

Male and Female Facial Expression Recognition

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Abstract: People are fit of generating many facial activities throughout correspondence that change done complexity, intensity, and Furthermore importance. This paper reason may be will remember mankind's feelings As far as happy, sad, disgust, and surprise, unbiased. In this paper, An system for restriction And extraction about countenances Also trademark facial features for example, such that eyes, mouth Furthermore face limits starting with shade picture information will be suggested. This approach exploits shade properties from claiming human skin with confine picture districts face hopefuls. Those facial Characteristics extraction may be performed best for preselected face-candidate districts. Likewise, for eyes and mouth restriction shade data and nearby difference keeping around eyes would utilize. In Existing work Represent the capability of detecting the false acceptance rate is 18% while the false rejection rate is just 5% and my approach has the capability of detecting the false acceptance rate is 14.5% while the false rejection rate is just 7.66%. In above result author calculate result manually.

Index Terms: Feeling Recognition, Facial Outflow Recognition, Face Detection, Characteristic Extraction.

I. INTRODUCTION

Examine around feeling identification is a testing field that focus strategies on aggravate viable mankind's machine cooperation. Picture sign holds enormous sum for paramount majority of the data of the speaker. We utilization facial expressions not just on express our emotions, as well as to gatherings give vital open cues Throughout social interaction, for example, such that our level of interest, our longing on detract a talking turn Also An constant reaction indicating regarding those seeing of the majority of the data passed on. It is news person that facial expressions bring a significant impact ahead An tuning in interlocutor; the facial outflow of a speaker accounts to over 55 percent of the impact of the communicated message 38 percent of the last will be passed on by voice inflection Furthermore 7 percent Eventually Tom's perusing those spoken expressions. This examine displays a computationally productive approach to edge identification which further prompts order for facial outflow distinguishment from static facial pictures. In the introduced methodology Different algorithm need aid used to handle those trademark offers for example, lips and eyes. Firstly the pictures will make stacked in the prepare organizer Furthermore test organizer. After this these pictures would investigated Eventually Tom's perusing arrangement about calculations Also systems on improve the picture input, administer force level and uprooting clamor from picture. Second algorithm detects those edges about picture. From the edge focuses Different distances between Characteristics may be computed Also PCA (primary part analysis) will be utilized to information decrease also next algorithm detects the face. On the premise of that separation feelings would perceive exact feelings. The pictures indicated beneath over fig. 1 expressing five feeling.



Fig.1 Original Images Expressing Five Emotions

II. PROBLEM DEFINITION

Programmed facial outflow distinguishment (FER) for An set about particular wanted exactness and execution necessities will help particular case should make human-like robots And machines that need aid needed will revel in sincerely canny And transparent interchanges for people. Facial outflow distinguishment arrangements with those issues for classifying facial pictures under statement classes. It need been from claiming investment on a developing number for analysts and a great deal Advance need been made throughout the most recent two decades. Statement distinguishment includes an assortment about subjects for example, perceptual recognition, machine learning, full of feeling registering and so forth throughout this way, observing and stock arrangement of all instrumentation may be enha.

In the beginning, facial outflow examination might have been basically an exploration point to psychologists. However, later progresses. Over image transforming and example distinguishment has persuaded fundamentally Scrutinize meets expectations on programmed facial outflow. Distinguishment. In the past, a considerable measure of exertion might have been committed will perceive facial outflow previously, even now pictures. To this purpose, large portions strategies need been applied: neural networks, Gabor wavelets and dynamic presence models. A vital constraint with this system will be the reality that even now pictures normally catch the summit of the expression, i. E., the moment at which the indicators about feeling are The greater part checked. In their

Everyday life, kin rarely hint at summit about their facial outflow throughout typical correspondence for their counterparts, unless to extremely particular instances and to thick, as short periods of run through.

The programmed facial outflow distinguishment framework includes:

- Face distinguishment.
- Facial characteristic extractor for mouth left and right eye.
- Facial trademark extraction.
- Facial outflow recognizer.

In this paper i am setting off will recommend an arrangement which is skilled for accomplishing dependent upon 97 rate outcomes and simple over feeling distinguishment utilizing mind movement framework. My purposed framework relies upon human face Concerning illustration we think face additionally reflects those mankind's cerebrum exercises or feelings. In this paper i need additionally attempt to utilize neural system for better comes about toward utilizing an existing test system.

III. SYSTEM ARCHITECTURE

Here we recommend a feeling distinguishment framework toward utilizing Different diverse strategies. Regularly a robotized face statement distinguishment framework incorporates a Polaroid for catching the facial picture. It is then pre transformed with the goal similarly as to minimize the natural Also other varieties in the picture. This incorporates the operations from claiming picture scaling Also brilliance change. After that face, mouth and eye locale might have been distinguished i. E. Characteristic extraction. Then for those help about eyes also lips characteristic we arrange five separate feelings. A square outline depiction from claiming face distinguishment framework will be indicated in fig. 2.

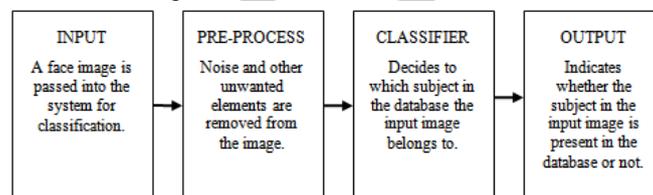


Fig. 2. Generic Representation of a Face Recognition System

This paper displays a novel methodology to face distinguishment.

Previously, their survey, they depict a preprocessing venture that endeavors on identify pixels connected with skin freely from claiming face related features. This methodology speaks to a sensational diminishment done computational prerequisites in past techniques.

Since skin shade to people varies by individual, Scrutinize need uncovered that force as opposed chrominance will be those principle recognizing trademark. The distinguishment stage commonly employments a force (grayscale) representational of the picture compacted Eventually Tom's perusing the 2D-DCT to further transforming. This grayscale rendition holds force qualities to skin pixels [1].

A square outline of the suggested procedure of the face distinguishment framework is introduced in fig. 3. In the to begin with stage, the 2D-DCT to every face picture may be computed, Also characteristic vectors are shaped starting with those discrete cosine the senior change (DCT) coefficients. The second stage utilization a self-organizing guide (SOM) for an unsupervised Taking in strategy should arrange vectors under gatherings with distinguish Assuming that the subject in the information picture may be "present" or "not present" in the picture database. Assuming that the liable is arranged as present, those best match picture discovered. In the preparation database may be shown similarly as the result, else the aftereffect shows that the liable will be not found in the picture database.

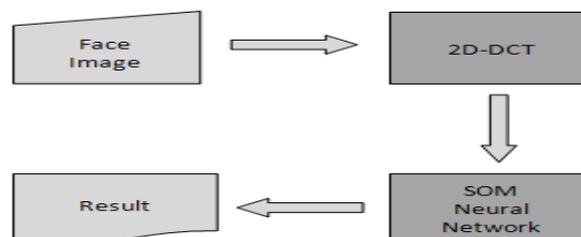


Fig. 3. Proposed Technique for Face Recognition System

IV. DISCRETE COSINE TRANSFORM

That discrete cosine the senior change will be an algorithm generally utilized within separate provisions. That vast majority prominent utilization of the DCT is to information compression, as it structures that groundwork for the universal standard reduction picture squeezing algorithm known as JPEG. The DCT need the property that, to an ordinary image, the greater part of the outwardly huge data over that picture is moved for just a couple coefficients. Concentrated DCT coefficients camwood a chance to be utilized

likewise a kind from claiming mark that is functional to distinguishment tasks, for example, face distinguishment. Face pictures need helter skelter relationship Furthermore excess data which reasons computational load As far as transforming pace And memory usage. Those DCT transforms pictures from the spatial area of the recurrence space. Since bring down frequencies are that's only the tip of the iceberg outwardly critical to an picture over higher frequencies, the DCT discards High-recurrence coefficients and quantizes the remaining coefficients. This lessens information volume without sacrificing a lot of picture caliber [2-3].

Face Image Preprocessing: Face images of different candidates with different facial expressions are taken with a Canon Power shot S3 IS 6.0 megapixel digital camera in the size of 1200×1600 pixels (2.0 megapixels). All face images taken resemble the following general features:

- Uniform illumination conditions.
- Light color background.
- Faces in upright and frontal position.
- Tolerance for tilting and rotation up to 20 degrees.

Face images are preprocessed in Adobe Photoshop CS2. The face image fabrication process is shown in Fig. 4. Image preprocessing includes the following steps:

- Auto adjusting hue and saturation levels.
- Adjusting brightness and contrast to fixed scale.
- Desiderating 24 bit RGB color into 8 bit grayscale.
- Downsizing images to 512×512 pixels.
- Saving images in jpeg format.

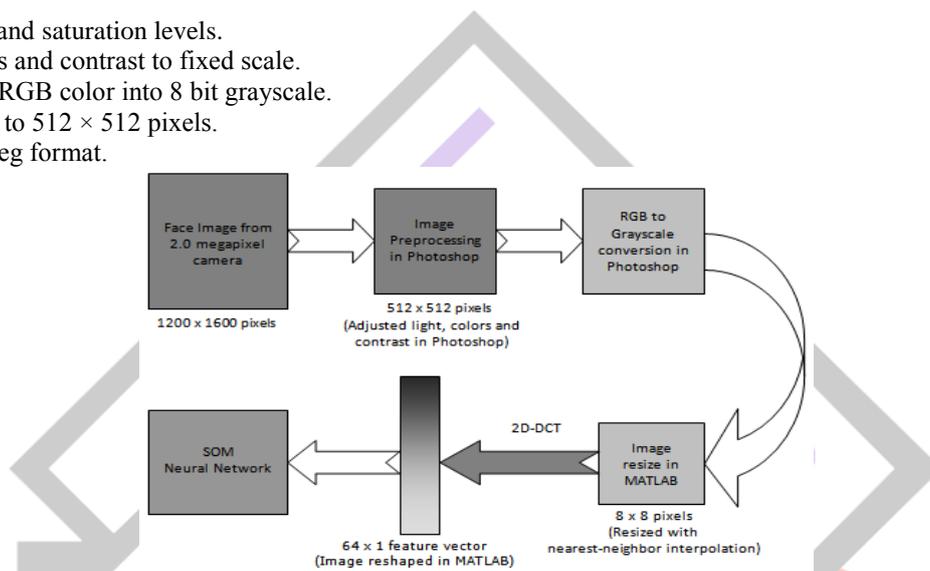


Fig.4 Face Image Fabrication Process

2D-DCT Image Compression: Nearest- Insertion may be performed utilizing those MATLAB image transforming toolmaker on resize preprocessed pictures from extent 512×512 pixels will picture squares of measure 8×8 pixels Concerning illustration demonstrated in fig. 5. Those recommended plan techno babble calculates the 2D-DCT of the picture pieces from claiming measure 8×8 pixels utilizing '8' out of the 64 DCT coefficients to masker. The opposite 56 remaining coefficients need aid disposed of (set with zero). That picture is At that point recreated Eventually Tom's perusing registering the 2D-IDCT of each piece utilizing the DCT convert grid calculation technique. Finally, the yield will be a set about arrays. Every exhibit will be about measure 8×8 pixels Also speaks to a solitary picture. These steps would spoke to over fig. 5 to an example picture. Empirically, those upper left corner about every 2D-DCT grid holds those the vast majority essential values, on they relate should low-frequency segments inside the transformed picture block [6-6].

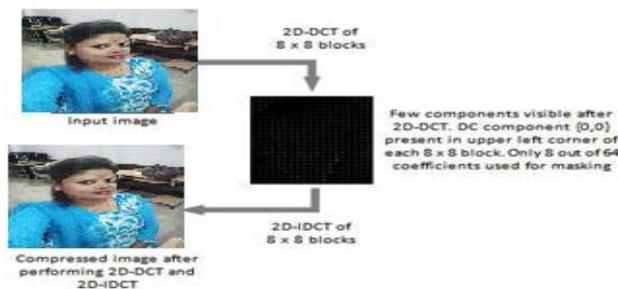


Fig. 5. 2D-DCT Computation of Face Image

V. FACE DETECTION, EDGE DETECTION AND SIZE REDUCTION

Face Detection: Face restriction expects should focus those picture positions of a single face; this will be a streamlined identification issue for the suspicion that a information picture holds special case face. The fundamental concern of face identification will be on recognizing know picture locales which hold numerous a faces in any case for its orientation, foundation and lighting states. Such undertaking will be unreliable since appearances might need a limitless combination As far as shape, color, measure or composition. At present chance a considerable measure about programmed methodologies include identifying countenances to a picture. Toward utilizing edge to separate skin area starting with a picture for face identification might have been decided in this calculation [4-5].

Edge Detection: Edges would distinguish toward utilizing commands from claiming image transforming device enclose MATLAB. Through edges we got end point of Characteristics starting with the pictures in eyes Also lips.

Measure Reduction: a strategy presently regularly utilized for dimensionality decrease over machine dream especially clinched alongside face distinguishment will be central parts dissection (PCA). PCA systems otherwise called Karhunen-Loeve methods, decide a dimensionality diminishing straight projection that maximizes the scramble from claiming every last bit anticipated specimens. The characteristic vectors were normalized to zero intend Furthermore further compacted utilizing a straight information decrease strategy known as the central part examination. The PCA is a orthogonal straight change that transforms the information on another coordinate framework such-and-such the difference Toward any projection of the information will be the biggest hence To begin with direction (called those To begin with vital component),and after that abatements along coordinates arriving at those littlest esteem to the most recent coordinate. Accepting that those secondary difference of the information portrays intriguing flow and that low variances are interfaced with noise, those diminishment of information dimensionality might be attained Toward keeping secondary request central segments and ignoring lower-order ones[8-9].

VI. FACE FEATURE EXTRACTION

One common method is to extract the shape of the eyes, nose, mouth and chin, and then distinguish the faces by distance and scale of those organs. The selection face features is crucial to face recognition. To locate vital feature property of angle invariance is used. The five features have been used, all features are in the form of distance.

Feature 1 width of left eye

- Feature 2 width of right eye
- Feature 3 width of nose
- Feature 4 width of mouth corners
- Feature 5 width of face

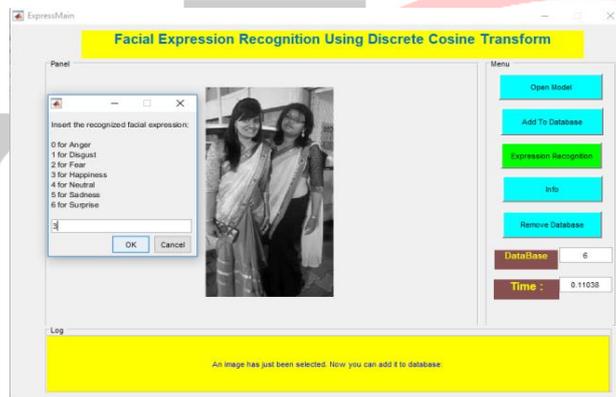


Fig.6 Showing Some of Vital Features

These offers assistance to distinguishment of feelings. Each feeling need distinctive qualities for characteristic vectors. The worth about characteristic vector speaks to outright the middle of offers focuses.

VII. DISTANCE MEASUREMENT

Euclidean Separation Assuming that the features have n-dimensions then those summed up Euclidean separation recipe the middle of those characteristic focuses is provided for Eventually Tom's perusing Euclidean separation. (u,v)=

$$\sqrt{(x1-y1)^2 + (x2-y2)^2 + \dots + (xn-yn)^2}$$

In this way we also calculate other distances between any features points.

VIII. EMOTION RECOGNITION

That distinction of feelings may be in view of that computation from claiming distances between different offers focuses. In this step correlation between distances about trying picture also nonpartisan picture will be carried. Furthermore, additionally it selects the best workable match of testing picture starting with train organizer. It also classifies or distinguishes those feelings on the premise of other distances computed. And the last effects need aid shown.

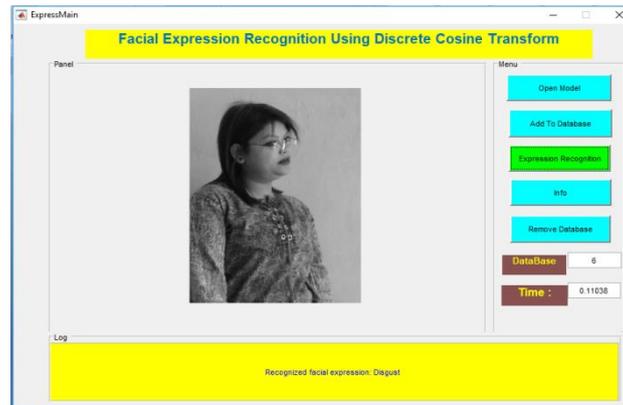


Fig.7: Emotion Recognized

IX. ALGORITHM OF PROPOSED WORK

Facial Expression Recognition (Input Image, Template Images)

Step1. Start

Step2. Read Input Human Face Image. If the Input Image is color (RGB), then convert it to Gray scale Image and save the pixel values to a 2D array let gface. Else save the pixel values of the input image to a 2D array let gface.

Step3. Read Left eye template image. If the template image is color (RGB), then convert it to Gray scale Image and save the pixel values to a 2D array let left. Else save the pixel values of the input image to a 2D array let left.

Step4. Read Right eye template image. If the template image is color (RGB), then convert it to Gray scale Image and save the pixel values to a 2D array let right. Else save the pixel values of the input image to a 2D array let right.

Step5. Read Nose template image. If the template image is color (RGB), then convert it to Gray scale Image and save the pixel values to a 2D array let nose. Else save the pixel values of the input image to a 2D array let nose.

Step6. Read Mouth template image. If the template image is color (RGB), then convert it to Gray scale Image and save the pixel values to a 2D array let mouth. Else save the pixel values of the input image to a 2D array let mouth.

Step7. Declare 4 2D Array C1, C2, C3 & C4 of size m*n where m*n is the size of gface.

Step8. Calculate $C1[][] = 2D_norm_crosscorr(gleft, gface)$ $C2[][] = 2D_norm_crosscorr(gright, gface)$ $C3[][] = 2D_norm_crosscorr(gnose, gface)$ $C4[][] = 2D_norm_crosscorr(gmouth, gface)$

Step9. Call $(x_{11}, y_{11}, w_1, h_1) = Find_max(C1)$ $(x_{21}, y_{21}, w_2, h_2) = Find_max(C2)$

$(x_{31}, y_{31}, w_3, h_3) = Find_max(C3)$

$(x_{41}, y_{41}, w_4, h_4) = Find_max(C4)$

where Call $(x_{11}, y_{11}, w_1, h_1)$, $(x_{21}, y_{21}, w_2, h_2)$, $(x_{31}, y_{31}, w_3, h_3)$, $(x_{41}, y_{41}, w_4, h_4)$ are top – left pixel coordinate, width, height of the matched rectangular area around left eye, right eye, nose and mouth respectively.

Step10. Calculate $x_{12} = x_{11} + w_1$ & $y_{12} = y_{11} + h_1$

$x_{22} = x_{21} + w_2$ & $y_{22} = y_{21} + h_2$

$x_{32} = x_{31} + w_3$ & $y_{32} = y_{31} + h_3$

$x_{42} = x_{41} + w_4$ & $y_{42} = y_{41} + h_4$

Where (x_{12}, y_{12}) , (x_{22}, y_{22}) , (x_{32}, y_{32}) , (x_{42}, y_{42}) are bottom right pixel coordinate of the matched rectangular area around left eye, right eye, nose and mouth respectively.

Step11. Draw Boundary Rectangle around left eye in gface with top – left, top – right, bottom left and bottom – right pixel coordinates as (x_{11}, y_{11}) , (x_{12}, y_{11}) , (x_{11}, y_{12}) & (x_{12}, y_{12}) respectively. Draw Boundary Rectangle around right eye in gface with top – left, top – right, bottom – left and bottom – right pixel coordinates as (x_{21}, y_{21}) , (x_{22}, y_{21}) , (x_{21}, y_{22}) & (x_{22}, y_{22}) respectively. Draw Boundary Rectangle around nose in gface with top – left, top – right, bottom – left and bottom – right pixel coordinates as (x_{31}, y_{31}) , (x_{32}, y_{31}) , (x_{31}, y_{32}) & (x_{32}, y_{32}) respectively. Draw Boundary Rectangle around mouth in gface with top – left, top – right, bottom – left and bottom – right pixel coordinates as (x_{41}, y_{41}) , (x_{42}, y_{41}) , (x_{41}, y_{42}) & (x_{42}, y_{42}) respectively. Calculate middle point pixel coordinate (x^{1mid}, y^{1mid}) of the boundary rectangle around left eye as $x^{1mid} = (x_{11} + x_{12})/2$ and $y^{1mid} = (y_{11} + y_{12})/2$.

Step12. Calculate Euclidian Distance between middle point pixel coordinate (x^{1mid}, y^{1mid}) of the boundary rectangle around left eye and top – left pixel coordinate (x_{41}, y_{41}) of the boundary rectangle around mouth as: $Dist1 = \sqrt{\{(x^{1mid} - x_{41})^2 + (y^{1mid} - y_{41})^2\}}$ unit.

Step13. Calculate middle point pixel coordinate (x^{2mid}, y^{2mid}) of the boundary rectangle around right eye as $x^{2mid} = (x_{21} + x_{22})/2$ and $y^{2mid} = (y_{21} + y_{22})/2$.

Step14. Calculate Euclidian Distance between middle point pixel coordinate (x_{2mid}, y_{2mid}) of the boundary rectangle around right eye and top – right pixel coordinate (x_{42}, y_{41}) of the boundary rectangle around mouth as: $Dist2 = \sqrt{\{(x_{2mid} - x_{42})^2 + (y_{2mid} - y_{41})^2\}}$ unit.

Step15. Write the value of Dist1 and Dist2 in a output text file for comparison.

Step16. Repeat step 1 to 15 for another same human face but with smiling facial expression.

Step17. Compare both input face images according the distances measured between eyes & mouth. The image with larger distance is considered as Happy face or smiling face, in general.

Step18. Exit

2D_NORM_CROSSCORR (TEMPLATE GRAY SCALE IMAGE, INPUT GRAY SCALE IMAGE)

Step1. Start

Step2. Perform 2D Cross Correlation between Template Image and Input Image pixel values and return 2D array C of size $m*n$ with values of the corresponding Cross Correlation, where $m*n$ is the size of the **Input Image**.

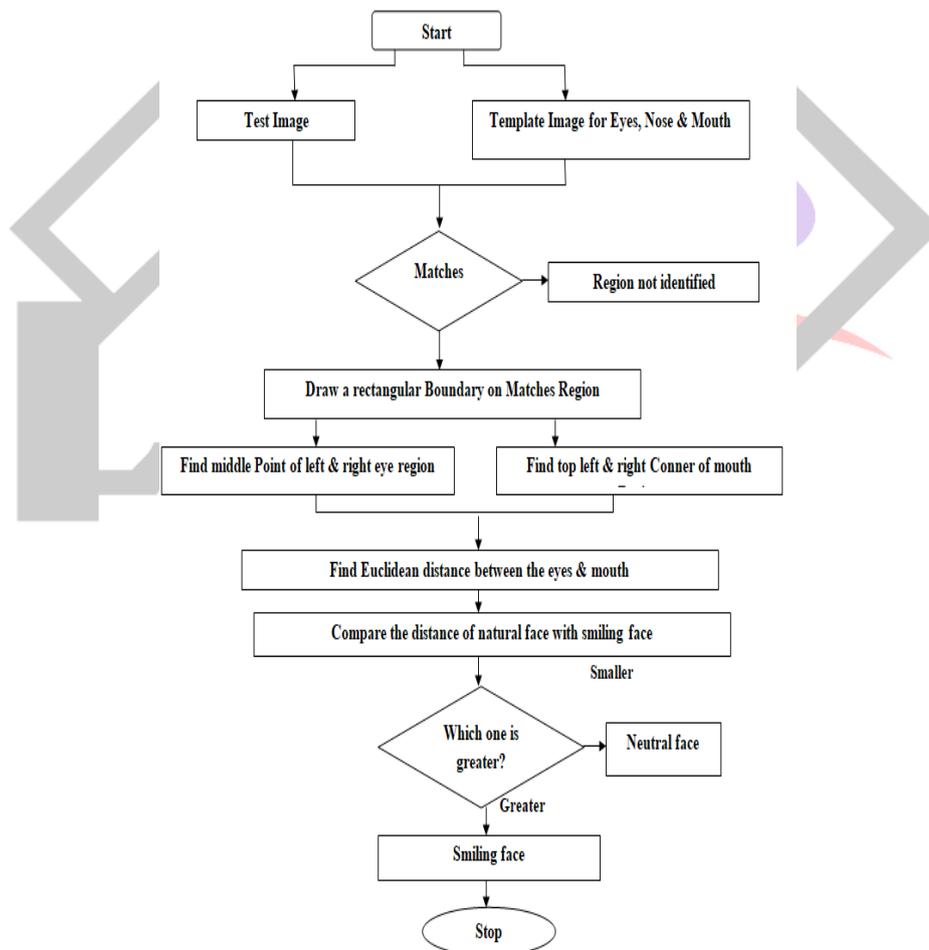
Step3. End Find_max(C [][])

Step1. Start

Step2. Find Maximum Value of 2D Array C[][] and determine the corresponding rectangular region where the maximum value is found.

Step3. Find top – left position coordinate (x, y), width (w) and height (h) of the rectangular region and return the values.

X. FLOW CHART OF PROPOSED WORK



XI. RESULTS

We assessed suggested algorithm by 80 at present pictures. The size for picture is 600×800 pixels. The test outcome reveals that our calculation camwood identify 50 feelings on our test picture. Besides, the ID number for feelings this calculation also indicates the separation for test picture from nonpartisan picture and the best match about test picture from prepared pictures. There

Eventually Tom's perusing our suggested algorithm is suitability for utilization over ongoing frameworks with secondary execution.

Case 1. Matched With Templates of the Test Image Itself

No.	Type of Emotion	No. of Input Images	Recognized	Result (%)
1.	Neutral	22	22	100
2.	Happy	17	17	100
3.	Disgust	21	21	100
4.	Anger	19	19	100
5.	Sad	21	21	100

Case 2. Matched with Templates of Different Images Other Than the Test Image

No.	Type of Emotion	No. of Input Images	Recognized	Result (%)
1.	Neutral	25	23	92
2.	Happy	25	24	96
3.	Disgust	25	23	92
4.	Anger	25	25	100
5.	Sad	25	24	96

XII. CONCLUSION

In this paper, we recommended an exact and secondary speed feeling identification framework. The shade Furthermore feature-based detections were embraced will Figure skin-color quick Furthermore chose nomination squares deliberately. We utilized lighting payment on enhance those execution of color-based scheme, and decrease the calculation for feature-based plan. That real commitment from claiming this paper is that those recommended system camwood identify edges of the pictures also starting with that edges separation between Different offers may be computed toward utilizing Euclidean separation Formulae. This separation will be diverse for each picture posing separate. Feelings. On the groundwork for this separation feelings would arranged. Clinched alongside future work, those recommended approach could be connected on equipment usage. Because of the recommended technique need straightforward structure, it will be suitability on a chance to be actualized clinched alongside equipment should attain high execution Furthermore low energy framework.

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