Multi Image Morphing: A Review

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Abstract - *Low contrast images can result from the wrong setting of image achievement or poor illumination situation. Such images may not be visually attractive and can be difficult for feature extraction. Contrast enhancement of color images can be useful in medical area for image inspection. In this paper, a new technique is proposed to develop the contrast of color images. The RGB (red, green, blue) color image is unclear into normalized RGB color space. Adaptive histogram equalization method is applied to each of the three channels of normalized RGB color space. The equivalent channels in the original image (low contrast) and that of contrast enhanced image with adaptive histogram equalization (AHE) are morphed together in proper proportions. The proposed system is tested on seventy color images of acne patients. The outcome of the proposed technique are analyzed using combined variance and contrast improvement cause measures. The results are also compared with decorrelation stretch. Both subjective and quantitative analysis demonstrates that the proposed techniques better the other techniques.*

Key Words: (**Normalized RGB, adaptive histogram equalization, cumulative variance.**)

1. INTRODUCTION

CONTRAST improvement is an important step in computer vision and image processing. Low contrast images may result from poor explanation condition during image acquisition or other aberrations of the image capturing and display devices [1]. In low contrast images, the image relevant details are not vivid. Especially in a medical area where images of the patients of different diseases are examined, and severity of the disease is evaluated.

The histogram is used as a fundament tool for finding the distribution of gray-level values in an image. The histogram of low contrast image spans over a small portion of the range of intensity values [2]. The histogram of well-contrasted image covers the whole dynamic range of intensity. Well-contrasted images are visually appealing and prove effectual in subjective evaluation. Along with specular illumination removal, contrast enhancement is also used as an necessary step in medical image processing [3]-[5].

The difference enhancement technique can be separated into two main types; direct enhancement and indirect enhancement techniques. By direct techniques, the intensity values of pixels in an image are modified by directly processing [6]-[8]. While indirect techniques are based on re-distribution of gray level values in an image by calculating collective distribution function (CDF) [9]. With the help of CDF, the histogram of gray level values is extended to the full dynamic range. The difference in monochrome images is measured by variance or standard deviation of gray level values. These variations in gray level values are attributed to the spatial frequency to which human visual system is very sensitive. The spatial frequency relevant information is captured by edges and usually calculated with the first derivative.

Difference enhancement of color images is very difficult. If the ratio of the components of RGB color space is changed, the color of the new image may look completely different than the original one. The techniques developed for gray images can be applied to color images in two ways. In the first approach, each channel of RGB color space is treated as a gray image. The method is applied to each of the three channels separately and combined together after processing. In the second approach, the RGB color image is first converted into a color space in which the chrominance and luminance components are separate from each other. The contrast enhancement technique is applied to the luminance component and leaving the chrominance part untouched. It is claimed that the hue is preserved while the contrast of the image is enhanced [10].

2. LITERATURE REVIEW

2.1 Cross Dissolve Morphing

Before the enhancement of morphing, the image transitions were commonly achieved throughout the use of cross-dissolves, e.g., linear intermission to fade from one image to another. Figure. 1 depicts this process applied over five frames. The result is poor, remaining to the double-exposure effect visible in misaligned regions. This problem is mostly apparent in the middle frame, where both input images contribute equally to the output. Morphing achieves a liquid transformation by incorporating warping to maintain arithmetic alignment throughout the cross-dissolve process.

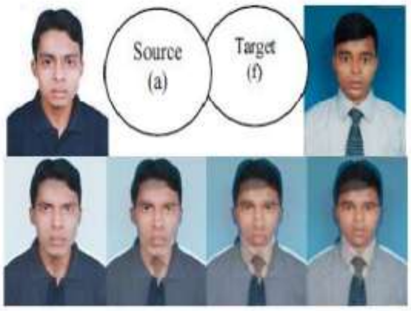

Fig-1: Example of cross-dissolve morphing

2.2 Mesh Warping

Mesh warping was pioneered at Industrial Light & Magic (ILM) by Douglas Smythe for use in the movie Willow in 1988. It has been successfully used in many subsequent motion pictures [1]. To demonstrate the 2-pass mesh warping algorithm, consider the image sequence shown in Fig.-2. The five frames in the middle row represent a metamorphosis (or morph) between the two faces at both ends of the row [1]. We will refer to these two images as IS and IT, the source and the target images, respectively. 'Five source images has mesh MS associated with it that specifies the coordinates of control points, or landmarks. A next mesh, MT, specifies their corresponding positions in the target image. MeshesMS and MT are respectively shown overlaid on Island IT in the upper left and lower right images of the figure. Notice that landmarks such as the eyes, nose, and lips lie below corresponding grid lines in both meshes. Together, MS and MT are used to define the spatial transformation that maps all points in IS onto IT. The meshes are constrained to be topologically equivalent, i.e., no folding or discontinuities are permitted. Therefore, the nodes in MT may wander as far from MS as necessary, as long as they do not cause self-intersection. Furthermore, for simplicity, the meshes are constrained to have frozen borders. All transitional frames in the morph sequence are the product of a 4-step process:

2.3 Field Morphing

While meshes show to be a suitable manner of specifying pairs of feature points, they are, however, sometimes cumbersome to use [1]. The field morphing algorithm developed by Beier and Neelyat Pacific Data Images grew out of the desire to simplify the user interface to handle correspondence by means of line pairs. A pair of corresponding lines in the source and target images defines a coordinate mapping between the two images. In addition to the straightforward correspondence provided for all points along the lines, the mapping of points in the vicinity of the line can be determined by their distance from the line. Since multiple line pairs are usually given, the displacement of a point in the source image is actually a weighted sum of the mappings due to each line pair, with the weights attributed to distance and line length. This approach has the benefit of being more expressive than mesh warping.

2.4 Point Distribution Method

This method uses points that the users fix to each main feature of the face, to help map the source image and the destination image together. The computation uses these points to calculate the result images. The resulting images from this work are satisfactory to theusers. However, it is not automatic, because the users have to fix the mapping point of the features before making the program merge them together. [11, 6]

2.5 Critical Point Filters Method

The critical point filters technique can extract the main features of the face by using the color differentiation in the features. The maximum sub-image can extract the eye and hair of the face, the max-min saddle sub image can extract lips, the min-max saddle sub-image can extract the skin and the minimum sub-image can extract the background of the image [6, 12, 13].

3. CONCLUSION

Morphing algorithms commonly share some mechanism such as feature specification, warp Generation and transition control. The ease with which researchers can efficiently use morphing tools is determined by the manner in which these components are addressed. We briefly surveyed widely used morphing techniques such as mesh warping and field Morphing.

REFERENCES

[1] PS Heckbert, "Fundamental of texture mapping and image warping," M.S. thesis, Dept. of Electrical and Electronics Engineering, University of California, Berkeley, CA 94720,June 1989.

[2] G Wolberg, Digital Image Warping, IEEE Computer Society Press, Los Alamitos, CA, 1990

[3] AZ Kouzani, S Nahavandi, N Kouzani, LX Kong, FH She. A morphing technique for facial image representation, IEEE Int. Conf. Syst., (2000) Man Cybern., (2), 1378–1383

[4] T Terada, T Fukui, T Igarashi, K Nakao, A Kashimoto, Y Wei Chen. Automatic Facial Image Manipulation system and Facial Texture Analysis. International Conference on

Natural Computation - ICNC , pp. 8-12, 2009.

[5] V Zanella, G Ramirez, H Vargas, LV Rasas. "Automatic Morphing of Face Images". International Conference on Adaptive and Natural Computing Algorithms - ICANNGA , pp. 600-608, 2009

[6] Areeyapinan, Jennisa, Pizzanu Kanongchaiyos. "Face morphing using critical point filters." Computer Science and Software Engineering (JCSSE), 2012 International Joint Conference on. IEEE, 2012.

[7] U Bhushan, GP Saroha, D Tiwari, " An Implementation of Image Morphing Through Mesh Morphing Algorithm", International Journal of Advanced Research in Computer Science and Software Engineering, 2012, 2(7), pp. 74-76.

[8] Islam, Md Baharul, Md Tukhrejul Inam, Balaji Kaliyaperumal. "Overview and Challenges of Different Image Morphing Algorithms." International Journal of Advanced Research in Computer Science and Electronics Engineering (IJARCSEE) 2.4 (2013): pp-410

[9] Beier T, Neely S (1992). Feature-based image metamorphosis. Computer Graphics, 26 (2), 35-42

[10] Karam, Hussien, A. Hassanien, M. Nakajima. "Featurebased image metamorphosis optimization algorithm." Virtual Systems and Multimedia, Proceedings Seventh International Conference on. IEEE, 2001

[11] Zanella, Vittorio, Olac Fuentes. "An approach to automatic morphing of face images in frontal view." MICAI 2004: Advances in Artificial Intelligence. Springer Berlin Heidelberg, 2004. 679-687

[12] B Chambers. "Point-And Window-Based Matching in Images Using Critical-Point Filters", Master„s Thesis, Department of Electrical Engineering University of Illinoist at Urbana-Champaign, 2004

[13] K Thanasoontornlerk, P Kanongchaiyos, "An Image Matching Using Critical-Point Filters and Level Set Analysis", International Conferences in Central Europe on Computer Graphics, Visualization and Computer Vision, 2007

[14] George Wolberg, "Recent advances in image morphing," in Proc. Computer Graphics Intl., Pohang, Korea, June 1996, pp. 64-71

[15] JD Foley, AV Dam, SK Feiner, JF Hughes. Computer Graphics: Principles and practice. Addison-Wesley Professionals, 2 edition, 1996

[16] MJ Jones, T Poggio, "Model-based matching by linear combinations Of prototypes," Tech. Rep.1583, MIT AI Lab., November 1996