Multiple Object Detection Interface using HSV, Hough and Haar-classifier

B. Pruthvi Raj Goud, G. L. Anand Babu, G. Sekhar Reddy, A. Mallikarjuna Reddy

Abstract: ***In the recent past of advancement in computer vision object detection and identification technologies are most valuable approaches in our day life. It is mostly used to find a different kind of objects being and provide a security in many zones. It becomes very difficult for achieving a best object detection or identification with high rate in a various situation and criteria. While working with different entities researcher job is going to very difficult but providing high availability is good omen to develop advisable, flexible environments. Like MODI i.e. "Multiple Object Detection Interface". The main aim of this paper is to identify the object on user requirement. Detect the information or content based on the type i.e. color, face, shape or eyes. It is helpful to the user to retrieve the objects based on his requirements while expose his/her analysis on images. Majorly, Multi color identification done through with the help of HSV color channels. Shape Identification Hough cycle/rectangle transformation. Finally choose human gestures as eyes and face detection with the help of HAAR like features. Every aspect is available in the market. We are trying to make it as single platform as MODI.***

Index Terms**: *Flexible, HSV, HAAR, HOUGH.***

I. INTRODUCTION

In recent decades, object recognition [1] is most popular domain and lot more applications are developed in this aspect. Recognition is done in two stages one is detection, next stage, we need to identify recognition from an image. To solve the most common and complex application of the real world which exists, we need to go through with object detection. Detection majorly deals with detecting instances of semantic objects which are represented in digital images and videos. There are many different approaches for detecting an object to resolve the society needs. There are few application are working with object detection. Those are:1) Face detection (FD) [1, 2] is the most popular applications. Presently face book distinguishes your face when you transfer a photograph. It's an exceptionally fundamental utilization of item identification which we can find in our everyday life. Face recognition will work out with various calculations like haar classifieds, filter and surf.2) Object identification can be additionally utilized for checking the quantity of individuals. It is utilized for dissecting store execution or group insights during celebrations. These will in general be progressively troublesome as individuals move out of the casing rapidly. 3) Vehicle detection[4], it is correspondingly when the item is a vehicle, for example, a bike or vehicle, object identification with following can demonstrate successful in assessing the speed of the article. The sort of ship entering a port can be controlled by article recognition. This framework for distinguishing boats is as of now being developed in some European nations. 4) Manufacturing Industry, Object identification is likewise utilized in mechanical procedures to recognize items. Let's assume you need your machine to just identify round articles. Hough circle identification change can be utilized for recognition. 5) Online pictures classification [5] Apart from these article recognition can be utilized for characterizing pictures found on the web. Foul pictures are typically sifted through utilizing object recognition. Ex: Google captcha. 6) Security[6][7] later on we may most likely use object discovery to distinguish irregularities in a scene, for example, bombs or explosives. Here we are going through with color detection from an image.7) Color detection There are few applications are working based on color. i.e. Skin detection: different people having different type of skin color. Based on the type we are going to decide them where they are belongs too. In Medical images also we are able to decide skin diseases also using detection. Google uses the colors for each region, based on the color we are going to identifier the region. Here we majorly focusing on detecting the RGB colors from an image with the help of specific attribute values of HSV or HSL.Image analysis is the most efficient approaches for an identification of the object which is based on the end user requirement.

II. LITERATURE SURVEY

Digital Image Processing (DIP) [8] is the process of digital images using various computer algorithms. This DIP has been employed in number of areas such as pattern recognition, remote sensing, color and video processing.The image processing is an analyzed and manipulation of a digitalized images, DIP technique can be applied in variety of different fields such as Diagnostic image analysis, Surgical planning, Object detection and Matching, Background subtraction in video, Localization of tumors, Measuring tissue volumes, Locate objects in satellite images, Traffic control systems, Locating objects in face recognition, iris recognition, agricultural imaging, and medical imaging.DIP addresses challenges and issues like that loss of image quality, to enhance degraded image. The major thing is how we are representing image in real world. In processing of an image, we have two differenttype of transformations [9] one is spatial domain and other is Frequency Domain.

Revised Manuscript Received on July 05, 2019.

B. Pruthvi Raj Goud, Department of Information Technology, Anurag Group of Institutions, Hyderabad, India.

G. L. Anand Babu, Department of Information Technology, Anurag Group of Institutions, Hyderabad, India.

G. Sekhar Reddy, Department of Information Technology, Anurag Group of Institutions, Hyderabad, India.

Dr. A. Mallikarjuna, Reddy Department of Computer Science and Engineering, Anurag Group of Institutions, Hyderabad, India.

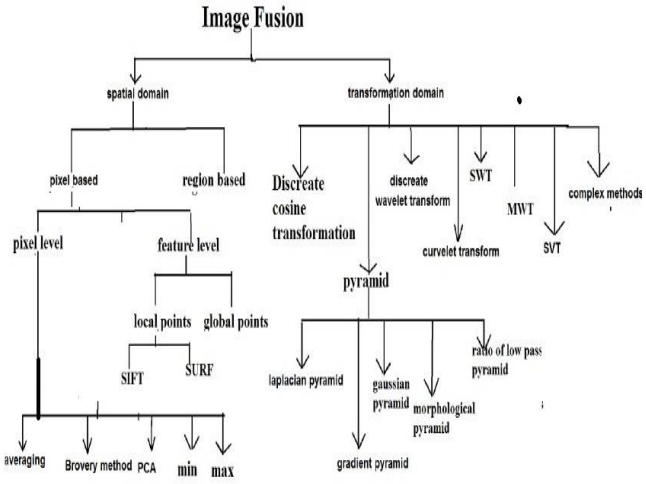

Fig 2.1: Digital Image Representation in Real World

With the help of image content representation, we can able to perform image Fusion[10, 18] segmentation, analysis, classification, identification and recognition systems. Here we have coloridentification, shape detection and gesture identification system. We know for the most part shading can be estimated by the accompanying traits [11, 19]:
(1) Brightness: This is the human sensation by which a zone displays pretty much light. (2) Hue: This is the human sensation as per which a zone seems, by all accounts, to be like one, or to extents of two, of the apparent hues red, yellow, green and blue. (3) Colourfulness: This is the human sensation as per which a territory seems to display pretty much of its shade. (4) Lightness: This can be characterized as the impression of a region's brilliance with respect to a reference white in the scene. (5) Chroma: This is the colourfulness of a territory in respect to the splendour of a reference white. (6) Saturation: This is the colourfulness [12, 20] of a region with respect to its brilliance.Circle detection[13] is completely based on the radius. Edge detection is going to help us to find the proper circles from an image.Advancement of computer visionary has made-up with a possibility to invoke new video processing applications in field of Gesture reorganization based on face. It has wide range of areas in human recognition which are going to provide the high-end Security, to develop the human computer interaction including the behavior analysis, teleconferencing and video surveillance.

Face Detection[14]: When the system accepting the input images. We are going to detect the multiple face segments from an image if it contains multiple persons in a single image. Their few various techniques shown in the fig 2.2

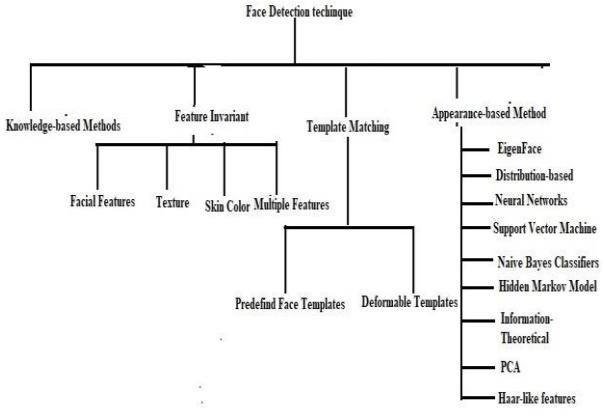

Fig 2.2: Face Detection types in Image processing.

In this paper a system is proposed for multiple human face detection from an input image using Haarlike[15] features and recognition based on feature extraction using an efficient algorithms like PCA, SIFT(64-128 dimensional) and SURF[16] which are available in database. In Future, to classify these features we are using SVM classification[17, 21].

III. EXISTING SYSTEM & PROPOSED SYSTEM

3.1 Existing system:

The existing system is not an automated system. In this system user needs to do the work manually, i.e. the detection of the multiple objects are done manually in the last decades. Retrieving the detected information of the object through the manual records is time consuming. The previous systems are providing very less availability to the user who wants to detect the object or content from images. Those systems can resolve the independent issues. Those are best in era where the detection happens for the specific type either it is for colour, shape i.e circle, square, rectangle, eyes and faces. It is a limited system. Searching of particular information is very critical it takes lot of time. We need to replace the code on user needs but we can't able to expect what they need. So it leads the users, to look for single detection from images. It is very easy to get the information from the image. The user has to send a request to a developer to change the code whenever they are at service to detect the content from images, developers are service providers has to accept the request and they need to change the code based on the user request and it is very time consuming to retrieve the detect objects. It is a tedious process as the verification of the user request and conformations takes a lot of time. The manual efforts in the previous system are more.

1) Poor Availability:If a user requested for object detection. We can execute only one approach at a time. A user doesn't have any menu to choose. So there is availability to the end user.

2) High Time Consuming: For every technique, we are going to changing the code. It will take too much time for user to requesting and accepting and replaces the code. This continuous process will takes too much time and manual work.

3) No Flexibility

3.2 Proposed system: The main objective of the proposed system of this paper is to build an application which integrates the different object detection techniques into single platform which is helps to customer, police system, traffic and service company on a common, easy to use and a fully customized platform which fulfills each ones objective of better detection servicing. It is developed in a manner that is easily manageable, time saving. There are five basic areas of the system **–Customer, Service Center, traffic signaling, Research people and Police**. We majorly focus on customer side. Each of these users will request for any one kind of detection which are available in the profile in the console. The software system enables Customers to detect object as well as it is providing.In this interface user can able to get the object from the list. We are able to provide a menu which lead on his/ her own interest while being on the execution board High level flexibility

to end user. There are multiple detection tetchiness are working in the platform i.e color can be detect based on the HSV attributes. Shape can be detected based on Hough circle transformation. Eyes and faces detection can be done using haar- like features. Several approaches are working for detection. We make it as single platform to get the features as

1)Availability: The user wants to detect multiple types of object or content from an image, based on his/her request i.e very Complex. We are providing few object detection techniques to get that availability to end user request.
2) Less Time Consumer: It will take very less time to execute the things which completely based user detection. We are providing option to end user instead of changing the code. There is no manual work by developer.
3) Multiple Options: Menu was given to end user so he can able to choose any one.
4) User Satisfaction: We are arranged everything to end user to get the flexibility. As per his decision, we can detect the object from images. Need to achieve the flexibilities in to real world.

IV. METHODOLOGY

In recent decades, object recognition is most popular domain and lot more applications are developed in this aspect. Recognition is done in two stages one is detection, next stage, we need to identify object from an image. To solve the most common and complex application of the real world which existing with we need to go through with object detection. Detection majorly deals with detecting instances of semantic objects which are represented in digital images and videos. There are many different approaches for detecting an object to resolve the society needs. There are few application are working with object detection.The main aim to provide a user friendly environment to the end user whose needs multiple object identification from a single interface. Here we have chosen few object to identify those are:

1. Identification of RGB colors with HSV channel which makes as comfortable to identifying red color, green and blue. It's completely depends on user wish to select from the menu which is projecting the console.

2. Here, we chose a typical thing to detect i.e. Shape detection from an image here we chosen Hough circle detection.

3. This is the most impact able thing to detect. Most recent research oriented area in the image processing. We chose a human gesture to detect from an image. Either it is eye and face with the help of Haar like feature.

Platform: we were use a cross platform along with visual studio 17 with open source Computer Vision rich library set to exposes the image processing features. Even we succeeded to retrieve eyes from an image. We are not representing as an option. The proposed system is design as fig 4.1. Based on the proposed mechanism, every time end-user will get a Menu on the console. Selective option has to elect by client to retrieve an object from an image.

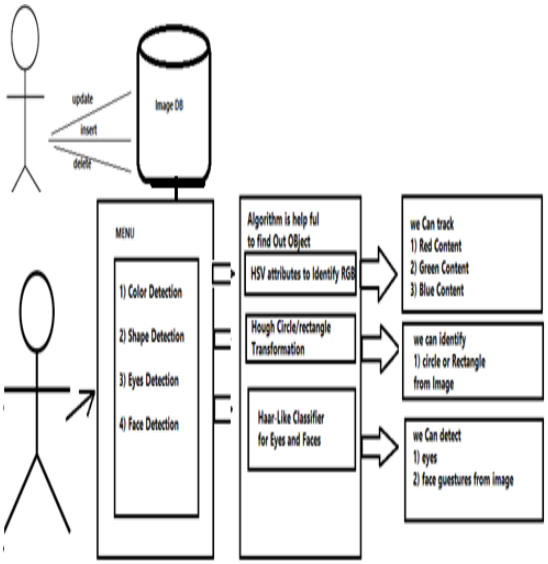

Fig 4.1: Architecture of Multi Object Detection interface.

1) Color Identification Process:

An RGB image is a colorful image consisting of fixed values of color contents for each pixel. These color contents have different values ranging from 0 to 255.There are inbuilt functions and commands available in OPENCV to extract the required color content from a RGB image.

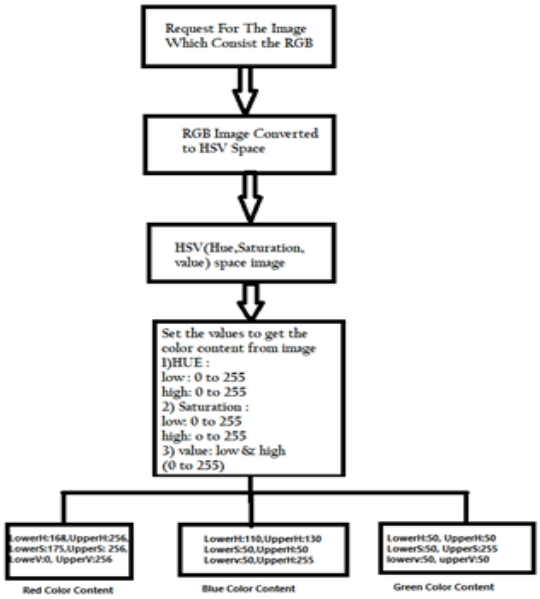

Fig 4.2 Extracting Colour from RGB Image

RGB2HSV Conversion Formula:

1. The R,G,B values are divided by 255 to converts into HSV range to 0 to 1 from 0 to 255. It can be done by dividing the value by 255 for 8-bit color depth.
$$R' = \frac{R}{255}, G' = \frac{G}{255}, B' = \frac{B}{255}$$
2. Find the minimum and maximum values of R, G and B.
$$Cmax = \max(R', G', B'), Cmin = \min(R', G', B')\Delta = Cmax - Cmin$$

3. Depending on what RGB color channel is the max value. The three different formulas $H =$

$$\begin{cases} 60^0 \times \left(\frac{G'-B'}{\Delta} mod 6\right), Cmax = R' \\ 60^0 \times \left(\frac{B'-R'}{\Delta} + 2\right), Cmax = G' \\ 60^0 \times \left(\frac{R'-G'}{\Delta} + 4\right), Cmax = B' \end{cases} H = 0 \; then \Delta = 0, S =$$

$$\begin{cases} 0, & Cmax = 0 \\ \frac{\Delta}{Cmax}, & Cmax \neq 0 \end{cases}, V = Cmax$$

The Hue value you get needs to be multiplied by 60 to convert it to degrees on the color circle. If Hue becomes negative you need to add 360 to, because a circle has 360 degrees.

2) Circle Identification Process:

The Hough transform can be utilized to decide the parameters of a circle when various focuses that fall on the border are known. A hover with sweep R and focus (a, b) can be depicted with the parametric conditions

$$x = a + R\cos(\theta); \; y = b + R\sin(\theta);$$

At the point when the edge θ clears through the full 360 degree run the focuses (x, y) follow the edge of a circle. On the off chance that a picture contains numerous focuses, some of which fall on borders of circles, at that point the activity of the pursuit program is to discover parameter triplets (a, b, R) to depict each circle. The way that the parameter space is 3D makes an immediate execution of the Hough system increasingly costly in PC memory and time. On the off chance that the circles in a picture are of known sweep R, at that point the inquiry can be diminished to 2D. The goal is to discover the (a, b) directions of the focuses. The locus of (a, b) focuses in the parameter space fall on a hover of span R focused at (x, y). The genuine focus point will be regular to all parameter circles, and can be found with a Hough aggregation exhibit.

3) Face Detection Process:

Faces are having a flexibility and high dynamic scope of appearance with a lot of variability. It's the only one aspect is considerable for face detection and recognition problem in computer visionary. The main prospective of face recognition system is going to be very challenging, highly dominating while provide the accuracy and speed of identification. The main issue will be able to resolve with a lot more machine learning algorithms. Haar features shown in the below image are used. They are just like our convolution kernel. Each feature is a single value obtained by subtracting sum of pixels under the white rectangle from sum of pixels under the black rectangle. Face identification features are retrieved and represented as of Cascade of Classifiers. With the help of it. We are retrieving the face objects from an image.

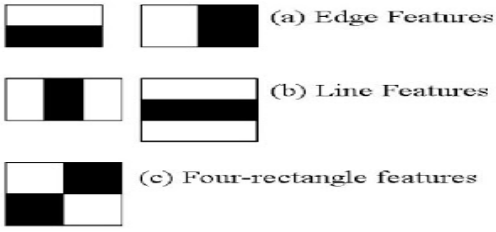

Fig:4.3(4) Feature Detection in Haar Cascade.

V. RESULT ANALYSIS

A. Figures and Tables:

Step 1:

When we choose option based on the options we are able to identified object are going to be exposed. When we choose option to which lead to detection Circles from the objects.

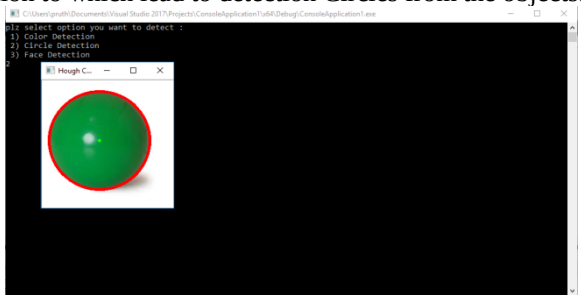

Fig 5.1 Circle identification with the help of Menu

Fig 5.2 sample Outputs for identifing the circles:

Step 2:

When we choose as option 1 it will try to detect the color which is represented on images based on the

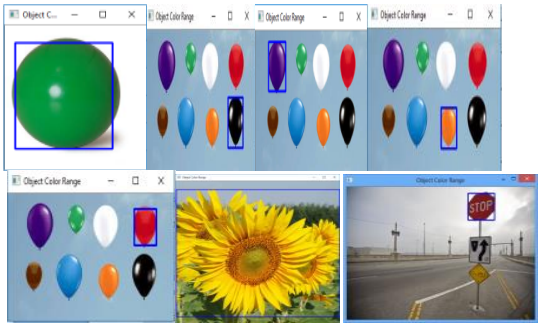

Fig 5.3 Color identification with the help of Menu

To identify a color from a given image we need to follow the steps and we need to pass the values. With the help of those values identification of a color is very easy. We need to represent the values plz follow the below tables.

Colour	Hue		Saturation		Value	
	Low	High	Low	High	Low	High
Red	168	256	175	256	0	256
Blue	110	130	50	255	50	255
Green	65	80	60	255	60	255
Yellow	0	75	139	256	132	224
White	0	256	0	61	0	61
Orange	10	25	100	255	20	255
Black	0	256	0	256	0	61

Step 3:

We choose option 3 to which leads to detection faces from an image.

Fig 5.4 Face identification with the help of Menu

VI. CONCLUSION AND FUTURE WORK

Multi object detection interface is a single detection interface which can serve the end user based on his/ her needs with basic algorithms. RGB Color can be detecting based on HSV values. Circle can be successfully identified with the Gaussian filters based on radius factor. Faces and eyes can be identified based on the haar like features. We are succeeding while serving to a single user with many detection techniques as color, circle and Faces. We exposed over results on output screen but there are many improvised algorithms are available. To improvise the accuracy of the application or interfaces in object detection domain and multiple objects identification like number plate identification or traffic signal identification. We will look forward as our future work to generate the interface which really helps to real world in identification or reorganization.

REFERENCES

1. A. Mallikarjuna Reddy, V. Venkata Krishna, L. Sumalatha," Face recognition approaches: A survey" International Journal of Engineering & Technology, Vol.7 ,(4.6),pp.117-121, 2018.
2. Muhammad Sharif, Farah Naz, Mussarat Yasmin, Muhammad AlyasShahid And AmjadRehman, "Face Recognition: A Survey", in JOURNAL OF Engineering Science and Technology Review, ISSN: 1791-2377, March 2017.
3. Sung In Cho ; Suk-Ju Kang, "Real-Time People Counting System for Customer Movement Analysis," in IEEE Open Acess, 2169-3536. 2014.
4. Yves Cyuzuzo ,Rene Kabalisa , Chika Yoshida , Joseph Muvara , " Automation system of vehicle requisition in public sector, Rwanda", IEEE ACIS,2016
5. Irene Amerini ; Chang-Tsun Li ; Roberto Caldelli, "Social Network Identification Through Image Classification With CNN", IEEE Acess, 2169-3536, 2019.
6. Y.Ramadevi, T.Sridevi, B.Poornima, B.Kalyani, "Segmentation And Object Recognition Using Edge Detection Techniques", International Journal of Computer Science & Information Technology (IJCSIT), Vol 2, No 6, December 2010.
7. Pawan Kumar Mishra , G.P. Saroha ,"A Study on Video Surveillance System for Object Detection and Tracking", in IEEE 3rdInternational Conference on "Computing for Sustainable Global Development", 2016
8. B. Pruthviraj Goud , B. Sushmitha , A. Vijetha, "Evaluation of Image Fusion of Multi Focus Images in Spatial and Frequency domain", in International Journal of Computational Engineering Research (IJCER), ISSN (e): 2250 – 3005, Volume, 08, Issue, 5, May – 2018.
9. Mamta Sharma, " A Review : Image Fusion Techniques and Applications", in (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 7 (3) , 1082-1085, ISSN:0975-9646, 2016.
10. Zaid Omar, Tania Stathaki," Image Fusion: An Overview", in 2014 Fifth International Conference on Intelligent Systems, Modelling and Simulation, IEEE, 2166-0662/14, 2014.
11. Manpreetkaur, "Color Based Object Detection Matlabgui", In International Journal of Scientific & Engineering Research", Volume 5, Issue 6, ISSN 2229-5518 , June-2014..
12. Matteo Maturi, Sebastian Mizera, and Gregor Seidel, "Multi-colour detection of gravitational arcs" Article published by EDP Sciences, ISSN: 0004-6361,2014.
13. D Ioannou, W Huda, A F Laine, "Circle Recognition through a 2D Hough Transform and Radius Histogramming" , published in Elsevier Science B.V, 0262-8856,1999.
14. BhaskarAnand, "Face Recognition using SURF Features and SVM Classifier" , in International Journal of Electronics Engineering Research. ISSN 0975-6450 Volume 8, Number 1, 2016.
15. Takeshi Mita , Osamu Hori , Toshimitsu Kaneko ,"Joint Haar-like features for face detection", in Proceedings / IEEE International Conference on Computer Vision. IEEE International Conference on Computer Vision, 550-5499/05, November 2005
16. YuktiBakhshi ,Sukhvir Kaur , Prince Verma,"Face Recognition using SIFT, SURF and PCA for Invariant Faces", published in International Journal of Engineering Trends and Technology (IJETT) – Volume 34 Number 1- April 2016.
17. Anuradha.S.G , Dr.K.Karibasappa , Dr.B.Eswar Reddy, "Video Segmentation For Moving Object Detection Using Local Change & Entropy Based Adaptive Window Thresholding", in ITCSE, ICDIP, ICAIT[CS & IT-CSCP] – 2013.
18. A. Mallikarjuna Reddy, V. Venkata Krishna, L. Sumalatha," Face recognition based on stable uniform patterns" International Journal of Engineering & Technology, Vol.7 ,No.(2),pp.626-634, 2018.
19. A. Mallikarjuna Reddy, V. Venkata Krishna, L. Sumalatha, "Efficient Face Recognition by Compact Symmetric Elliptical Texture Matrix (CSETM)", Jour of Adv Research in Dynamical & Control Systems, Vol. 10, 4-Regular Issue, 2018.
20. A. M. Reddy, V. V. Krishna, L. Sumalatha and S. K. Niranjan, "Facial recognition based on straight angle fuzzy texture unit matrix," 2017 International Conference on Big Data Analytics and Computational Intelligence (ICBDAC), Chirala, 2017, pp. 366-372.
21. A. M. Reddy, K. SubbaReddy and V. V. Krishna, "Classification of child and adulthood using GLCM based on diagonal LBP," 2015 International Conference on Applied and Theoretical Computing and Communication Technology (iCATccT), Davangere, 2015, pp. 857-861.