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A STUDY ON SKIN TONE BASED ROI SEGMENTATION TO EXTRACT NEWS-READER REGION FROM HEARING IMPAIRED NEWS VIDEOS

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ABSTRACT

In this research article, the video segmentation based on skin color using Region of Interest is presented. The objective of the research is capturing the sign words from the deaf and dumb news videos and preparing textual information. By default, video processing requires huge memory space to process the frames. The time taken for processing frames and pixels are also too high. For this research, the news video has been pre-processed and presented for object recognition process. The skin tone of the news reader varies with respective to the attributes of the images like brightness, luminescence and the color of the video. When broadcasting an edited-video, there are possibilities in its resolution. The resolution also affects the skin tone of the news reader. Hence skin tone selection based region of interest for news-video is analyzed and presented to gain knowledge for video segmentation.

KEYWORDS: Segmentation, ROI, Color models.

I.   INTRODUCTION

Segmentation is the process of partitioning a digital image into multiple segments. Image segmentation is important in image processing. Automatic segmentation of foreground from background in video sequences has attracted lots of attention in computer vision. Segmentation is used to separate objects or classify objects in foreground or background and analyze each object individually. Also, segmentation has been applied for feature extraction from input images [1]. Video segmentation is a way of dividing a movie into meaningful segments. In general, image segmentation is a process of partitioning an image into non-overlapped, consistent regions that are uniform with respect to some characteristics like intensity, color, tone or texture and more. There are different techniques for image segmentation e.g. Threshold, cluster, classification, artificial neural networks (ANNs), region growing, edge detection etc. [2]. A segmentation algorithm divides an input video into sub-parts. Every part is consistent with respect to single or added property that is the difference of dimensions in the areas must exist much fewer differences on the object edges. A video segmentation algorithm is largely classified in two modules which depend in the motion estimates provided: video segmentation without correspondences and video segmentation with correspondence. A video segmentation without correspondence describes a film in the finest way, also then processes the foreground outline to exist the object correctly. A video segmentation with correspondence is an approach that utilize extended period position correspondence i.e. position track to achieve a consistent spatial-sequential segmentation in a motion picture [3]**.** In our research work, the news reader area alone need to be segmented and extracted. The most specific area for segmentation is the region which is having the property of skin tone and its surrounding areas in the news-video.

Problem Statement

Sign language is a useful tool to ease the communication between the deaf person and normal person. There is a communication gap between deaf people and normal world, since it facilitates two way communications. This research focuses to develop a methodology that process video and interprets sign language into text. In this time difficulties of hearing impaired would have been overcome to improve their understandings such that it converts the language in associate text that's well explicable by deaf people [4]. The content of Deaf and dumb video is classified into many dynamic partitions. The classification consists of video region which represents news, logo

of a channel, scrolling text, advertisement banner, the reader who communicates sign language and one who reads the news. For the research, all classification of video will not be needed for processing. The most specific area contains the reader who communicates the sign language is needed. Hence selective segmentation method should be employed to extract the region.

Available ROI Methods

A region of interest is a portion of an image that we need to filter or perform some operations. ROI is defined by creating a binary mask, which is a binary image that is the same size as the image we want to process. In the mask image, the pixels that define the ROI are set to '1' and all other pixels are set to '0'. Skin segmentation is the type of segmentation which divides a video frame into multiple parts based on skin properties. This is used to identify objects or other relevant information or data in digital images. The different ways to perform image ROI segmentation are done by using color space. This identifies in depth data of the image. Color map contains several overlapping objects with different color, shape and size. All type of color spaces are considered for RIO identification. The color based ROI is feasible ROI extraction method, because it identifies the exact segmented region where we picked skin color to extract the needed region of the image. The color spaces are RGB (Red-green -blue), CMY (cyan, magenta, yellow), YCBCR (Y is the luminance component and CB and CR are the blue difference and the red difference in the chrominance components), LAB (luminosity indicating the color falls along the red-green axis and blue-yellow axis), HSV (hue, saturation, value), HSI (hue, saturation, intensity). In the RGB color space, each color is described as a combination of three main colors, namely Red, Blue, and Green. This color space can be visualized as a 3D matrix with the main colors set out on the axis. The values for the main colors vary from 0 to 255. In the CMY color space, the colors for cyan-magenta-yellow are used for hard copy devices. A printed color that looks red absorbs the other two components G and B and reflects R. Thus, the C-M-Y coordinates are just the complements of the R-G-B coordinates. In the YCBCR, YCbCr color space is widely used for digital video.

In this format, luminescence information is stored as a single component (Y), and chrominance information is stored as two color-difference components (Cb and Cr). Cb represents the difference between the blue component and a reference value. Cr represents the difference between the red component and a reference value.HSV is a color model that describes colors (hue or tint) in terms of their shade (saturation or amount of gray) and their brightness (value or luminescence). The HSV color wheel may be depicted as a cone or cylinder. In Lab, the L*a*b* color space also known as CIELAB or CIE L*a*b* enables you to quantify visual differences from image. The L*a*b* space consists of a luminosity 'L*' or brightness layer, chromatically layer 'a*' indicating where color falls along the red-green axis, and chromatically layer 'b*' indicating where the color falls along the blue-yellow axis. In HSI, the color model represents every color with three components: hue (H), saturation (S), intensity (I). The Saturation component signals how much the color is polluted with white color. The range of the S component is [0, 1]. The Intensity range is between [0, 1] and 0 means black, 1 means white. In general, there are several color models such as RGB, HSV, and YCbCr etc. But when a RGB image is compared with other color spaces, it has the limitation of not able to precisely separate intensity and color level of pixel, that causes difficult to differentiate skin colored areas or regions. One problem that needs also to be addressed in discussing RGB and CMY is the issue of gamut constraints. The representation of the whole range, or gamut, of human color perception is quite large. Hence HSV and HSI are preferred over other color models.

Need for Skin Color Segmentation

Color information is one of the simple cues used for detecting news reader region. The identification of representing color for extracting region is crucial. In the RGB space, three primary colors represent the color as well as brightness. In the news reader region, the hands are more important component to extract the sign language. The ROI method requires the complete extraction of a reader in which the hands must be located at the center. If the video frame developed the region based on the skin tone, then the hands would be present at the center. The input video is a combination of several classified regions. All the regions may have common area and there is a possibility to extract those parts in segmentation which will not support to identify the sign language. The implementation of skin tone based ROI in common areas will help to extract the newsreader area without unwanted regions. Hence skin tone is an important factor for segmentation to solve the problem.

II.   LITERATURE REVIEW

Gurjeet kaur Seerha, Rajneet kaur (2013) have reviewed various segmentation techniques. This paper briefs the sequences of images are considered and if it as a video in that case we make a use of motion for segmenting

regions. Motion information can be used in different ways to segment objects in a video for example one can compute motion vectors for every pixel in the image, since pixels which belong to moving object will have motion in more or a less similar. The type of video used for segmentation is MPEG-4 video object (VO) segmentation. The segmented image is a binary image of jpeg format. Threshold is used to separate foreground from background by selecting a threshold value T, any pixel (x, y) is selected as a part of foreground if its intensity is higher than or equal to threshold value i.e. f (x, y) ≥T, else pixel points to background. Drawbacks of this method is, it is time consuming and calculate the means at every iteration due to this time complexity increases with the size of the image direction, we can group such pixels by applying clustering techniques to the pixel motion vectors [1].

M. Jogendra Kumar, Dr. GVS Raj Kumar, R. Vijay Kumar Reddy (2014), stated image segmentation has emerged as an important phase in image based applications. Segmentation is the process of partitioning a digital image in to multiple regions and extracting a meaningful region known as the region of interest (ROI). Image segmentation algorithms are based on either discontinuity principle or similarity principle. The idea behind the discontinuity principle is to extract regions that differ in properties such as intensity, color, texture, or any other image statistics. The idea behind the similarity principle is to group pixels based on common property [2].

The Author Savitha, Ada (2015), reviewed on various approaches in image segmentation stating region based segmentation algorithms operate iteratively by grouping together pixels which are neighbors and have similar values and splitting groups of pixels which are dissimilar in value. A region of interest (often abbreviated ROI), is a selected subset of samples within a dataset identified for a particular purpose. In computer vision and optical character recognition, the ROI defines the borders of an object under consideration. In many applications, symbolic (textual) labels are added to a ROI, to describe its content in a compact manner. Within a ROI may lay individual points of interest (POIs). This method is computationally expensive, sensitive to noise, a local method with no global view of the problem [3].

Research on ROI Based Segmentation

The author Ashish Sethi et al, proposed various approaches like Skin color segmentation with Feature point matching using SIFT, Region Growing with Feature point matching using SIFT, Skin color segmentation with correlation matching, region growing with Correlation matching. The author stated that Region of Interest (ROI) is identified by applying skin segmentation, region growing exemplar based technique and contour segmentation. This method cannot handle the complex background using contour based approaches therefore the author has used skin segmentation and region growing for obtaining ROI [4].

The author Savita Dubey et al, stated the region based technique is also known as "similarity based segmentation", used to find out region directly. It partitions an image into uniform sub-regions based on some properties such as texture, color, intensity etc. Pixels belong to same intensity characteristics and closed to each other can be group together and assumed to be in same object. Region contains more information because it covers more pixels than edges. To detect regions the author used texture and it is not simple to handle it with edges. In noisy images where edges are difficult to get, region growing technique is used. Watershed algorithm, region split and merge algorithm and region growing algorithm are the some commonly used methods of region based technique [5].

The author Shreyashi Narayan Sawant proposed if the contours comparison of skin detected area complies with any one of the stored hand gesture contours, a small image will enclose the hand gesture area only and that small image will be used for extracting the PCA features. Here the hue, saturation, value (HSV) color model has been used for skin detection, since it has shown to be one of the most adapted skin-color detection. This method is also compatible with the human color perception. This paper gives real time performance and robust against rotations, scaling and lighting conditions [6].

Tables:

Table 1. Various methods of skin color segmentation

YEAR	AUTHOR	METHODS
2012	Ashish Sethi	Skin color segmentation with Feature point matching using SIFT
2012	Shreyashi Narayan Sawant	HSV for skin detection
2013	Gurjeet Seerha	Threshold for background and foreground separation
2014	M.Jogendra Kumar	Segmentation based discontinuity principle or similarity principle
2015	Savitha Ada	ROI based individual points of interest
2016	Savitha Dubey	Similarity based segmentation

III. CONCLUSION

Based on the reviewed research work, the segmentation started before some decades. In the past five years all the segmentation based on discontinuity principle or similarity principle, the segment evaluation has been initiated from feature point matching using SIFT method. It grows with threshold and finally it ends with similarity based segmentation. The similarity segmentation is a wide area where large numbers of attributes are used for identifying discontinuities and similarities. Based on the work presented by most of the researchers, HSV color model is an appropriate method in ROI based segmentation to extract a human object. Hence this method could be used in our research to extract the news reader area from the deaf and dumb videos.

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