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Face Recognition and Detection from Group Photograph

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Abstract

Background/Objectives: Face recognition has become a challenging and fast growing area in real time applications. The paper deals with recognition and extracts the single person face from the group photograph. It becomes the next generation technology. **Methods/Statistical Analysis**: skin detection algorithms is performed to recognize the face and extract the features. Grey Level Co-occurrences Matrix Technique were used to analyse the feature. **Findings:** We proposed a system for face recognition and detection. Face is extracted from the input image using detection algorithm. Binary distance helps to locate the bounding box limits. GLCM technique helps to extract the grey scale properties from the input image. These properties are compared to the database to identify the person. **Application/Improvements:** The accuracy rates can further be improved by considering various factors like pose, expressions etc.

Keywords: Color Analysis, Detection, GLCM, Recognition

1. Introduction

Face recognition has been an integral part in computer world and an area where machine learning can be done. In the past[1] various evolutionary techniques have been used to learn face recognition. But face recognition from a single image is a tiring task due to its high quality[2]. Designing a system for image recognition has various limitations in real time[3]. Face recognition in digital images is used in manufacturing industries, surveillance in public places, identification of criminals and in intelligence. From the Figure 1, an algorithm for automatic detection of faces in group photograph is introduced. This is a two-step process in which first we detect regions in human skin from color image and then extract the information to locate the face. The skin detection is performed using a skin filter. The face can be detected by obtaining a grey scale image containing only detected skin areas. Other software packages exist that can recognise facial features in pictures of human. This project focuses on face detection in color image that relies on combination of color and grey scale information and moreover it does not require time for neural net as previous algorithms. The task is to detect facial regions in an image and to analyse image. The process involves a filter that is designed using basic mathematical and image processing functions of mat lab.

2. Methodology

Flow chart shows the detailed methodology for the detection of face from the photograph.

2.1 Skin Detection Algoritm

Skin detection algorithm is applied to detect the face in a digital image. Better recognition is directly proportional to the quality of the image[4]. There are various types of approaches which includes easy and difficult approaches to extract the face portion like edge based, geometry based, with controlled background in a given photograph[5]. By using one of the approaches we extract face portion of the given input image. From the Figure 2, Input image can be composed of varieties of colours i.e., not color specific. In this approach color information is going to play a key role in extracting the images. This technique is gaining an enormous response in recent days. Color information is a

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key factor used in region segmentation. Region segmentation is a process of dividing a given image into separate parts or objects[6]. An approach of region segmentation uses color component to divide the image into a set of regions. We are using the skin color to identify the face of a person in the given image. Skin color distribution varies from the background of an image. There are several types of color spaces in existence like RGB, HSV and YCrCb. YCrCb colorspace is more efficient compared with RGB color space[7]. Color space plays a crucial role in better results for the skin detection process.

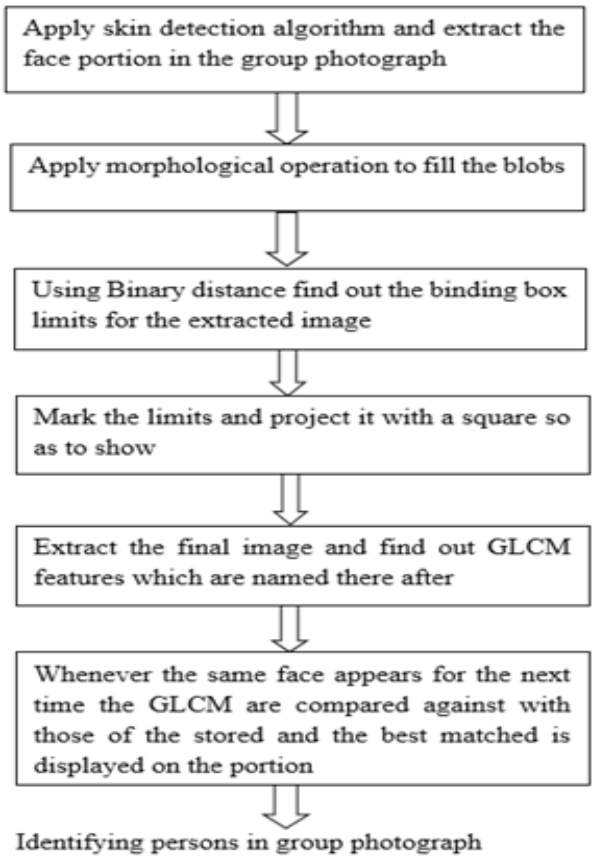

Figure 1. Flow chart for face recognition and detection from group photograph.

RGB Color space: This model deals primarily with colours like red, green, blue. This type of color space is not so complex and involves lesser computations but generally used in computer graphics. RGB is not so efficient in dealing with real world images.

HSV Color Space: HSV stands for Hue, Saturation and Value. Hue represents pure color, Saturation is the amount of white light mixed with hue and value represents the lightness of the image. Commonly used model in image processing. Equations for conversion from RGB to HSV.

$H = \cos\text{-}1\ (R - \frac{1}{2}G - \frac{1}{2}B)/\sqrt{R^2 + G^2 + B^2 - RG - RB - GB}$. if G>=B

$S = (\text{Max}(R, G, B) - \text{Min}(R, G, B)) / \text{Max}(R, G, B)$.

$V = \text{Max}(R, G, B)/255$.

YCrCb Color space: YCrCb stand for luminance, red chromaticity and blue chromaticity. Used in television sets and videos. YCrCb is a scaled and offset model of YUV color space. Equations for conversion from RGB to YCrCb are

$Y = 0.299R + 0.587G + 0.114B$

$Cb = 128\ (0.169R\ 0.331G\ 0.5B)$

$Cr = 128\ (0.5R\ 0.419G\ 0.081B)$

Region segmentation can provide a better results only if good contrast is established between background and skin color. The main problems occurs if both the background color and the skin of the person is of same color. It becomes a difficult task to locate the exact portion of the face. There are several limitations for this kind of approach, which involves when the input image is given with a bright spot on the face is difficult to identify.

2.2 Morphological Operations

We need to perform the morphological operations to fill the gaps in the input image. Dilation and Erosion are the main morphological operations[8]. Both operations aim to process the pixels. Dilation deals with maximum value whereas erosion deals with minimum values. Using binary distance approach for the given input image, we get bounding box which limits detecting the boundary of an image. Using the limits, face can be tracked and it is projected in the form of a square in the given image.

2.3 Grey Level Cooccurances Matrix for Face Detection

Extracting the face from the image takes next step to detect who the person is. GLCM is one of the earliest approaches used for texture feature extraction[9]. From the extracted faces we are going to take the properties of the face. The extracted properties after detecting are projected in the group photograph in the form of a square, as shown in the Figure 3.

3. Results

Figure 2. Input image.

Figure 3. Extracted face for the given input image.

4. Conclusion

Face recognition is an evolving technique in the field of image processing due to its vital role in various applications. In this paper, we proposed a system for face recognition and detection. Using skin detection technique, face is extracted from the input image. Binary distance helps to locate the bounding box limits. GLCM technique helps to extract the grey scale properties from the input image. These properties are compared to the database to identify the person. There are various domains in which face recognition is applied. Face recognition in digital images is used in manufacturing industries, surveillance in public places, identification of criminals and intelligence.

5. References

1. Hancock PJB, Smith LS. GANNET, Genetic design of a neural net for face recognition. In: Schwefel H-P., Manner R, editors. Proceedings of the Conference on Parallel Problem Solving from Nature. Springer Verlag; 1991.
2. Kheirkhah E, Tabatabaie ZS. A hybrid face detection approach in color images with complex background. Indian Journal of Science and Technology. 2015 Jan; 8(1):49–60.
3. Movina R, Ayoob R, Kumar MS. Face Recognition using Symmetric Local Graph Structure. Indian Journal of Science and Technology. 2015 Sep; 8(24):1–5.
4. Dharavath K, Talukdar FA, Laskar RH. Improving face recognition rate with image preprocessing. Indian Journal of Science and Technology. 2014 Aug; 7(8):1170–5.
5. Shelke K. Face recognition from group photograph. International Journal of Engineering and Innovative Technology. 2013 Jul; 3(1):1–5.
6. Lokhande VH. Study of region base segmentation method. International Journal of Advanced Research in Computer Science and Software Engineering. 2014 Jan; 4(1):1–4.
7. Al Haj M, Amato A, Roca X, Gonzalez J. Finding faces in color images through primitive shape features. 2nd Computer Vision: Advances in Research and Development (CVCRD); Bellaterra, Espanya. 2007. p. 1–6.
8. Raid AM, Khedr WM, El-dosuky MA, Aoud M. Image restoration based on morphological operations. International Journal of Computer Science, Engineering and Information Technology. 2014 Jun; 4(3):1–13.
9. Shaika KB, Ganesan P, Kalist V, Sathish BS, Jenithab JMM. Comparative study of skin color detection and segmentation in HSV and YCbCr color space. 3rd International Conference on Recent Trends in Computing Procedia Computer Science; 2015. p. 41–8.