at low spatial frequency bands.

In this paper [5] described that in video imaging system, faces of interest are often appears to be in small size, because of large distance between the camera and the scene. Pixel value of image is an essential factor which affecting the face recognition by human and computer. In this, study of face recognition performance using different image resolutions. For automatic face recognition system, a low-resolution bound is found through experiments. By using Eigen transformation based hallucination technique to improve the image resolution. These faces images are not only much helpful for face recognition systems by humans, but also make automatic face recognition procedure easier, since they exploiting the face difference by adding some high frequency details.

In this paper [6] describes a novel technique which can be applied for single-image super resolution problems. While this formulation of similar other learning based methods of super-resolution, that method is inspired by recent manifold learning methods, particularly Local Linear Embedding (LLE). Specifically by taking small patch in low-resolution and high resolution forms manifolds with similar local geometry in two distinct feature spaces. Experiments show that method is flexible and give good empirical results.

In this paper [7] proposed a new face hallucination framework based on image patches, which formulates two-novel statistical super-resolution models. Considering that image patches reflects the combined effects of personal characteristics and patch location. In first one formulates Tensor-patch model based on constituent factors. By using local linear embedding, develop an enhanced multi linear patch hallucination algorithm, which one is efficiently exploited the local image structure in sample space. To better preserve the face details, exploit coupled PCA algorithm to learn relationship between high-resolution residue and low-resolution residue which can be utilized for compensate the error residue in hallucination face images. Experimental results demonstrate that the framework works well to maintain the global facial structure and also recovers the detailed facial traits in high quality.

III. Conclusion

The structures of face images are divided into three parts i.e. facial sub-parts, edges, curves and smooth areas. Their

gradient maps generated valuable and integrated output to produce high resolution results with the best visual quality. By taking larger database and more complicated alignments of face images will promise better results, which can be done in future work. We have also seen that the experimental results of face recognition performance over different images resolutions in previous papers. The results needs to be further confirmed using more face recognition algorithms and data sets. We have emphasized on number of other applications of our face images appearance modeling methods.

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