

# Feature's Extraction of Human Body Composition in Images by Segmentation Method

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**Abstract**—Detection and recognition of the Human Body Composition and extraction their measures (width and length of human body) in images are a major issue in detecting objects and the important field in Image, Signal and Vision Computing in recent years. Finding people and extraction their features in Images are particularly important problem of object recognition, because people can have high variability in the appearance. This variability may be due to the configuration of a person (e.g., standing vs. sitting vs. jogging), the pose (e.g. frontal vs. lateral view), clothing, and variations in illumination. In this study, first, Human Body is being recognized in image then the measures of Human Body extract from the image.

**Keywords**—Analysis of Image Processing, Canny Edge Detection, Classification, feature Extraction, Human Body Recognition, Segmentation.

## I. INTRODUCTION

**D**ETECTION and recognition of the Human Body Composition and extraction their features (width, length and all measures of human body) in the Images are important field in Image, Signal and Vision Computing in recent years. One can mention recognition of the human face, his arm's motion, his body as well as prediction of human Motion, among others. In this work, it has been attempted to extract human body features in images. One of the main objectives of the Artificial Intelligence Science (AIS) is designing machines that act smart and like humans as much as possible. In order to a machine can be smart and useful must understand it's Surrounding ambient and take appropriate action based on processing of the information obtained. Perhaps the most appropriate information to be retrieved for action reaction, is the information of the man's how and which place in the Ambient and what operation he carries out. It is here that the

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science of image processing and vision by the machine plays a fundamental role. Recognition of human and extraction their features in images are a major issue in detecting objects, since the positions of human in the picture can be different, such as sitting or standing, opposite or back to the image, clothed or unclothed. Also one of the important challenges in finding human segmentation in the image is the issue of modeling human shape in the image [1]. A fundamental task in computer vision is that of segmenting an image into meaningful regions. It must be ensured that the resulting partition of the image is formed by homogeneous and connected parts. Image segmentation is a specific case of clustering, i.e., there is a need to group a number of samples into clusters. Hence, many general clustering algorithms may be applied to this problem, with some adaptations.

## II. PREVIOUS WORKS

For static images, several research works have been done to detect the human body using a description of the background shape and the model of the human body [2]. Barron and Kakadiaris [3] and Taylor [4] have studied restoration of the 3D-model of human body, but in their method, it was assumed that the position of connections of the human body image is a known fact. Therefore, this assumption had some problems. Rodriguez and Mubarak [5] found a solution for discovering and patching of human in the standing position in the extension of video images. Ioffe and Forsyth [6] showed, how to find a human in an image by finding candidates of his/her body parts, such that the sum of parts so obtained accords to the person's appearance, but their system 1) had problems for complicated configures, 2)problem in image segmentation, 3) their system applied on human with without clothed. Another group of solutions for the composition of human body is provided by [7], [8], [9], [10]. This class of solutions found a few of human body elements in the image considering low level features.

There are three standard approaches to find human body in the literature. The first approach is through comparison of models. Some researchers such as Oren, Papageorgiou, Sinha, and Osuna [11] used this method to detect a passerby. Also, Niyogi and Adelson [12], Liu and Picard [13], Cutler and Davis [14] used this approach for detecting human motion on a path. But since a human can appear with very different

combinations and situations in the image, the first approach is not appropriate, since then the number of models will be many. The second approach emphasizes finding the human face in the image and finding the remainder of the combination to remove the weak points of the first approach. Poggio and Sung [15], Rowley, Baluja, and Kanade [16] used this idea. This approach would succeed when the face is opposite to the image. The third approach uses classic methods of search, emphasizing on similarities. These methods have their origins in the studies of Faugeras and Hebert [17], Thompson and Mundy [18]. In These methods, the similarity between the image composition and the object features are analyzed. This suggested method also removes the weak points of the third approach.

### III. OBJECT DETECTION METHODS

There are two strategies and solutions for detection of objects [6]: A) Searching based on the model characteristics using a comparison between the object model and the image. In this method, the degree of similarity between the model and the image is computed on objective function. This is called a top-down strategy. B) Summing-up of image features in larger groups. A group of features if similar to the object are being used to select a larger group of features. This approach is called a bottom-up approach.

The top-down approaches are used in most activities in images. Top-down approaches decrease the area searching and also time searching, but increase the complication. In This suggested method have been helped the top-down approach for segmentation and recognition human body and also extracting the Human Body features in image.

### IV. IMAGE ENHANCEMENT

One of the important operations in field of image processing is an image enhancement [19].

This method can be done in area field or frequency field. Some algorithm's enhancement operates freely on all the image's pixels that have been populated image's pixels operation. Another algorithm operates on image's pixels with pixels neighbors that are famous image's area operation. In this paper, has been used this method for images enhancement.

### V. RESIZING IMAGE

Images resize done on entire picture in this project .the aim of this Image resizing in this project, are increasing the image overhead.

On of the resizing Image method, use the matrix operation [19]. In this method, has been used the window that change the original image into resizing image. Then this window move from beginning to end. Resolutions Average dots that window cover them, used as a dot in the center of window. This subject is as shown in Fig. 1.

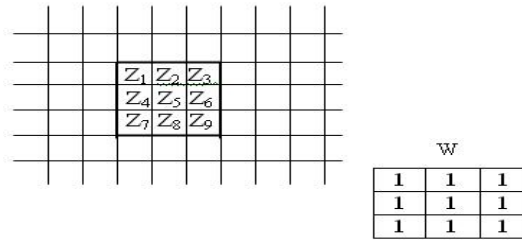


Fig. 1 Use window 3×3 for image resize

After operating window on the image, the z5 dot resolution, as shown in equation.1.

$$Z_5 = \frac{1}{9} \sum_{i=1}^9 w_i z_i \quad (1)$$

The size of the image has been changed by using this method to the 346×461 images. This was done to reduce the burden of computation. Some Common Mistakes

### VI. PROPOSED METHOD

The suggested method that contains 7 stages, are shown in Fig. 2.

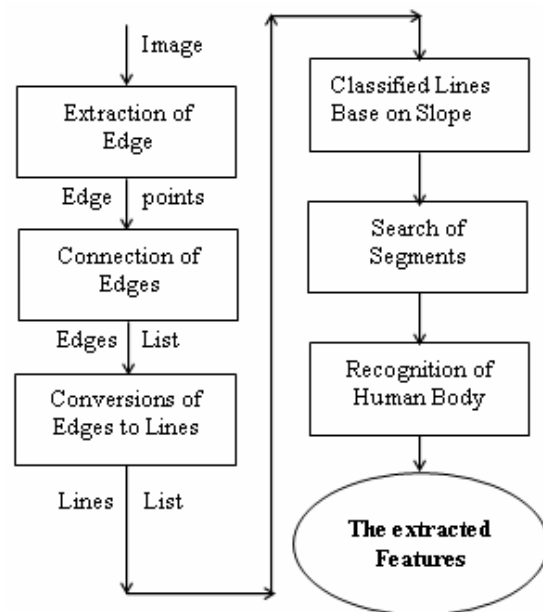


Fig. 2 The Suggested Method for feature Extraction of the Human Body Composition in Images with segmentation

In the first stage, the image is received from input, the image edges are extracting by using the canny method and the edge points will be found. The result of this stag is a figure that contains edge points from input image. In the connection of edges stage, by operating on edge points that has been came from previous stage, the edge points turned into edges list. The instruction is that by searching the first edge point such as (x1, y1); this point is chosen as a first list member. Then by searching eight points around this point (Fig. 3) every point from this neighbor points that was edge point, will be chosen

as a second member of a list. After that from the new neighbor points or the last element of a list, the new edge point will be searched and also added to the list. This work will be continued till the last point of a list does not have a neighbor edge point. The whole dots that have been gathered are signed for a second list, and then the new list of edge point will be searched. The outputs of this stage are a list of edges.

|   |       |   |
|---|-------|---|
| 7 | 3     | 6 |
| 4 | [I,J] | 2 |
| 8 | 1     | 5 |

Fig. 3 Eight neighbor points around the center point

In the stage of conversion the edges to lines, the connected edge points in past stage, turned into straight lines. In this stage, turning into the edge points to lines are done by the help of up to down, breaking in two lines method (Fig. 4). First, a line is made between the first point and last point of a list. Then if the maximum normal error (MNE) increased the maximum range, this line will be divided into two lines. As the flowing that among the points, the point that has the most distance from the mentioned line (point C) will be chosen and (AB) line will be divided into (AC, CD)lines. This algorithm will be done on the all edge points of lists and the collection of the lines will be gained.

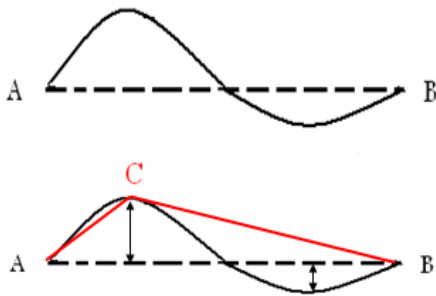


Fig. 4 Conversion of edges to lines by up to down, breaking in two lines method

In the stage of classifying line's slope, line's slope will be gained. After gaining line's slope, they will be classified. Since two parallel lines have the same slope, in this stage the aim is classifying the lines that are based on slope. It is clear if two lines have a same slope, definitely they will be put in the same part. The relation between line's slope and angles with horizontally axis, are shown in Equation.2.

$$\theta = \arctan(m) \tag{2}$$

$\theta$  Is a line angle with horizontally axis and  $M$  is a line slope. If two lines with a bit error are parallel, they are putt in the same part. For this, twelve sectors are supposed. These sectors cover each other. In the other hand a line can be a member of two sectors. Finally twelve classes will be gained

from the lines.

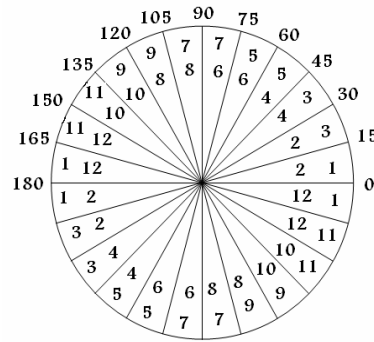


Fig. 5 Each line that has a degree with horizontally axis; can be a member of two sectors

After classifying the lines according to their slopes, it turns to; finding the possible built segments by these lines. In the rectangle two lengths are parallel with each other and they are symmetric with the passed axes from the middle of rectangle's width [12]. According to this reason if there are a few parallel or symmetric lines around a hypothesis axis, they can be supposed as a rectangle. For this, all the lists will be tested one by one in order to finding the rectangles.

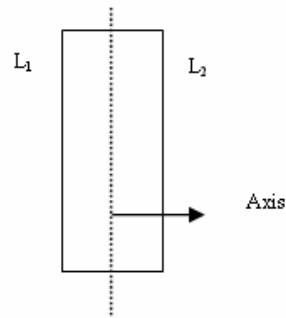


Fig. 6 In the rectangle two lengths are parallel and symmetric with the passed axis of them

In the stage of recognition of human body segments, the human body assumed in standing position that consists of five segments (including: torso, two hands and two legs). Two hands and two legs are connected to the torso in a special position. There are a few attribute in these segments that is useful for finding human body segments in the figures. A) A torso has a basic role for finding human body segments. Because, four other segments (two hands and two legs) are specially connected to the torso. B) The connection points of two hands and two legs are symmetric with a vertically axis that passed from the middle of body. C) For each hand: width and length of hands, and for each leg: width and length of legs can be assumed that they are equal two by two.

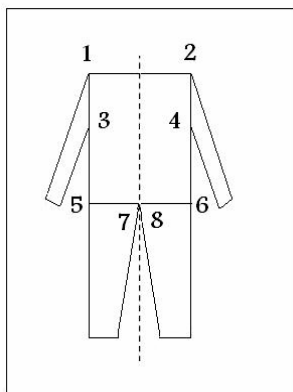


Fig. 7 The shape of five segments of human body (including: torso, two hands and two legs)

With these attributes, segment’s position with each other, their area, their width and length, help the algorithm for find a human in picture. Finally Human Body Composition Feature, Extracted from the previous stage.

VII. EXPERIMENTS

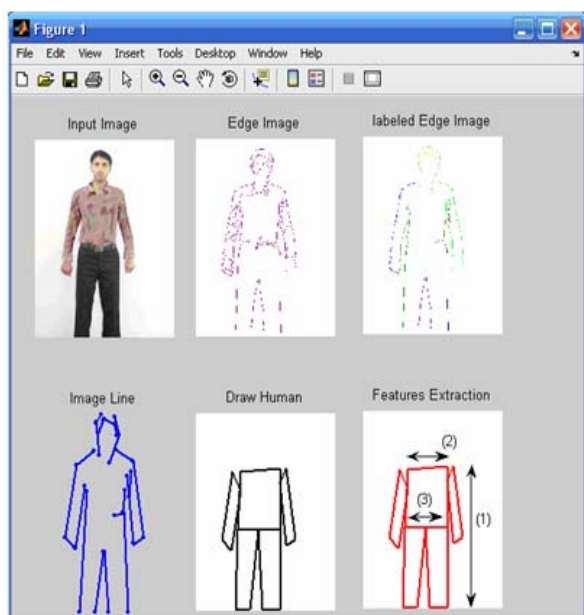


Fig. 8 Results of executing the proposed method on a colorful image and features extraction

The Results of executing the proposed method on a colorful images and features extraction from image are as shown in Fig. 8. The Result of feature extraction of the human body composition is as shown in Table I.

TABLE I  
RESULT OF FEATURE EXTRACTION OF THE HUMAN BODY COMPOSITION

| measure | (1)   | (2)  | (3)  |
|---------|-------|------|------|
| width   | -     | 45cm | 34cm |
| height  | 146cm | -    | -    |

VIII. CONCLUSION

In previous works, only the human body has been recognized in image. But in this work, furthermore the width and length of human body have been extracted in the image.

Meanwhile the designed program can work on all of the human sizes. This algorithm was applied to a number of colorful images containing human body and that 98 percent of obtained results were satisfactory. In the suggested method, the algorithm can extract features (measurement) of human body in the images.

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