EXPRESSION INVARIANT GENDER RECOGNITION FROM FACE IMAGES USING GABOR FILTER

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ABSTRACT:

The objective of our project is expression invariant gender recognition from face images using digital image processing technique. Gender recognition is important in many application area such as human computer interaction, biometrics surveillance. The recognition process is divided into three main operations consists of face detection, feature extraction and gender classification. In this project using viola jones algorithm the face is detected. The gabor filter is used to extract the edge feature from face images at various orientation and frequencies. The feature extraction of testing and training images are given to the support vector machine. Based on that classifies the given images as male or female.

KEYWORDS:

Gabor filter, support vector machine, edge feature, sobel filter, viola jones algorithm, feature extraction.

INTRODUCTION

In recent years the recognition of the gender from face images has attracted interest in both fundamental and applied research. The difficulties emerge from the position variations of a face captured by camera which depend on image acquisition process(pose of face, image illumination, contrast and background) [1].In this paper they propose a new face recognition system using gabor filter. The first part of proposed recognition algorithm consists of a face feature extraction process. The featuring approach processes each facial image with a filter bank containing several 2D gabor filter at various orientation, frequencies and standard deviation[2]. First the faces are detected from facial images using viola jones algorithm. The features are extracted from detected faces from gabor filter used for edge analysis. The proposed method was evaluated by using AR database .

FEATURE EXTRACTION:

GABOR FILTER

Gabor filter is the implementation of the gabor transform which is a short term Fourier transformation with Gaussian window for analysis in the spatial domain. The distortion information of content adaptive image steganography incoperates the edge information of the image. On embedding there causes edge anomaly in an image. This edge anomaly can be characterized by the gabor output obtained by 2D gabor filtering. The two dimensional gabor filter represents the edge information because of its spatial selectivity and orientation.

The 2D gabor filter can be discretized in the order M x N by setting the ranges of x and y. Then the 2D gabor filter is generated according to the value set for the parameters. The order of M x N is 8 x 8.

g(x,y) is the gabor function

$$g(x,y) = \exp(-\frac{(x^2+\gamma^2 y^2)}{2\sigma^2}) X \cos(\frac{2\pi}{\lambda} x+\varphi)$$

where,

$$x = a\cos\theta + b\sin\theta$$

$$y = -a\sin\theta + b\cos\theta$$

λ -Wavelength of sinusoidal factor

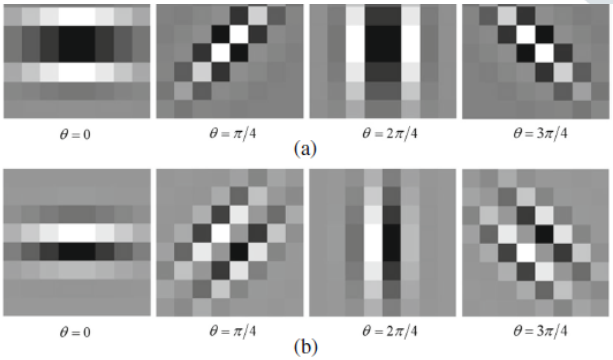
θ -Orientation of gabor function

σ -Standard deviation of Gaussian

Envelope.

ϒ -Spatial aspect ratio.

- In figure (1), 2D Gabor filter is shown with different orientations and phase offset. In figure (1a), the filter is centro symmetric and anti-centro symmetric in figure (1b). Different filters can be generated depending on the different values of the orientation parameters.



Filtered image

FACE DETECTION:

VIOLA JONES ALGORITHM

Viola Jones Algorithm used for face detection . Using trained data viola Jones Algorithm classifies as male or female. Four working ingredients are Haar features used to detect presence of the features in given image, the integral images for feature computation, Adaboost for feature selection, attentional cascade for efficient computational resource allocation. Viola Jones Algorithm is real time face detection system that gives multiple detection, a post processing step to reduce detection redundancy using a robustness argument.

Female Male

EDGE DETECTION

Edge detection includes a variety of mathematical methods that aim at identifying points in a digital image at which the image brightness changes sharply or more formally, has discontinuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed **edges.**

SOBEL FILTER:

Sobel operator performs a 2D facial gradient measurement on an image and so emphasis region of high spatial frequency that corresponds to edges .Typically it is used to find the approximate absolute gradient magnitude at each point in an grayscale image. Sobel operator is a kind of orthogonal gradient can be expressed as a vector.

Input image sobel gradient

Edge detected image

CONCLUSION

In this paper we propose a new face recognition system, using Gabor filtering . The Proposed recognition algorithm consists of a face feature extraction process . Our featuring approach processes each facial image with a filter bank containing several symmetrical Gabor filters, at various orientations, frequencies and standard deviations. These feature vectors are applied to the SVM classifier for gender recognition. This method robustly gives the excellent performance in recognizing the gender under various conditions like facial expressions, illumination, pose variation and occlusions. The accuracy rate for this gender recognition method has been increased in comparing with the existing new methods and it takes less amount of time to detect the gender because of using a few number of higher order moments for gender classification.

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