

# Gender Recognition Based on Facial Features using COSfire Filter

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**Abstract**— The main objective of this paper is to identify the gender of the human being based on their face detection by using COSfire filter. In this paper, the Viola Jones algorithm is used to detect the face of the human being and extract the features of that face. The extracted features are then applied to COSfire filter for classification of gender. The COSfire filter compares feature extracted image with data base image and then gives the classification of the gender that is male or female. This method is used in various applications like human-robotic interaction, in biometric systems and in real applications. This method gives up to 97.50% of accuracy as compare to other techniques. COSfire filter compares the testing image with the trained data base which consists of 100 male and 100 female images, output of this COSfire filter determines the gender of the person. The gender is classified on the basis of eyebrow, lips, forehead and eyes.

**Index Terms**— Face detection, Viola Jones algorithm, feature extraction, COSfire filter.

## I. INTRODUCTION

Gender classification is a main problem in a society and it attracts more attention recently. This problem is a challenging one in many recognition techniques. The gender classification process is used to identify the gender of the human being base on their face image. The analysis of face images plays an important role in the computer section. The analysis of face is used in many applications like in biometric systems, human-robotic interaction, in public places for tracking the specific person, in online identity verification and in many real time applications. The gender identification is very easy to the person but for computers it is very challenging one.

Automatic gender identification technique is totally based on the face of the human being. The face detection is very important section for the gender identification. The gender identification technique is a binary problem that predicts an image that which belongs to man or woman by detecting the face of the human being.

Figure below shows the block diagram of general approach for gender identification system. Here in general the testing image is applied to the face detector, after face detection of the testing image the features are extracted by the suitable algorithm and then the gender is classified by comparing the testing image with the trained data base which gives the result as the testing image which belongs to man or woman. In this paper, the gender identification is solved in an efficient

manner. The face detection and face of the testing image is extracted by using Viola Jones algorithm. The Viola Jones

algorithm is very easy, it has very hi efficiency and it helps in reducing the complexity of the system. Then the extracted features are applied to the COSfire filter.

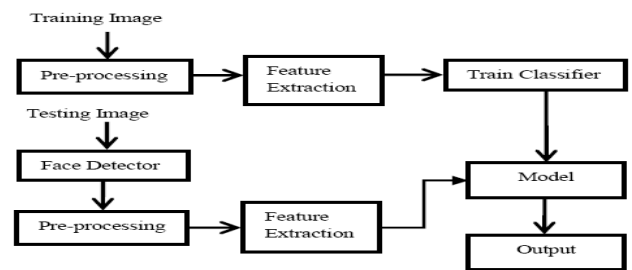


Figure 1: General approach for gender identification system.

This filter compares the tesing image with the trained data base and classifies the gender of the testing image such as male or female. This paper gives up to 97.50% accuracy as compare to all other techniques. The gender classification is based on the features like eye, eyebrows, distance between one eye to another eye, length of nose and width of lips etc. The trained data base contains some images of males appearing as females and images of females appearing as males. This technique successfully classified all the images into males and females. This system have some advantages like, it has very high accuracy because of using Viola Jones algorithm, it has high performance efficiency, low complexity in classification of gender because of COSfire filter which is very simple and easy to understand, and this system is highly reliable and very fast.

## II. LITERATURE SURVEY

According to the nearest neighbour algorithm[1] the classification of data is done by the information which present in its sample test.

The main problem of this technique is that the data is totally depends on a set of assumptions that sometimes are not met in the data distribution. Nearest neighbour algorithm is a nonlinear technique which is not up to the mark in the feature extraction. It gives up to 76.82% of accuracy.

According to fisher's algorithm[1] the grouping of the data is done according to the properties of data. This grouping is done on the basis of difference in the two consecutive data

which are injecting in the sample set. This algorithm doesn't give better result as compare to nearest neighbour algorithm that means it gives up to 75.26% of accuracy.

The problem in this algorithm is, sometimes the calculation of optimal vector in order to train the samples becomes so difficult. And also it is very difficult to classify the gender when test samples are different than the training samples.

According to the support vector machines [4] the picking of the right data is difficult, results are incomprehensive and no standardization for dealing with these problems which gives up to 81.45% of accuracy.

According to the back propagation network [2] picking of the correct topology for the classification of gender is difficult, it takes long time, it requires lot of data and issues of outputs are incomprehensive which gives up to 95.87% of accuracy.

### III. DESIGN METHODOLOGY

The gender classification system is designed in such a way that, the system that can identify the gender of the human being based on their face detection by using Viola Jones algorithm. It is very helpful in real time applications.

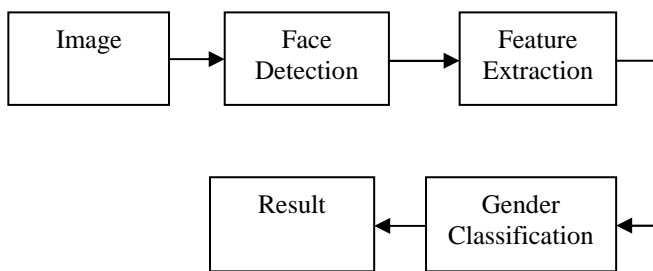


Figure 2: Architecture of gender classifier.

The main aim of this project is to identify the gender from an image using COSfire filter, figure 2 shows the block diagram of architecture of gender classifier. The gender classification technique is mainly classified into four categories, that is given by

- a. Face Detection
- b. Feature Extraction
- c. COSfire Filter
- d. Gender Classification

#### A. Face Detection:

Face detection performs an important role in the gender classification technique. It uses Viola Jones algorithm to classify the gender of the human being by their face detection of a given input image.

Viola Jones algorithm is a very fast and accurate method to detect the face of an image. This algorithm detects the face based on haar like features, integral image, adaboost machine learning method, and cascade classifier. Nowadays the Viola Jones algorithm is used in many applications like cell phone cameras, security perimeters etc.



Figure 3: Face detection

#### B. Feature Extraction:

Feature extraction is an important factor in gender identification technique; the feature extraction is done based on the eyes, lips and forehead and so on. This method is very useful and it requires less memory that means it divides the features of face and calculates the distance and lent hog the features.

Figure 4 shows the image of feature extraction, here the width of the lip is calculated.



Figure 4: Features Extraction.

#### C. COSfire filter:

COSfire filter classifies the gender of the human being based on their face detection. The extracted features are given to the COSfire filter; it compares the testing image with the trained data base. Based on the comparison value it classify the gender of an image, this filter is more efficient and it has more accuracy.

#### D. Gender Classification:

In gender classification the first step is to detect the face and extract the features of the testing image. The extracted features are then given to the COSfire filter which classifies the gender of an image based on their face detection that is male or female. The gender classification is based on the features like distance between one eye to another eye, width of mouth, length of nose, width of forehead etc.

#### E. Flow Chart:

The figure 5 shows the flow diagram of the gender classification, the gender classification system mainly consist of face detection, feature extraction and classification.

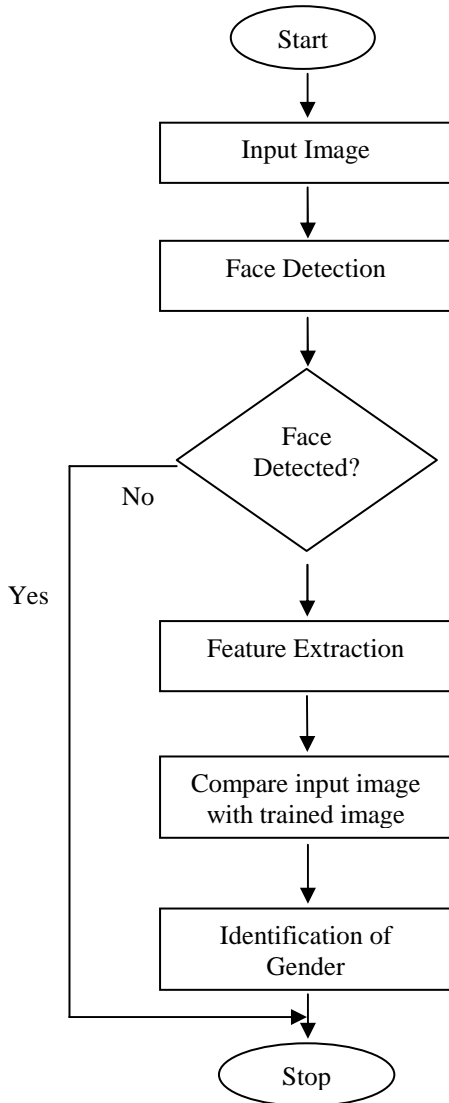
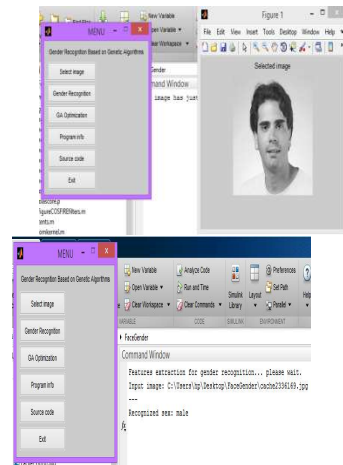


Figure 5: Flow diagram of gender classification.

Figure 5 shows the flow diagram of gender classification. At first the input image which is to be tested is given to the face detector. Viola Jones algorithm is used to detect the face of the input image. Then the output of the Viola Jones algorithm is given to the feature extraction process, if the face is not detected it comes out of the loop. After feature extraction the input image is compared with the trained images by COSfire filter and then it classifies the gender that is male or female.

#### IV. RESULTS

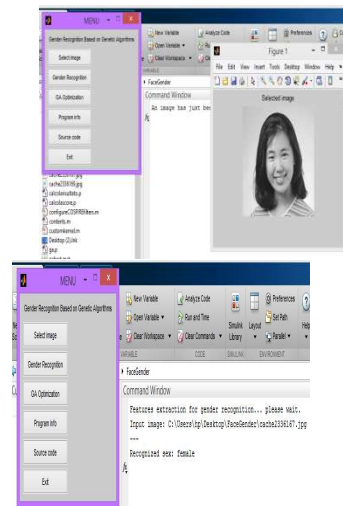
This work classifies the gender on the basis of features. When to classify the gender, it first detect the face, once the face is detected then the features are extracted by using viola Jones Algorithm, once the features are extracted then use the cosfire filter to classify the gender. This System produces up to 97.50% of efficiency and it is very accurate. The gender identification system can be used in real time applications. The main of this paper is to identify the gender of an input image by using COSfire filter.



(a) Selecting input image.

(b) Output of gender identification.

Figure 6: Output of male identification by face detection.



(a) Selecting input image.

(b) Output of gender identification.

Figure 7: Output of female identification by face detection.

Figure 6 and 7 shows the output of gender identification by face detection. Here the input image is selected from the trained database and that image is given as a input to the face detector. The Viola Jones algorithm is used for the face detection process and output of the face detector is given to the feature extraction. The COSfire filter is used as a classifier; it compares the input image with the trained database and gives the result that is male or female.

TABLE 1: COMPARISON RESULT OF DIFFERENT ALGORITHM.

Method	Accuracy
Nearest Neighbour Algorithm	76.82%
Fisher's Algorithm	75.26%
Support Vector Machines	81.45%
Back Propagation Networks	95.87%

COSfire Filter	97.50%
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Table 1 shows the comparison result of different algorithm for gender identification of human being by their face detection. In this table 1 the cosfire filter have more accuracy up to 97.50% as compare to all other method.

Figure 7 shows the graphical representation for the accuracy of the different algorithm as mentioned in table 4.2. As observed in the figure 7 gender identification using cosfire filter gives the highest accuracy as compared to all other methods. The cosfire filter gives the result up to 97.50%.

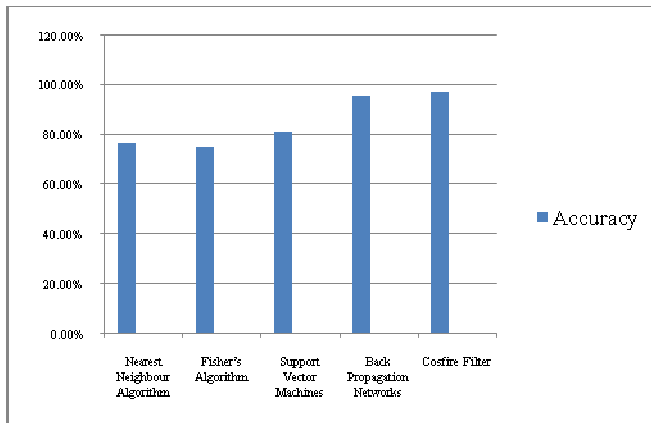


Figure 7: Accuracy of different algorithms.

## V. CONCLUSION & FUTURE SCOPE

This paper concludes that, the cosfire filter classifies the gender of a given input image on the basis of extracted features. This method has very high accuracy and it is low complexity. Viola Jones algorithm is used to detect the face and extracts the features of an image. The proposed system is successfully used in real time applications like ladies apartments and robotic-human interaction and so on. In future, this work can be extended to determine several other parameters as well as several other methodologies can be used to obtain the result accurate for gender classification. There may be possible that several other features can be used in future to determine the gender which may improve the result.

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