|| Volume 5 || Issue 9 || September 2020 || ISSN (Online) 2456-0774
INTERNATIONAL JOURNAL OF ADVANCE SCIENTIFIC RESEARCH
AND ENGINEERING TRENDS

GENDER RECOGNITION USING FACIAL IMAGES BASED ON FUSION

Kshitij R More[1], Omkar S Rasal[2], Prabhakar S Dhavan[3], Prof Laxmikant Malphedwar[4]

Computer Engineering, Dr D Y Patil School of Engineering Academy, Pune, India [1 2 3 4]

More.kshitij7709@gmail.com[1], omkarrasal79@gmail.com[2], sairajdhawan712@gmail.com[3]

Abstract: - This paper proposes a fusion-based gender recognition technique that uses facial pictures as input. Firstly, this paper utilizes pre-processing and a landmark detection technique so as to search out the vital landmarks of faces. Thereafter, four totally different frameworks are projected that are galvanized by progressive gender recognition systems. the primary framework extracts options mistreatment native Binary Pattern (LBP) and Principal element Analysis (PCA) and uses a back propagation neural network. The second framework uses physicist filters, PCA, and kernel Support Vector Machine (SVM). The third framework uses lower a part of faces as input and classifies them mistreatment kernel SVM. The fourth framework uses Linear Discriminant Analysis (LDA) so as to classify the facet define landmarks of faces. Finally, the four selections of frameworks are coalesced mistreatment weighted ballot. we have a tendency to conjointly track users age supported image. This paper takes advantage of each texture and geometrical data, the 2 dominant varieties of data in facial gender recognition. Experimental results show the facility and effectiveness of the projected technique. This technique obtains a recognition rate of ninety-four for neutral faces of the FEI face dataset, which is adequate to progressive rate for this dataset.

Keywords: - *Gender Recognition, Gabor filter, Local binary pattern, Lower face, LDA, SVM, Back propagation neural network, PCA.*

I INTRODUCTION

Gender recognition is often enforced mistreatment differing types of information, like facial pictures, hand skin pictures, body signals, and etc. However, because it is that the simplest way for the human to acknowledge gender by watching face, facial pictures square measure the foremost informative knowledge for gender recognition. Since previous decades, numerous strategies and algorithms are planned for facial gender recognition. A survey on strategies in gender recognition mistreatment facial pictures. Consistent with facial data for gender recognition is often categorized into 2 main categories: (I) geometrical data and (II) texture (or appearance) data.

Geometrical data contains the form and pure mathematics of face and OS, and texture data takes into consideration the intensity and pattern of facial pixels. Note that in the literature of facial gender recognition, typically geometrical data is employed infusion with texture data and not alone; though, texture data is employed alone in innumerable cases. Moreover, texture and intensity square measure typically thought-about identical, observed as holistic features; but, in intensity, texture, and form items of data square measure thought-about otherwise and square measure united in an exceeding gender recognition system.

This paper proposes a fusion-based gender recognition methodology that uses the vital concepts of previous add facial gender recognition space. The structure of the planned methodology is shown in Fig one. As are often seen during this figure, the facial pictures square measure first off pre-processed, i.e., become gray-scaled and bar chart equalized. Thereafter, landmarks of faces square measure detected mistreatment one in all the landmark detection strategies in the literature. The middle of faces square measure cropped out of pictures after. Four frameworks square measure planned during this methodology, galvanized by the previous works. The 2 initial use texture data of faces for recognition. The third one uses each geometrical and texture data, and also the last one uses just the geometrical data. The inspiration and reasons square measure explained for every one of those frameworks within the next sections. Finally, selections of 4 frameworks square measure voted with applicable weights and employing a threshold, the ultimate call on the gender of every take a look at a face is obtained.

II PROBLEM STATEMENT

Recognition can be implemented using different types of data, such as facial images, hand skin images, body signals, and etc. However, as it is the easiest way for human to recognize gender by looking at face, facial images are the most informative data for gender recognition. We proposed a fusion-based gender recognition method which uses the important ideas of previous work in facial gender recognition area.

Motivation:

User recognition can be implemented using different types of data, such as facial images, hand skin images, body signals, and etc. However, as it is the easiest way for human to recognize gender by looking at face, facial images are the most informative data for gender recognition. We proposed a fusion- based gender recognition method which uses the important ideas of previous work in facial gender recognition area.

Scope:

- To considers both geometrical and texture information of facial images.
- To powerful gender recognition algorithm by using four frameworks parallel

III LITERATURE SURVEY

1. **Paper Name:** A Neural Network Approach to Gender Classification using Facial Images

Author: Kanchan Tarwani, Dr. K. K. Bhoyar

Description: Plastic Gender classification is a vital task in today's technological world with a range of applications like industrial identification, police work functions, observation applications, and human-computer interaction. during this paper, Associate in Nursing approach for developing an Associate in Nursing automatic system to classify gender from Associate in Nursing facial image victimization Neural Network Classifier is conferred. A feed forward back propagation neural network is trained to classify the given image as male or feminine. The given image is 1st preprocessed victimization facial color segmentation and solely the face half is fitted in minimum bounding parallelogram. The preprocessed image is then increased by applying bar graph deed, smoothening and sharpening and is then allowed to feed as input to the neural network. The experiments area unit performed on Indian Face info, MIT-CBCL info, and FEI info and therefore the accuracy of the system is computed for these databases. it's found that coaching time with this approach is significantly reduced, and therefore the system accuracy variable between ninety to ninety-two.

2. **Paper Name:** Real-time Gender Recognition based on Eigen-features selection from Facial Images

Author: Yimin Zhou, Zhifei Li

Description: This paper planned a completely unique image process technique combining Principal element Analysis (PCA) and Genetic algorithmic rule (GA) to scale back the interference of facial features, lighting or wear however extracting gender feature from the frontal face. The collected facial pictures area unit initial cropped and aligned mechanically, then the gray-level info is often regenerate to feature vectors via PCA. once Eigen features area unit extracted with high classification performance by the help of GA, the neural network classifier are often trained consequently. Compared to the classification strategies supported international gray level info, the obtained classifier has a higher identification rate however 0.5 less used feature dimension, that the calculation load will considerably be reduced throughout coaching and identification procedures, that edges to the event of a period of the time identification system. moreover, the FERET dataset and FEI dataset area unit wont to validate the generality of the planned technique, wherever ninety-two and ninety-four accuracy rates of the gender recognition are often achieved severally.

3. **Paper Name:** Age and Gender Classification using Convolutional Neural Networks

Author: Gil Levi and Tal Hassner

Description: Automatic age-associated gender classification has become relevant to an increasing quantity of applications, significantly since the increase of social platforms and social media. withal, the performance of existing strategies on real-world pictures remains considerably lacking, particularly in comparison to the tremendous leaps in performance recently rumored for the connected task of face recognition. this paper show that by learning representations through the utilization of deep-convolutional neural networks (CNN), a big increase in performance is often obtained on these tasks. to the current finish, we tend to propose a

straightforward convolutional web design that may be used even once the number of learning information is restricted. Here value our technique on the recent urge benchmark for age and gender estimation and show it to dramatically outstrip current progressive strategies.

4. **Paper Name:** Gender classi_cation: a convolutional neural network approach

Author: Shan Sung, Mohamed, Syafeeza, Rabia

Description: An approach employing a convolutional neural network (CNN) is planned for period gender classification supported facial pictures. The planned CNN design exhibits a way reduced style quality compared with different CNN solutions applied in pattern recognition. the quantity of process layers within the CNN is reduced to solely four by fusing the convolutional and sub sampling layers. in contrast to standard CNNs, we have a tendency to replace the convolution operation with cross-correlation, therefore reducing the processing load. The network is trained to employ a second-order back propagation learning formula with hardened international learning rates. Performance analysis of the planned CNN resolution is conducted on 2 in public out there face databases of SUMS and AT&T. we have a tendency to accomplish classification accuracies of ninety eight.75% and 99.38% on the SUMS and AT&T databases, severally. The neural network is in a position to the method and classifies a thirty-two nine-thirty two-component face image in but zero.27 ms, that corresponds to an awfully high turnout of over 3700 pictures per second. coaching converges inside but twenty epochs. These results correspond to a superior classification performance, sub stantiative that the planned CNN is a good period resolution for gender recognition.

5. Paper Name: A Proposed System For Gender Classification Using Lower Part Of Face Image

Author: Abul Hasnat, Santanu Halder, Debotosh Bhattacharjee, Mita Nasipuri

Description: The present study proposes a quick gender organization from frontal facial pictures exploitation options elect from mouth and chin solely. Most of the study on gender classification found in literature deals with countless options that make the organization a posh one whereas reducing the number of options makes the system less complicated however the choice of options additionally plays a necessary role in gender classification. usually lower a part of face image carries comfortable data relating to gender of someone. therefore during this study, options from lower a part of the face area unit thought of for gender identification. planned methodology works in four steps - a) Extraction of the Lower a part of frontal face pictures exploitation the strategy geometric model planned by Bhattacharjee et al. b) Construction of grey Level Co-occurrence Matrix from the extracted image c) Extraction of options from GLCM and d) Classification of the face employing a commonplace classifiers. The planned methodology has been tested on seventy-five male and thirty five feminine color face pictures of commonplace FRAV2D info and a few face pictures captured exploitation standard camera. The experimental result shows the effectiveness of this straightforward gender organization that achieves ninety four.34±1.8% accuracy on taking a look at the information.

IV EXISTING SYSTEM:

The problem of mechanically extracting age-connected attributes from facial pictures has received increasing attention in recent years and lots of strategies are place forth. we tend to note that despite our focus here on people classification instead of precise age estimation (i.e., age regression), the survey below includes strategies designed for either task. Early strategies for age estimation area unit supported hard ratios between totally different measurements of countenance. Once countenance (e.g. eyes, nose, mouth, chin, etc.) area unit localized and their sizes and distances measured, ratios between them area unit calculated and used for classifying the face into totally different age classes consistent with hand-loomed rules. a lot of recently uses an identical approach to model age progression in subjects underneath eighteen years previous. As those strategies need correct localization of countenance, a difficult drawback by itself, they're unsuitable for in-the-wild pictures that one might expect to search out on social platforms.

V DISADVANTAGES:

- This technique based on calculating ratios between different measurements of facial features.
- The problem of automatically extracting age related attributes from facial images.

VI PROBLEM DEFINITION

Recognition is often enforced mistreatment differing kinds of information, like facial pictures, hand skin pictures, body signals, and etc. However, because it is that the easiest method for the human to acknowledge gender by viewing face, facial pictures ar the foremost informative information for gender recognition. we tend to propose a fusion-based gender recognition technique that uses the vital ideas of previous add facial gender recognition space.

VII PROPOSED SYSTEM:

This paper proposes a fusion-based gender recognition technique that uses the necessary concepts of previous add facial gender recognition space. the general structure of the planned technique is shown in Fig one. As will be seen during this figure, the facial pictures area unit foremost pre-processed, i.e., become gray-scaled and bar chart equal. Thereafter, landmarks of faces area unit detected exploitation one among the landmark detection strategies in the literature. the middle of faces area unit cropped out of pictures subsequently. Four frameworks area unit planned during this technique, galvanized by the previous works. the 2 initial use texture data of faces for recognition. The third one uses each geometrical and texture data, and therefore the last one uses simply the geometrical data. The inspiration and reasons area unit explained for every one of those frameworks within the next sections. Finally, selections of 4 frameworks area unit voted with applicable weights and employing a threshold, the ultimate call on the gender of every check face is obtained.

VIII SYSTEM ARCHITECTURE:

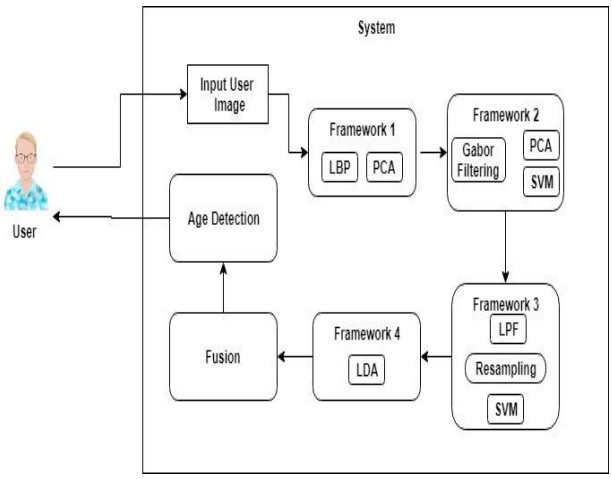

Fig.1 System Architecture

IX MATHEMATICAL MODELS

Let S is the Whole System Consists:

S = { I , P, O, Sc, Fc }

Where,

S = System

I = Input

I = { U }

D = No of Users

P = Process

P ={OC, Usf, DF, AF1, AF2, AF3, AF4, FoF, DA}

OC = System camera open

Usf = User show face on camera

DF = Detect face using Viola Jones algorithm

AF1 = Apply framework 1 that recognize face using LBP and PCA algorithm

AF2 = Apply framework 2 that use gabor filtering, PCA, SVM

AF3 = Apply framework 3 that use LPF, resampling and then SVM

AF4 = Apply framework 4 that use LDA

FoF = Fusion of framework and get gender

DA = Detect age

OUTPUT:

O = Output

Output : Detect gender and age of user

Sc= Success Case

Our system detect gender and age of user

Fc= Failure Case

System Fail to detect gender and age of user

X RESULTS

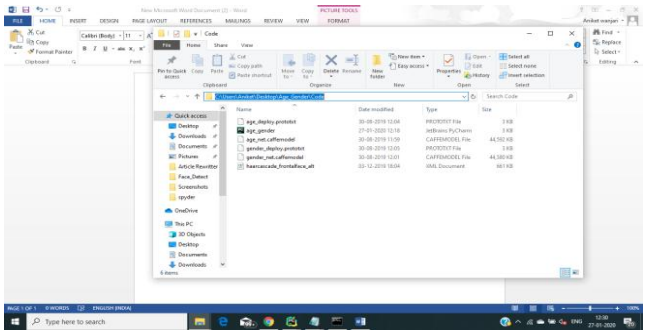

Fig.2 Required Projects Code Files

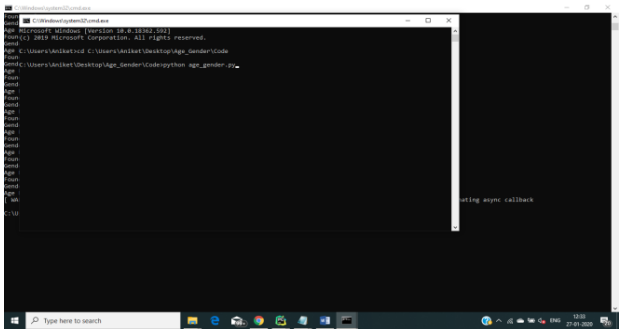

Fig. 3 Project Code Running Process

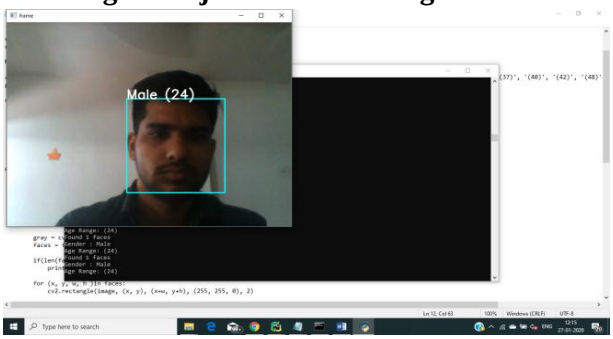

Fig 4. Exact Results with gender and age

I. Algorithm

SVM (Support Vector Machine):

- It should separate the two classes A and B very well so that the function defined by:
- f(x) = a.x + b is positive if and only if x E A
- f(x) 0 if and only if x E B
- It exists as far away as possible from all the observations (robustness of the model). Given that the distance from an observation x to the hyperplane is a.x+ b/a.
- The width of the space between observations is 2/ a. It is called margin and it should be largest.
- Hyperplane depends on support points called the closest points.
- Generalization capacity of SVM increases as the number of support points decreases.

Viola-Jones Algorithm

- Set the minimum window size, and sliding step corresponding to that size.
- For the chosen window size, slide the window vertically and horizontally with the same step.
- At each step, a set of *N* face recognition filters is applied.
- If one filter gives a positive answer, the face is detected in the current widow.
- If the size of the window is the maximum size stop the procedure.
- Otherwise increase the size of the window and corresponding sliding step to the next chosen size and go to the step 2. [7]

LBP (Local Binary Pattern)Algorithm

- Divide the examined window into cells.
- For each pixel in a cell, compare the pixel to each of its 8 neighbors
- Where the center pixel's value is greater than the neighbor's value, write "0". Otherwise, write "1".
- Compute the histogram, over the cell, of the frequency of each "number" occurring
- Concatenate (normalized) histograms of all cells. This gives a feature vector for the entire window.

PCA (Principal Component Analysis)

- Find the mean vector: ...
- Assemble the mean adjusted matrix..
- Compute the covariance matrix..
- Compute the Eigen vectors and Eigen values of the covariance matrix.
- Compute the basis vectors.
- Represent each sample i.e., image as a linear combination of basis vectors.

LDA (Linear Discriminant Analysis)

- Step 1: Computing the d-dimensional mean vectors. ...
- Step 2: Computing the Scatter Matrices. ...
- Step 3: Solving the generalized eigenvalue problem for the matrix S−1WSB. ...
- Step 4: Selecting linear discriminants for the new feature subspace.
- Step 5: Transforming the samples onto the new subspace

XI CONCLUSIONS

In this paper, a fusion-based facial gender recognition technique is planned within which four totally different frameworks, impressed by the progressive gender

recognition ways, exist. the primary framework consists of LBP, PCA, and back propagation neural network, whereas the second framework enclosed Dennis Gabor filtering, PCA, and kernel SVM. The third and fourth frameworks severally cope with lower a part of faces and aspect define landmarks and use kernel SVM and LDA for classification.

REFERENCES:

[1] E. Makinen and R. Raisamo, "Evaluation of gender classification methods with automatically detected and aligned faces," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 30, no. 3, pp. 541–547, 2008.

[2] M. Nazir and A. M. Mirza, "Multi-view gender classification using hybrid transformed features," 2012.

[3] K. Tarwani and K. Bhoyar, "A neural network approach to gender classification using facial images," in International Conference on Industrial Automation and Computing, 2014.

[4] C. Perez, J. Tapia, P. Est´evez, and C. Held, "Gender classification from face images using mutual information and feature fusion," International Journal of Optomechatronics, vol. 6, no. 1, pp. 92–119, 2012.

[5] B. A. Golomb, D. T. Lawrence, and T. J. Sejnowski, "Sexnet: A neural network identifies sex from human faces." in Neural Inform. Process. Syst. (NIPS), vol. 1, 1990, pp. 572–579.

[6] A. Jaswante, A. U. Khan, and B. Gour, "Back propagation neural network based gender classification technique based on facial features," International Journal of Computer Science and Network Security (IJCSNS), vol. 14, no. 11, pp. 91–96, 2014.

[7] A. Khan and B. Gour, "Gender classification technique based on facial features using neural network," International Journal of Computer Science and Information Technologies, vol. 4, no. 6, pp. 839–843, 2013.

[8] S. Tamura, H. Kawai, and H. Mitsumoto, "Male/female identification from 8× 6 very low resolution face images by neural network," Pattern recognition, vol. 29, no. 2, pp. 331–335, 1996.

[9] P. Jain, "Automatic human gender identification system," Master of Technology Thesis, Indian Institute of Technology Kanpur, 2008.

[10] Amit Jain, Jeffrey Huang, Shiaofen Fang, "Gender identification using frontal facial images," In Multimedia and Expo, 2005. ICME 2005. IEEE International Conference on, IEEE, 2005.

[11] Baback Moghaddam, Ming-Hsuan Yang, "Learning gender with support faces," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 24, no. 5, pp. 707–711, 2002.

[12] Caifeng Shan, "Learning local binary patterns for gender classification on real-world face images," Pattern Recognition Letters, vol. 33, no. 4, pp. 431–437, 2012.

[13] Eran Eidinger, Roee Enbar, Tal Hassner, "Age and gender estimation of unfiltered faces," IEEE Transactions on Information Forensics and Security, vol. 9, no. 12, pp. 2170–2179, 2014.

[14] P. Sasikala, N. Nirosha, E. Gurumoorthi, J. VijayaBarathi, "Identification Of Gender And Face Recognition Using Adaboost And SVM Classifier," International Journal Of Engineering And Computer Science, vol. 3, no. 11, 2014.

[15] Abul Hasnat, Santanu Haider, Debotosh Bhattacharjee, Mita Nasipuri, "A proposed system for gender classification using lower part of face image," In Information Processing (ICIP), 2015 International Conference on, IEEE, pp. 581–585, 2015.

[16] Hu Han, Anil K. Jain, "Age, gender and race estimation from unconstrained face images," Dept. Comput. Sci. Eng., Michigan State Univ., East Lansing, MI, USA, MSU Technical Report (MSU-CSE-14-5), 2014.

[17] Chandrakamal Sinha, "Gender Classification from Facial Images using PCA and SVM," Master of Technology thesis, National Institute of Technology Rourkela, 2013.