Gender Classification using SVM With Flask

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***Abstract*— *The main objective of this work is the uniting and streamlining of an automatic face detection application and recognition system for video indexing applications. Human identification means the classification of gender which can increase the identification accuracy. So, accurate gender classification algorithms may increase the accuracy of the applications and can reduce its complexity. But, in some applications, some challenges are there such as rotation, gray scale variations that may reduce the accuracy of the application. The main goal of building this module is to understand the values in image, pattern, and array processing with OpenCV for effective processing faces for building pipe-lining, SVM models.*

***Keywords*— Gender classification, Human Recognition, Facial Images, OpenCv, Image Processing.**

I. INTRODUCTION

Human's face identification is a major hallmark in discernible machine learning and image processing systems to identify desired target. A human face tote discriminative and separable information consisting gender, age, ethnicity, etc. Face information is applicable in many cases such as human-computer interaction, image retrieval, biometric authentication, drivers monitoring, human-robot interaction, sport competition senses analysis, video summarizing, and image/video indexing. Basically we are building a image processing application which is face recognition and it also try to detect the facial features and classify the gender i.e male or female. The process is starting by gathering the data. As the data is gathered we are going to arrange the highly unstructured data in a structured form after that we are learning image techniques using OpenCV and get mathematical concept behind the image. For image analysis we require techniques for preprocessing our data, extract feature from image like computing eigen images using PCA(Principal Component Analysis) and Single Value Decomposition. With the eigen images we can learn to test our Machine Learning model, and the model before deploying it. After Machine Learning model is ready we are going to learn to develop web server gateway in flask by using HTML, CSS and BOOTSTRAP in front-end part and PYTHON for back-end part. The below image shows the steps for building the application.

II. METHODOLOGY

In this Web App we will be working on input image of human beings. The uploaded image must be clean and clear to extract the human facial features from image taken as Input for the processing. We tested the project only on the human faces. The following methods is used in this technology:-

1. Image Uploading
2. RGB/BGR to gray scale
3. Image Data Preprocessing and Analysis
4. Predictive Model
5. Displaying result

III. IMAGE UPLOADING

This is initial phase of the project. We will be uploading the image to the project.

It is a normal image of human being. The image type must be JPEG or PNG. We have used HTML form to upload the image.

Fig. 1: Uploaded Image

IV. RGB/BGR to GREY SCALE

The image is passed to pipeline model which is integrated with flask. Understanding Data is must within the project life cycle. We have to understand the data starting from domain knowledge.

We will work on the image taken as input. It can be in RGB or BGR format. The digital images are used to represented in multi-dimension arrays. We will be converting that image into gray scale using cv2 library. Gray scale image is two dimension array. The function used to convert image into gray scale is given below:-

```
if color == 'bgr':
gray = cv2.cvtColor(imageFile,
cv2.COLOR_BGR2GRAY)
else:
gray = cv2.cvtColor(imageFile,
cv2.COLOR_RGB2GRAY)
```

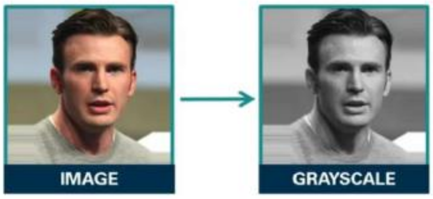

Fig. 2: Image Conversion

V. ImAGE DATA ANLYSIS &PREPROCESSING

In this phase we will be working on the gray scale image which is extracted from the input image which is obtained from above methods. There are four kinds of analysis that need to perform on the extracted image for better decision making and they are listed below:

Defining Transformation: In this step we will be finding the shape of the image. We will be finding the optimal size from the histogram and box-plot.

Hazed Removal (Noise Remove): In this step we will be removing noise from the image by adjusting light intensity, estimating transmission map and clarifying image.

Image Segmentation: In this step we will be partitioning the image into multiple segments (sets of pixels, also known as image objects). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

Object Detection: Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images.

Python library OpenCV will be used for face recognition. We will be detecting the face from the gray scale image using cv2 library. We will be performing further more methods on that face detected using the given function:-

```
faces = haarcascade.detectMultiScale(gray,1.5,3)
```

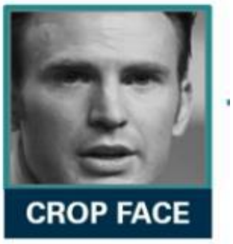

Fig. 3: Cropped Image

VI. FEATURE EXTRACTION

We cannot directly detect faces that were cleaned and extracted faces using object detection techniques with Machine Learning models. We will need to extract the features from the face. The Feature extraction techniques we used are an eigen images approach.

Eigen face

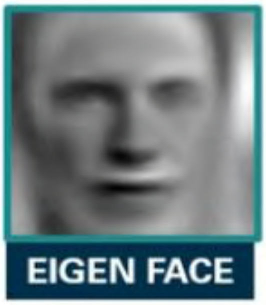

Fig. 4: Eigen Image

An eigen face is the name given to a set of eigen vectors when used in the computer vision problem of human face recognition. We will be deriving the eigen vectors from the covariance matrix of the probability distribution over the high-dimensional vector space of face images. This produces dimension reduction by allowing the smaller set of basis images to represent the original training images. Classification can be achieved by comparing how faces are represented by the basis set.

VII. PREDICTIVE MODEL

We have trained a machine learning model with the eigen image data. There are many machine learning models are there but for the image we will be using SVM.

In this phase we will be detecting gender of each face using trained SVM model. Now there each Face is recognized individually in this phase.

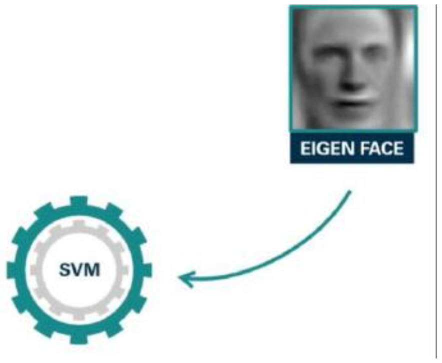

Fig. 5: Feeding Images

VIII. DISPLAYING MODEL

This is the final phase of the project. We have performed all the method. We will be displaying Gender of the Image and the predicted score.

Fig. 6: Producing Output

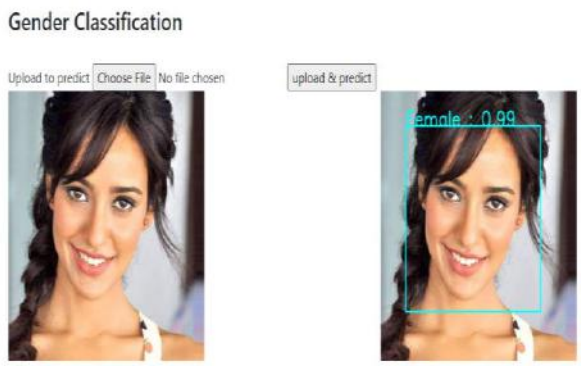

Fig. 7: Interface for Upload

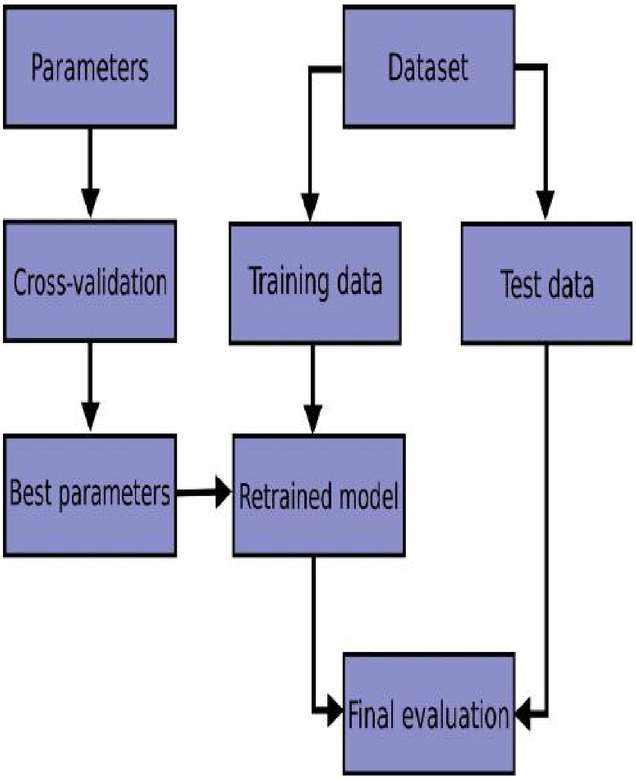

Fig. 8: Data Flow

IX. CONCLUSION

In this Gender classification project we made software which detects Gender using SVM model. It will be finding the face of the human and predicting the gender. Though we have tried to make efficient software but there are some conditions for this software to work:-

- Image of the human faces should be clean and clear.
- Image quality should be high.

X. FUTURE WORK

On the future direction, results that are Good for gender recognition as well as years opinion can continue to be received utilizing transfer learning strategies with expansion in reliability. Combos of fusions as well as datasets of attributes might be what is on the horizon for the development.

ACKNOWLEDGEMENTS

An acknowledgement section may be presented after the conclusion, if desired.

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