

Feature Extraction of Human Silhouette

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Abstract— An approach for discovering significant data features or attributes is feature extraction. Feature extraction is demonstrated by extracting feature points from a silhouette curve. In this study, we present a systematic approach for comparing the silhouettes of human bodies from front and side views of images and real-time pictures. The first step in our silhouette detection approach is picture capture. After acquiring the image, a silhouette and contour detection approach is applied to the image to obtain feature extraction, and the human body contour (profile) of binary images (pictures) may be represented using an efficient (structured) detection technique that is an optimum edge detector known as canny edge detection. The recommended method's feature points were validated by examining changes of the silhouette curve in order to evaluate the effectiveness of the autonomous body feature extraction system. Furthermore, the recovered feature points can be used to compute body dimensions in the future (proportions). Canny's study aimed to enhance the image's edge detectors. As a result, the newly developed system can automate body feature extraction and acquire anthropometric data for a range of applications.

Keywords— Canny Edge Detection, Feature Extraction, Anthropometric data, Silhouette curve.

Introduction

As digital cameras become more popular for image capture, many applications are based on 2D images and real-time images. The majority of traditional methods for collecting anthropometric data use the palpation technique to locate body feature points. However, the manual measurement approach is time-consuming and prone to human error. Because of the essential human variations in the mechanical taking measurements methodology, optoelectronic technology provides an option for anthropometric evaluation. For image-based innovation, 2D pictures may be easily produced using a low-cost camera. These acquired pictures can be used to analyse the organization of body forms. Extracting human body characteristics from pictures can help to streamline the entire 3D model creation and anthropometric data gathering process. A number of research used image-based methods to recognize human body characteristics in images. A diverse collection of body characteristics may be identified using the shape curve derived from the body contour.

One of the most crucial, interesting, and revolutionary intellectual achievements of all time is the quest for universal learning. In today's settings, issues are extremely complicated, involve high dimensional data, and are diverse. The task is to learn and extract information from the data in order to make sound judgments. Likewise, by tracing the form contour, the feature regions throughout the body contour may be recognized. The appropriate anthropometric data may be retrieved after the

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feature points have been accurately recognized. The aim of this paper is to provide an overview of how feature extraction is achieved using LabVIEW, as well as an outline of current challenges in feature extraction.

I. FEATURE EXTRACTION IN LABVIEW:

A. LABVIEW

National Instruments' **Laboratory Virtual Instrument Engineering Workbench (LabVIEW)** is a system-design platform and development environment for a visual programming language. LabVIEW is widely used for data acquisition, instrument control, and industrial automation on a number of operating systems (OSs), including Microsoft Windows, UNIX, and Linux. LabVIEW incorporates the design of user interfaces (also known as front panels) into the development cycle. Virtual instruments are LabVIEW programs-subroutines (VIs). Each VI is made up of three parts: a block diagram, a front panel, and a connection pane. It is used to represent the VI in block diagrams, which are referred to as VIs.

B. Feature Extraction

Feature extraction is the process of identifying the required region of interest in any picture. We obtain several types of 2D pictures for feature extraction, such as front and side views of an image. These images can be taken from any source, and we can also collect real-time images using cameras. In LabVIEW, we use a kernel tool to capture real-time pictures at any moment. Feature extraction is the key to determining effective and significant criteria for image size measurements. To extract the silhouette from 2D body pictures, the acquired images are read and sent for canny edge detection algorithm. Following the establishment of the silhouette curve, we choose the field for the region of interest in order to acquire the feature points.

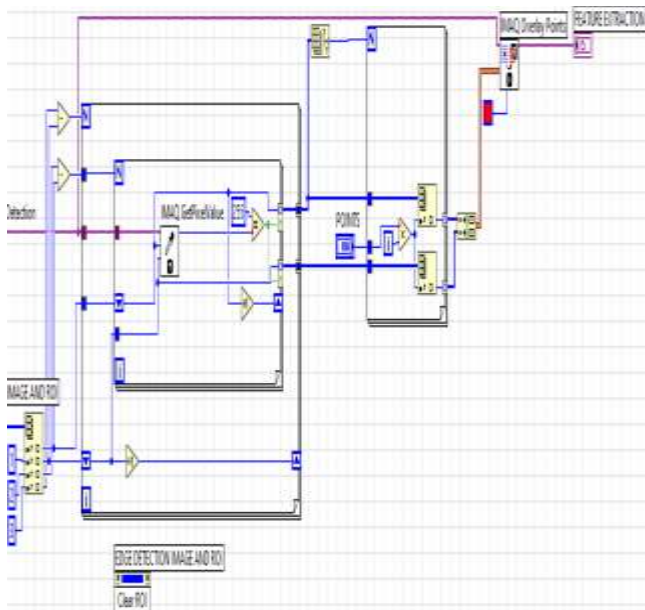
I. CANNY EDGE DETECTION

The Canny Edge Detection algorithm is used to generate a silhouette curve from an input picture. It smoothes the picture first to remove noise. After smoothing the input picture using a Gaussian filter, the Gradient magnitude and angle images are computed. The gradient magnitude picture is subjected to non-maxima suppression. Finally, the edges are detected and linked using double thresholding and connectivity analysis. Canny edge detection algorithm is also known as the optimal edge detector.

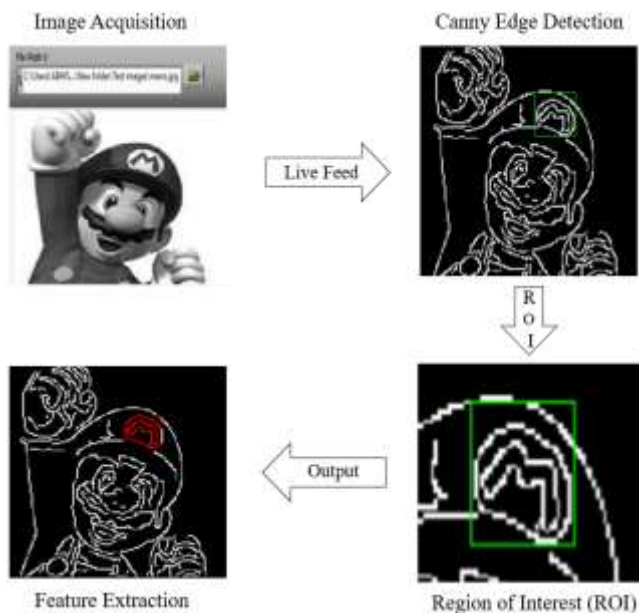
II. REGION OF INTEREST

A region of interest (ROI) is a portion of an image where you wish to concentrate your image analysis. ROIs allow you to concentrate your image processing and analysis on a specific area of the image. The. An ROI can be traced using standard contours (oval, rectangle, and so on) or free contours (freehand). When you place an image indicator on the front panel, these tools become available. An ROI is frequently used to generate a binary mask picture. Pixels within the ROI are assigned to 255 in the mask picture, while pixels outside the ROI are set to 0.

MODEL ARCHITECTURE



This is a schematic of our feature extraction model. In this case, we choose the region of interest in the form of a square or rectangle, and then we take the x and y coordinates within the box. We pass this information to GetPixelValue. Using the GetPixelValue function, we choose the masked and unmasked regions. If the x and y coordinate values are identical to 255, the region is considered unmasked. This unmasked region can be used to extract features. If it is 0, the region is considered masked. The unmasked region is placed in a loop to plot the points. The user is asked to enter the number of points in the front panel. The Multiple points Algorithm is used to plot these points. This output is passed to the overlay points function, which uses it to plot the feature points. From here, we extract the feature points.



METHODOLOGY AND IMPLEMENTATION:

We analyse feature extraction on pictures in this study, and we use LabVIEW tools to acquire and perform the feature extraction. To begin, we use image acquisition and file path to capture the picture. The picture is read using the IMAQ tool and submitted for canny edge detection, which yields

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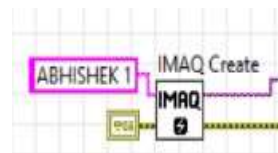
the silhouette curve of the obtained image. We utilize the ROI tool to pick the required area in the picture, and then we use IMAQ GetPixelValue to detect the non-masked region, which is represented by the value 255 in LabVIEW. If it detects 0, it is deemed to be a veiled region. Using the overlay point's function, we now only obtain feature points in the non-masked region of interest, i.e., the 255 value. In this case, we utilize an algorithm to plot points by multiples of selected points. We may also select a colour for charting the feature points. As a result, we obtain the necessary feature points on the picture.

IMPLEMENTATION:

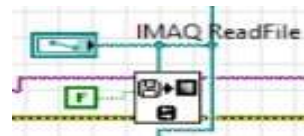
IMAQ Create:

Creates a temporary memory location for an image. Use IMAQ Create in conjunction with the IMAQ Dispose VI to create or dispose of NI Vision images in LabVIEW. **Image Name** is the name associated with the created image. Each image created must have a unique name.

IMAQ READ:



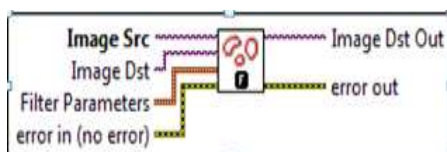
Reads an image file. The file format can be a standard format (BMP, TIFF, JPEG, JPEG2000, PNG, and AIPD) or a nonstandard format known to the user. In all cases, the read pixels are converted automatically into the image type passed by **Image**.



File Path is the complete pathname, including drive, directory, and filename, of the file to read.

Canny Edge Detection:

To produce a silhouette curve from an input image, the Canny Edge Detection method is utilized.



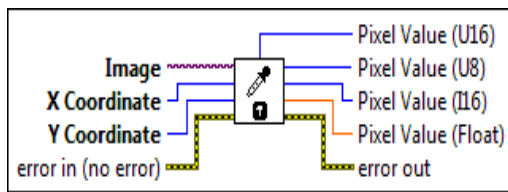
Region of Interest:

A region of interest (ROI) is a section of an image on which you want to focus your image analysis.



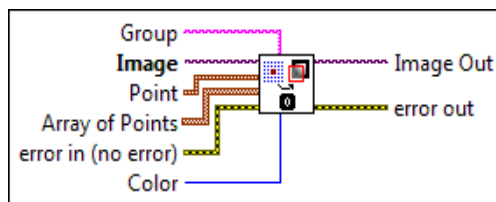
Get Pixel Value:

A pixel value from an image is read. We collect the points from the specified region of interest and use them to extract the features.



Overlay points:

Overlays a single point or an array of points on top of a picture.



RESULTS AND ANALYSIS:

In this case, we acquire a picture by giving the image's filepath. The picture is then sent to canny edge detection, and the silhouette curve of the captured image is obtained. Now we choose the region of interest for feature extraction. We select the face of the human silhouette curve to obtain the feature points in the region of interest for measuring body measurements.

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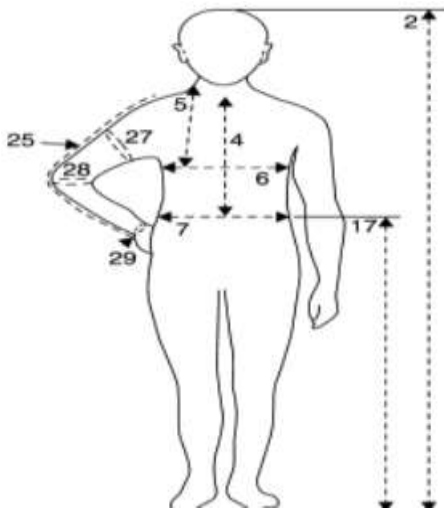
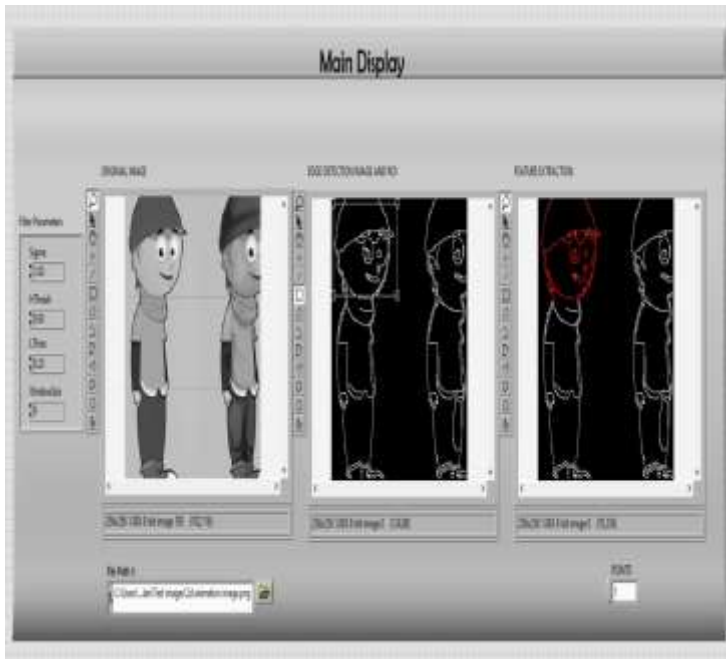


Fig: Feature extraction from human body

ANALYSIS:

Feature Points Algorithm:

Step-1: The user will select the region of interest.

Step-2: We consider the x, y coordinates from the defined region of interest.

Step-3: We utilize a LabVIEW tool to determine the pixel value in the region of interest.

Step-4: IMAQ GetPixelValue returns 255 for the unmasked region and 0 for the masked region.

Step-5: Now we plot the feature points in a sequential manner on the non-masked region using IMAQ Overlay Points.

CONCLUSION:

LabView is proposed for the extraction of feature points on a Silhouette curve. The feature points may be acquired using this approach. Ten pictures, five men and five girls, were evaluated to see if the proposed approach was effective. All of the feature points for the ten subjects were successfully retrieved. The experimental results back up the efficacy and resilience of the method. Moreover, when compared to prior research, it appears that the suggested technique exhibited superior performance in feature point extraction using LabView. The collected feature points may then be utilized to automate body dimension measurements for a variety of purposes. In future it may be combined with artificial vision to add variables and make it easier for users to obtain. Feature extraction may also be accomplished utilizing cameras in a real-time environment. 3D images may be used for feature extraction.

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