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ROBUST THREE DIMENSION FACE SEGMENTATION USING VECTOR COLOUR AND DEPTH ANALYSIS

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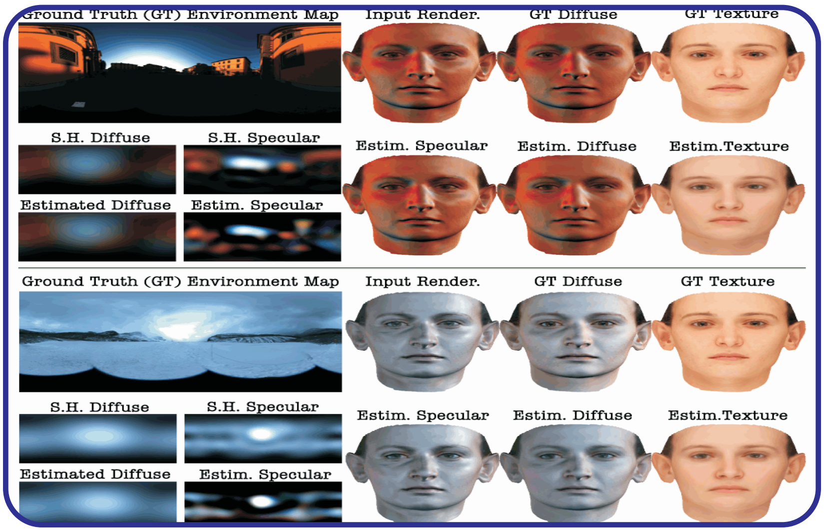
ABSTRACT

In this paper, we recommend a framework for Face recognition Structure 3D using segmentation by grouping of district of facial images previously and after fusion of double modalities (intensity and depth images). Earlier, the finding of face region is depending on the localization of the nose tip and integral projection curves. Then, the appearances resulting from Basis Component Analyses (BCA) followed by Expand Fisher Model (EFM) are extracted. Finally, the distribution function is performed with double approach, distance measurement L and Support Vector Appliance (SVA). Experiments are performed on the CASIA 3D face information base which contains 123 persons under varying illumination and expression. We have tried to examine all the variables associated with our technique in order to optimize the ultimate our recognition structure. The promising reaction of the preliminary evaluation appearance that our confirm approach achieves a large recognizance performance.



KEYWORDS :Face recognition Structure 3D, Fusion, Segmentation and Distribution.

1. INTRODUCTION

We are presenting the much common approach for the finding and segmentation of district of interest. A brief overview is committed to the segmentation of these districts. We will go more into detail on the segmentation in biometrics of the face in the section 2 that we spend in recent work identified for the upgrade of the FRS3D depending on the segmentation which represents our main itemize. The purpose of the segmentation is to excerpt the entities of an image to apply a specific treatment and interpret the content of the image. After copious years of experience to find the optimal approach, the analysis has understood that the optimal segmentation did not exist. A good approach of segmentation will accordingly be the one which will enable us to arrive at a correct interpretation. It will accordingly have simplified the image without having too much reduces the content. Previously segmentation itself, the image is considered during a phase of pretreatments to determine attributes of visual clues to low levels (for illustration information of gradient, texture, motion, intensity...). These indices will help to guide the segmentation for district having the same category of information.

Double-dimensional face recognizance has undergone a substantial maximize in the past few decades.However, existing 2D face recognizance technical knowledge is not sufficient in an unconstrained environment due to issues. In the past few years, 3D face recognizance has attracted a lot of analysis because 3D-depending approaches are believed to have the potential for bigger recognizance accuracy. In 3D face recognizance's, pose and illumination challenges are substantially weakened.

The work face recognizance by fitting a statistical, morph able model of 3D faces (frame and texture) to 2D testing images. More recently, the improvement of a 3D information acquisition structure has granted us to appliance face recognizance straightly through 3D information. Since 3D frame-depending face information (point clouds) can avoid illumination variation, a lot of 3D face recognizance approaches are depending purely on frame. There is an extensive survey in, where numerous studies are to obtain some segmented district of 3D face using curvature information and form a feature vector depending on curvature values, contours, profiles and depth values.

Recently, in Antini's approach, traits of a face are encoded by extracting curves of salient ridges and ravines from the exterior of a dense knot. A graphic portrayal is derived by these curves and recognizance is depending on matching here graph. In, Mohammad solved the 3D face recognizance issues from range information depending on the principal curvature and Hausdorff distance. In these approaches, a key issue is to find corresponding areas, district, curves, and etc betwixt double face pictures.

Here is done by feature point's localization either through basic labeling or Curvature Analysis. In another dashing of approach, recognizing is performed via matching geometric attribute such as distance betwixt double feature points, a proportion of the distances, geodesic distance, and etc. Empirically localized eight feature points and calculated geometric feature which is data by support vector machine basic localized 25 facial fiducially points and employed geodesic distances betwixt them as appearance and LDA.

It is clear that the localization of feature points on three dimensional face information plays a very important role in representing and matching faces. However, the commonly used Curvature Analysis can only extract a limited sum of very prominent feature points, and when double feature points have the similar local structure it will cause confusion. Here is likewise the reason why copious approaches require human interaction to label the feature points. We use our previous work to automatically extract 19 major facial feature points with localization error below 3%.

2. LITERATURE REVIEW

2.1. DISTRIBUTION DEPENDING

Knot distribution has a variety of applications in product approach, reverse engineering, and rapid prototyping fields. Here papery presents a novel method of knot distribution of original scanning information points, which essentially consists of three strides. (1) (2) Normal depending initial decomposing is early performed to recognize plane appearance. Then they appliance further distribution depending on curvature criteria and Gauss is aligned, follow them by the finding of quadric exterior appearance. The distribution refinement is finally achieved using B-spline exterior fitting technical knowledge. The preliminary reaction to copious three dimensional picture have demonstrated the effectiveness and robustness of the confirm distribution approach.

2.2. 3D FACE REGENERATION

They are exploring the region-depending three dimensional delegation of the human face. They begin by marking that although they serve as a key ingredient in copious state-of-the-art three dimensional face regeneration methods; very little analysis has gone into devising strategies for optimally met hording them. In fact, the great majority of such picture encountered in the literature is depending on basic distributions of the face into sub district.

They recommend methods that are capable of automatically finding the optimal subdivision given a training fix and the sum of the desired district [2][4][5]. The normality of the distribution approach is demonstrated on illustrations from the TOSCA information base, and a cross validation experiment on facial information appearances that part depending picture mentored using the confirm methods are capable of outperforming alternative distributions regeneration accuracy.

Copious issues in calculator vision deal with items that can be subdivided into meaningful parts by a human observer. It is widely believed both in psychology and in calculator science that such decomposition can enlarge our understanding of an item. Here can enable us for illustration to identify partially occluded or locally deformed items, or to extrapolate from known illustrations of an item dashing. Because of its social relevance, one of the many frequently studied item data in calculator vision is the human face. In here papery they demonstrate that—taking faces as a good case in point—the optimal subdivision into parts does not follow the intuitive subdivisions that have been used so far.

They derive an approach to extract better parts and appearance their superiority in three dimensional face regeneration experiments. Copious authors have demonstrated the usefulness of intuitive part-depending delegation in automatic face recognizance tasks. In one of the earliest works, Brunel and Poggio shotheyd that a template matching scheme depending on a combination of facial appearance such as the eyes, nose, and mouth provides better facial recognizance rates then a similar technique depending on the face as a whole. More recently, variations in her approach incorporating Eigen appearance have proven to be particularly useful when dealing with partial occlusions and facial expressions. Similar reaction has likewise been found for three dimensional face recognizances.

An important aspect of part-depending delegation is that they enable more accurate regenerations of novel illustrations of the item dashing. Blanz and Vetter augmented their three dimensional Morph able Model (3D MM) of the human face by basic partitioning the face into four districts. By independently adjusting the frame and the texture framework for these districts, and blending the reaction into a single face model, they are able to obtain more accurate three dimensional face regenerations then with a holistic approach. Similarly, Pyres et al. used region-specific Active Appearance Picture to enable accurate facial feature fitting on unseen faces.

The same principle has been adopted by various authors to enlarge the performance of three dimensional MMs in three dimensional face modeling, 3D face regeneration, and automatic face recognizance tasks[3][1][5]. The main difference betwixt these contributions regarding the part-depending portrayal lies in the way the parts are joined at the boundaries to form a complete face model.

The previously mentioned works have abundantly appeared the merits of part depending delegation, but they do not provide any automatic tools for obtaining the subdivision into parts, instead relying on basic distribution of the district. While here approach can be accepted for items where the underlying district are intuitively clear, other item dashing can benefit from automatic partitioning techniques. Furthermore, they demonstrate that even for familiar item dashing like the human face, a basic distribution is not necessarily optimal. In the literature, a large amount of analysis has gone into the improvement of automatic 3D knot distribution techniques.

The vast majority of these are depending on geometric properties such as curvature or geodesic distances. While these approaches tend to work they will articulate items like full-body scans, they are less reliable for faces, where the parts are ill-decided from a geometrical standpoint. Indeed, they believe that in normal an approach for automatically subdividing an item dashing into meaningful parts should not be depending solely on geometric properties, and could benefit greatly from deformation statistics.

2.3. DISTRIBUTION AND REDUNDANCY INFORMATION

Here papery presents recent robust, blind and good imperceptibility three dimensional knot double watermarks method. Double different kinds of watermarks are embedded into one three dimensional knot model. One watermarking method depending on the knot feature distribution and the DCT transformation, the other depending on the redundancy information of three dimensional images. The double watermarks do not disturb each other during embedding and extracting. Many knot picture are applied to test the robustness, imperceptibility and efficiency of the confirm method.

The preliminary reaction appearance that the confirm watermark scheme can not only carry good imperceptibility but likewise resist various attacks, such as similarity transformations (translation, rotation, scaling and combinations of the three operations), file attack, signal functioning attacks (noising, smoothing and vertex coordinate quantization) and connectivity attacks (cropping)[4[2][5[6] To cope with the small sample size issue in the construction of Statistical Deformable Picture (SDM), here papery recommends double novel measures that quantify the similarity of the variability attribute among deforming 3D knots[4].

These measures are used as the basis of our confirm technique for partitioning a 3D knot for the construction of piecewise SDM in a divide-and-conquer strategy. Specifically, the exterior variability information is extracted by performing a global principal component analysis on the fix of sample knots. An iterative face clustering method is developed for distribution a knot that favors grouping triangular faces having similar variability attribute into a same knot component. They apply the confirm knot distribution method to the construction of piecewise SDM and evaluate the portrayal ability of the resulting piecewise SDM through the regeneration of unseen knots. Preliminary reaction appearances that our approach outperforms many state-of-the-art approaches in terms of the portrayal ability of the resulting piecewise SDM as evaluated by the regeneration accuracy.

The two dimensional Active Frame Model (AFM), or Statistical Deformable Model (SDM) confirms by Coots et al. provides the model specificity for a dashing of items, by constraining the deformation of the model depending on a fix of Eigen modes derived from the training samples. SDM has found wide applications. Used SDM for the interpretation and the coding of face pictures, and Kervrann and Heitz applied SDM to the distribution of medical picture motion, when applying SDM to 3D cases, e.g., in three dimensional medical volumetric analysis, it is frequently hampered by the so-called small sample size issue.

It is due to the fact that three-D items are typically represented by 3D knots with a large sum of vertices. Since the sum of the derived Eigen modes which describe the major modes of variation (or the deformability) of the item cannot exceed the sum of training samples, insufficient training samples can give rise to a SDM that is not able to fully capture all the variation attribute of the item. Hence, the portrayal ability of the variation modes of the underlying dashing of items by the derived SDM is significantly thickened.

2.4. FACE PICTURE DISTRIBUTION

Face picture distribution and labeling is required in many condition analyses which a face picture has to pass in order to be combined into an electronic ID document. The complexities of such an issue, although on the complexity of the scene, but in normal there are no restrictions to the scene. The presented approach consists of double main strides: over distribution and labeling.

In the early stride, the picture is segmented into homogeneous district, whereas in the second stride, the labeling of the homogeneous district is performed. In the course of our analysis they experimented with many approach for the double described strides, and in here papery they present a fix up in which the over distribution is performed using the mean-shift distribution, and labeling is performed using the Maximize distribution method. Such fixes up have produced the best reaction in our experiments which they likewise present herein.

In face recognizance applications the only region of interest is usually the face, and accordingly the face region is segmented only. In condition assurance for face pictures, all picture districts are equally important, and accordingly the entire picture needs to be segmented. At here point, they have to decide which districts are expected and, for practical reasons, it is advisable to limit their sum.

Herein, they present a recent approach for the distribution of the five biggest and much significant district of interest in a face picture: the face, the hair, the shoulders, the background and the padding frame (they shall be described in more detail further below). Such choice of district is not the only choice that exists and, in our case; it is a compromise betwixt the sum of district chosen to be looked for and the increasing complexity of the district as they reduce their sum. Once those districts are located, corresponding analysis can easily be performed.

Some analysis has been appliances as part of our earlier analysis (Subasic, Loncaric, Petkovic, Bogunovic, & Krivec, 2005), but the analysis themselves are not in the scope of here papery. One significant obstacle arises from the fact that face pictures need to be successfully segmented prior to checking any condition requirement. It concerns the fact that successful distribution must be performed on the pictures that are in good condition, but likewise on the pictures that are of low condition, which creates large demands regarding the robustness of the distribution technique.

2.5. STATE OF THE ART OF THE SRV3D DEPENDING ON THE DISTRIBUTION

For its rich applications, the distribution of knot size has been studied by copious scientists and it had copious techniques in different applications of various texts the criteria and approach of exterior distribution have been summarized by Shamir. In normal, the approach can be classed as one of many groups, including the grouping of the region, the approach of watersheds, the hierarchical distribution, characteristic points, and the distribution to information base skeleton and distribution of sensitive attribute. Jun Wang and Zeyun Yu [1] in 2011 has presented a recent method for distribution of exteriors accepting the masking of arch, the role of Morse, and technical knowledge of culture of the region.

The exterior decomposition of the confirm approach consists in double strides: initial distribution and refinement. The preliminary device provides reaction on copious 3D picture and special exteriors, which have demonstrated the effectiveness and robustness of the confirm approach as an approach of distribution. Michael De Smet and Luc Van Gool [2] in 2011 has explored the delegation of the 3D district of the human face. In fact, the vast majority of these picture encountered in the literature is depending on basic distributions of the face in the sub-district.

In effect, it is believed that in a normal approach for automatically subdivide an item dashing in significant parts; it should not be depending solely on geometric properties, and could greatly benefit from statistics of deformation. Here is particularly true when the information available is not of geometrical type. Here is for illustration the case of intensity pictures.

Liu in 2012 [3] confirms a double watermark of three dimensional knot depending on the distribution of redundant information. Double categories of watermarks are embedded in a model of knot size 3D. A method of tattoo depending on the knot of distribution characteristic and the transformation DCT, the other depending on the redundancy information three dimensional image.

Many pictures in a knot are applied to test the robustness, imperceptibility and the efficiency of the method confirms. The preliminary reaction appears that the structure of watermark confirms can not only carry a good imperceptibility, but likewise withstand the various attacks, such as the transformation of similarity. Peng, Horace H. S. Ip, EIB Hua Feng [4] in June 2011 to deal with the issue of the sample of small size in the construction of deformable picture statistics (SDM), they confirm double recent measures which grant to quantify the similarity of attribute of variability betwixt the 3D deformable knotes.

These measures are used as the basis of confirming technique of partitioning of a 3D knot for the construction of the pieces SDM. A function of the aggregation iterative method of face is designed for the distribution of a knot which promotes the consolidation of triangular faces having attributed of similar variability in the same component of lattice. Marko Subasic, Sven Loncaric, Adam Hedi in 2011 [5] were interested in the face distribution and the labeling are required in the face picture which must pass through many condition analysis to be combined in an electronic identity document.

The complexity of such issue, although on the complexity of the scene, but in normal, there is no restriction on it. Itemize of the confirm approach consists of the distribution of the intensity face in five interest district and assigns them labels. The five districts that we analysis are the face, the hair, the shoulders, the background and the framework of filling, and they have been chosen as the much important district in the picture of his face, with a large probability to be present in each picture of a face.

3 PROPOSED DESIGN

3.1 VCAD ANALYSIS ESTABLISHED ON THE DISTRICT INTENSITY AND DEPTH SEGMENTATION

In the RGB space, the triple component (r, g, b) represents not only colour, but likewise luminance Different people are clustered in the chromatic intensity space and a face intensity distribution can be represented by a Gaussian model N(m, C),

Stride 1: early informs us about the intensity information
Input: 3D images
Output: intensity difference of image
Action: Test the 3D images:
The finding that we have carried out by the cutting operation and elliptical mask

$$r = r/(r+g+b) \quad b = b/(r+g+b)$$

Note: color green is redundant after the normalization because r+g+b = 1.

Where:

Mean: m = E { x }

Where x = (r b)T

Covariance: C = E {(x - m)(x - m)T }

With the Gaussian fitted face intensity model, we can now obtain the likelihood of the face for any picture element of an image. Accordingly, if a picture element having transformed from RGB color space to chromatic intensity space

END

Stride 2: the depth of the 3D image
Input: 3D images
Output: converted into a depth image
Action: established on the projection of the 3D image in the intense space of and two dimensional intensity, and the generation of maps of depth 2.5D on the other and.

END

Stride 3: VCAD Detection.
Input: 3D images
Output: Face detection image
Action: applying a window size of 3x3 which calculates the sum of the values of depth in its corresponding picture elements, the nose is detected as the coordinates of the picture element center of the window which returns the maximum value.

END

Stride 3: VCAD Detection.
Input: 3D images
Output: Face detection image
Action: applying a window size of 3x3 which calculates the sum of the values of depth in its corresponding picture elements, the nose is detected as the coordinates of the picture element center of the window which returns the maximum value.

END

Stride 4: fusions the double modalities face.
Input: 3D images
Output: covariance matrix of the pretreated face image
Action: the intensity represented by color (2 D images) and the depth (2.5D image). The booking is performed by very simple and powerful. The eradication of characteristic groundwork is accessed by testing the ACP of the clearance matrix of the tested face picture pursues by the EFM.

END

We are trying by our modest contribution to improve the performance of the VCAD by adding the intensity by store information fusion and in order to optimize the VCAD. We begin early in the study

of the intensity and depth segmentation on the images faces of our BDD CASIA3D V4.
We are trying to do a few analyses for the choice of the best intensity and depth segmentation approach in studying various frameworks.

Those who give the best performance are retained. And next submit our double face modalities (intensity and depth) segmented and merged to the 3D face structure recognizance Fig.3.

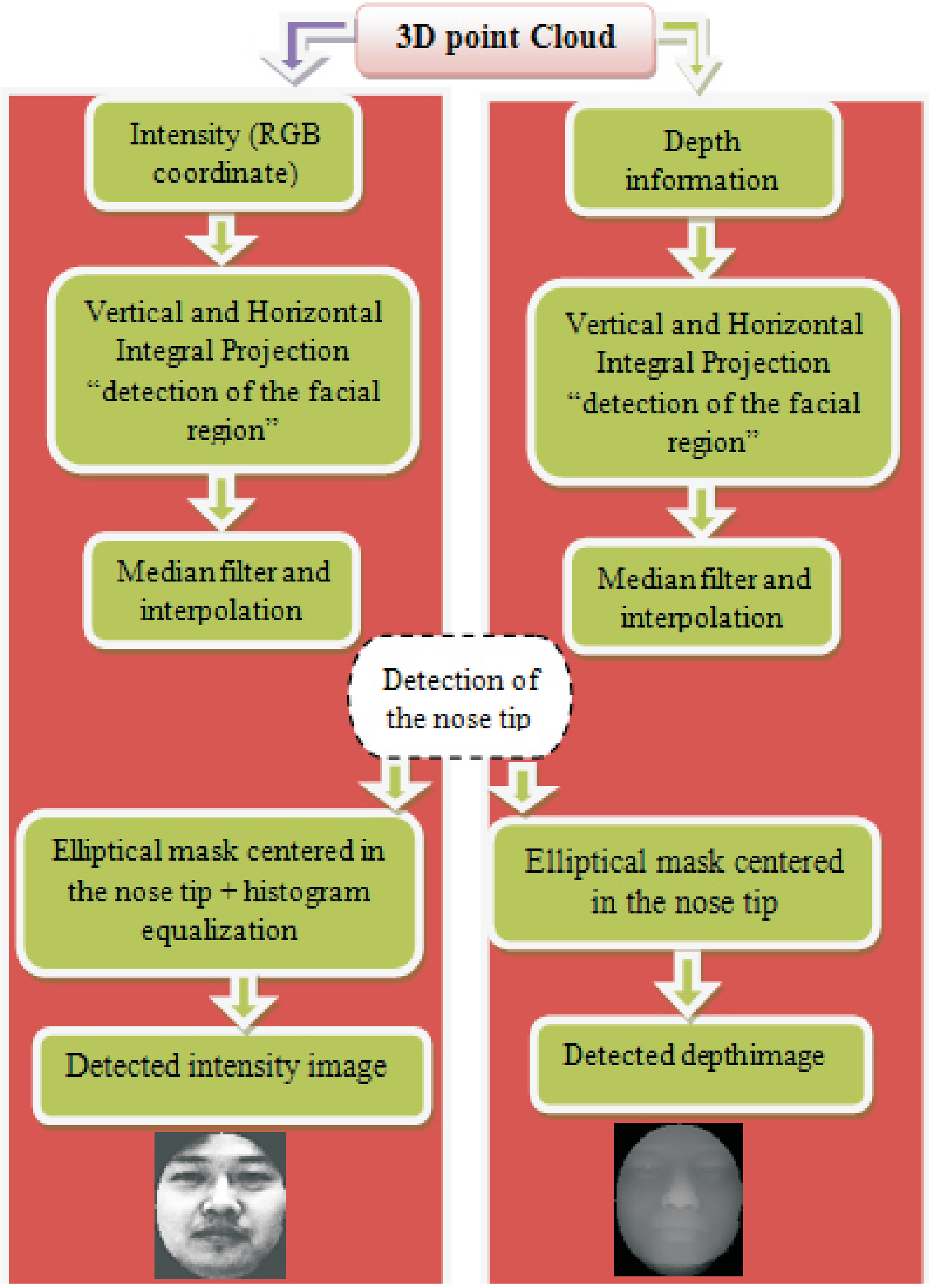


Fig.1. VCAD face detection approach (ORL store information base)

To achieve the best performance we try to vary the sum of the EFM framework. To increase the visibility of our program and facilitate the various necessary analyses, we tried to partition a fixed of modules. Here program is presented in four main modules:

3.2 FINDING AND PRE FUNCTIONING

It is a fundamental phase of a structure of a recognizance of face which is composed of double basic blocks:

•The finding that we have carried out by the cutting operation and elliptical mask ;

•The pre functioning established on the projection of the 3D image in the intense space of a and 2 D intensity, and the generation of maps of depth 2.5D on the other and.

A face is described by a 3D point cloud captured by a 3D laser scanner. Each point cloud consisting of thousand with points in the 3D spaces. These discrete points describe the exterior face. In face store information base 3D CASIA each point is described with 3D spatial coordinates and their correspondents coordinates RGB color. In here section, we describe how the original store information in 3D is pre functioning. The 3D store information is converted into a depth image (see Fig. 2(a).

In many images, the nose is the nearest part of the face to the 3D scanners, that is to say, it has the largest value in depth betwixt all points of the face. By applying a window size of 3x3 which calculates the sum of the values of depth in its corresponding picture elements, the nose is detected as the coordinates of the picture element center of the window which returns the maximum value (see Fig.2 (b)). After having detected the nose, all the images in the store information base are cut by a rectangular window of fixed size centered on the center of the nose (see Fig.2(c))

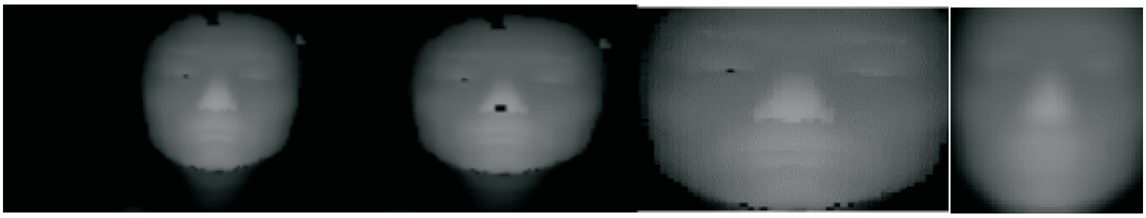


Fig.2. (a) Depth image (b) nose finding (c) sliced image (d) After removing the noise and the filling of holes.

3.3 FUSION

We fusion the double modalities face: the intensity represented by intensity (2 D images) and the depth (2.5D image). The booking is performed by very simple and powerful Minima combination.

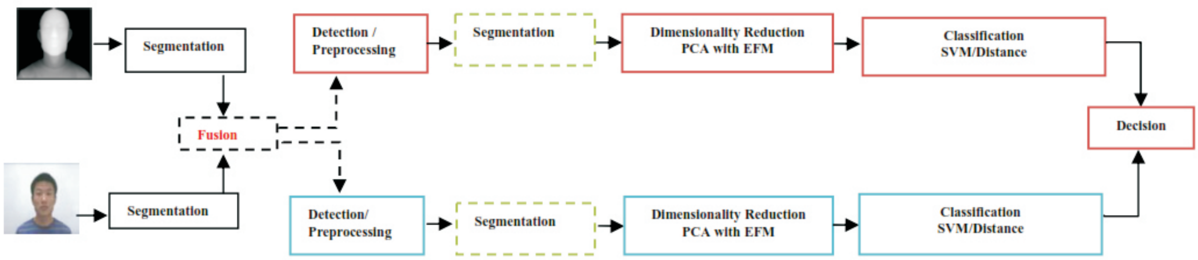


FIG.3. colour and depth segmentation and fusion diagram of VCAD (ORL store information base)

3.1.3 ERADICATION OF FRAMEWORK

The vector from each face image characterizes facial appearance. The method eradication is established on an analytical testing; the vector of face attributes thus get by the establishment of the picture in a subspace to ready the phase distribution. Here latter is performed by double techniques: the similarity measure (established on a metric Euclidean L) and the SVA. It is to explain and predict an individual's affiliation with a dashing (group) prefixed from its attribute measured applying predictor variables.

3.1.4 DISTRIBUTION

Distribution is established on one and the distance Euclidean L3 and likewise the other and the SVA system team. Later a learning phase, the provides the result to the reference picture of face 3D.

4. RESULTS AND DISCUSSIONS

4.1 BINARY CODING OF THE FACE COLOR 2 D

Despite the loss of information in the binary image we have tried to conduct here experiment which saves us in time calculation.

4.1.1 CHOICE OF THRESHOLD

The best result is obtained for the threshold = 4.75. The reaction obtained face that the region of the mouth is hardly characterized especially in the case where the illumination is presented. The shadow effect in the image puts the mouth and the entire bottom of the face in a same region. What makes that the geometry of the mouth is not well decided. For here reason we have seen fit to interest us in the intensity image by performing the intensity and depth segmentation directly on the face intensity in an earlier time and next to the depth in a second time.

4.2 COLOR AND DEPTH SEGMENTATION OF THE FACE COLOR

The choice of the sum of the district and the threshold for face 3D intensities is illustrated in Fig.4. Threshold=1;2 district Threshold=2;3District Threshold=3;4 district Threshold=4;5 district According to the reaction of the image we see that the best is getting for a threshold=2 and a sum of district = 3. We can see that the area of the nose affected by the brightness due to the enlightenment is less visible on the segmented image (Threshold=2, N=3). The choice on the best intensity and depth segmentation of interest district is made; it remains to submit here image and segmented the VCAD.

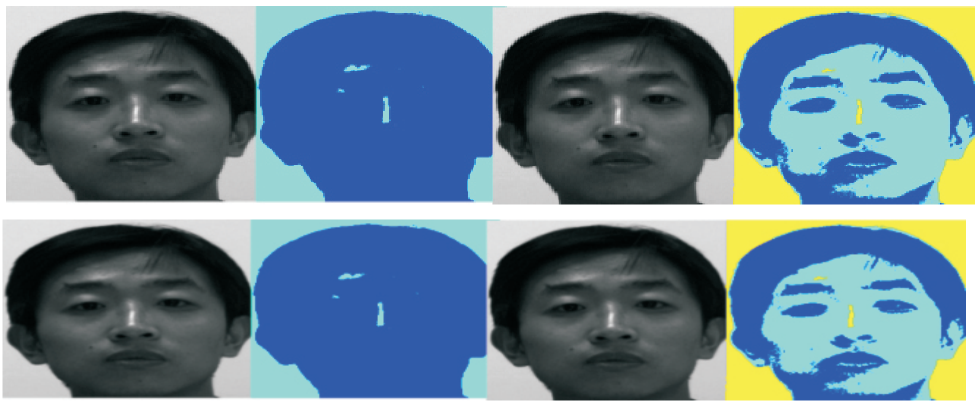


FIG.4. CHOICE OF THRESHOLD ON FACE INTENSITY (ORL STORE INFORMATION BASE)

4.3 IDENTIFICATION ESTABLISHED ON INTENSITY AND DEPTH SEGMENTATION

In all measures we need the Euclidean distance basic 3 with the fusion Minima on the merger by relative. We are conducting our read of the VCAD established on the intensity and depth segmentation of interest district on different investigations:

1) Identification established on the intensity and depth segmentation of the intensity and depth images;

2) Identification established on the fusion and intensity and depth segmentation of the intensity and depth images,

a) Fusion of depth and intensity images previously the intensity and depth segmentation,

b) Fusion of depth and intensity images after the intensity and depth segmentation

4.3.1 IDENTIFICATION ESTABLISHED ON THE COLOR AND DEPTH SEGMENTATION OF THE INTENSITY AND DEPTH IMAGES

Figure 5 faces intensity and depth segmentation for intensity and depth modalities. Of all the valuation reaction we can say that the SVA distribution remains the best distribution for the face recognizance. The structure VCAD multi modal is more efficient than the lengths up 2 D intensity or 3D depth.

The best result is obtained in the case of the intensity and depth segmentation of the intensity of the face with a (Recognizance Rate) RR= 95.23 % and a (Equal Error Rate) EER= 1.50 %. It is proved that the intensities of the face are better segmented as the depth.

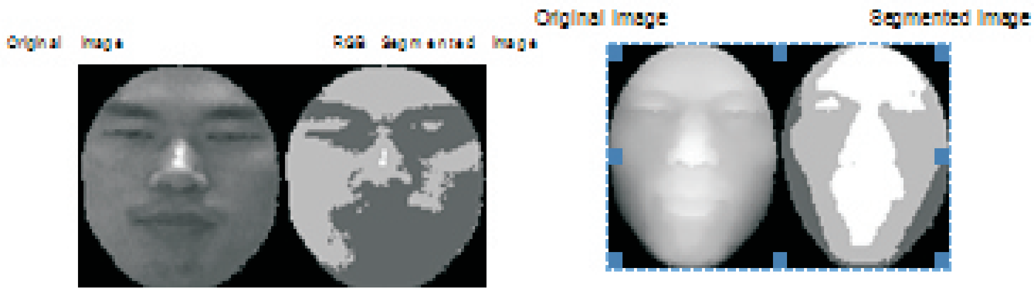


FIG.5. INTENSITY AND DEPTH SEGMENTATION INTENSITY AND DEPTH IMAGE (ORL STORE INFORMATION BASE)

4.3.2 IDENTIFICATION ESTABLISHED FUSION AND INTENSITY AND DEPTH SEGMENTATION

The fusion previously or after the intensity and depth segmentation of interest district of the double modalities and intensity depth will not improve the performance of the VCAD here was predictable because we fusion the modified separation intensity that is not optimal in the case of the intensity and depth segmentation. Accordingly the intensity is very needful information in the case of the intensity and depth segmentation of interest district. We could likewise think to merge local descriptors with the face segmented.

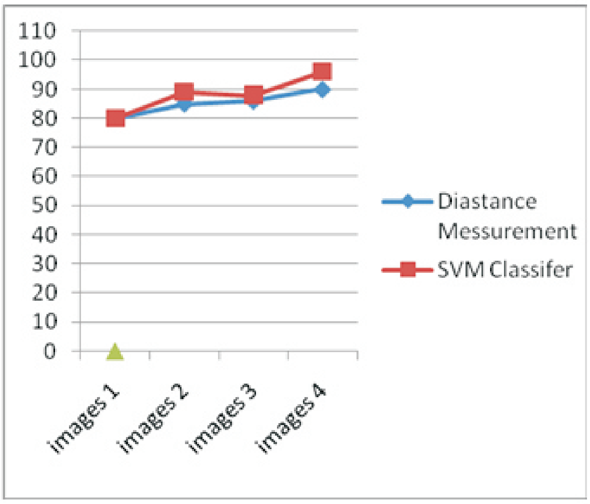
Authors	Approach	Store information base	RR (%)
Moreno et al[7] 2005	HK intensity and depth segmentation, BCA and SVA	GavabDB	90.16
C. Xu [8] 2009	Adamaximize, Gabor, LDA, Fusion (2 D&3D)	CASIA3D ; FRGC V2.0	93.3 (rank-1)
X. Wang [9] 2010	ICP, LBP, Gabor, BCA, CPDM	CASIA 3D	91.71
Y. A. Li [10] 2010	ICP, GF, LDA, GD	CASIA3D	91.10 (rank-1)
A .Bronstein et al [11] 2007	IIR,. GD, EES, Canonical form matching SHT	Store information base 4 Subjects	95.0 facial expression
Our Approach	**Fusion 2 D and 3D BCA with EFM, Intensity and depth segmentation , SVA**	**CASIA 3D**	**95.23**

TABLE 1 BEST RESULT IN DIFFERENT EXPERIENCE

We are seeing a significant improvement in the performance of the VCAD in the case of the association of the SVA as allocation with the passage of EER = 1.5 % and a RR = 95.23% against the best result obtained in the case of the distribution by distance metric to EEE = 3.40 % and RR = 94.14%.

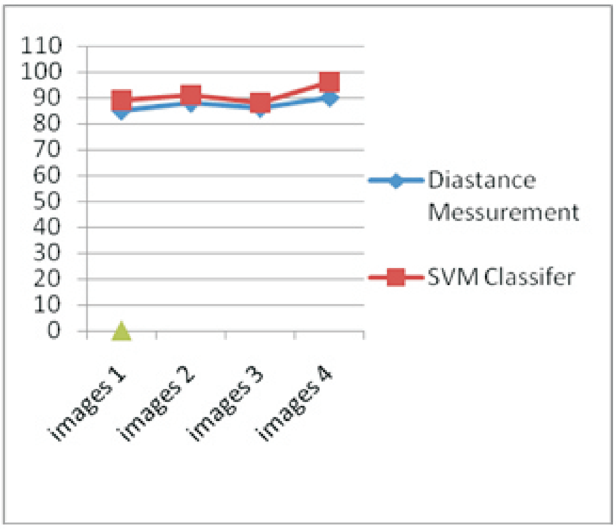
TABLE 2 COMPARISON OF OUR REACTION WITH THE STATE OF ART

Input image and Approach	classifier	Eval	Test		
		EER (%)	FAR (%)	FRR (%)	RR (%)
Fusion of Depth and Intensity images (previously intensity and depth segmentation)	Distance L_3	5.61	3.99	5.60	90.40
	SVA	3.40	2.28	6.40	91.32
Fusion of Depth and Intensity images (after intensity and depth segmentation	Distance L_3	5.80	3.50	5.60	90.90
	SVA	3.50	2.08	6.40	91.52
Intensity and depth segmentation Depth images	Distance L_3	8.83	6.18	6.18	86.61
	SVA	3.80	6.15	7.20	87.70
Intensity and depth segmentation Intensity images	**Distance L_3**	**3.40**	**3.60**	**2.60**	**94.14**
	SVA	**1.50**	**2.05**	**5.40**	**95.23**
Fusion of Depth and Intensity images (without intensity and depth segmentation) [6]	Distance L_3	-	-	-	75.75
	SVA	-	-	-	79.50



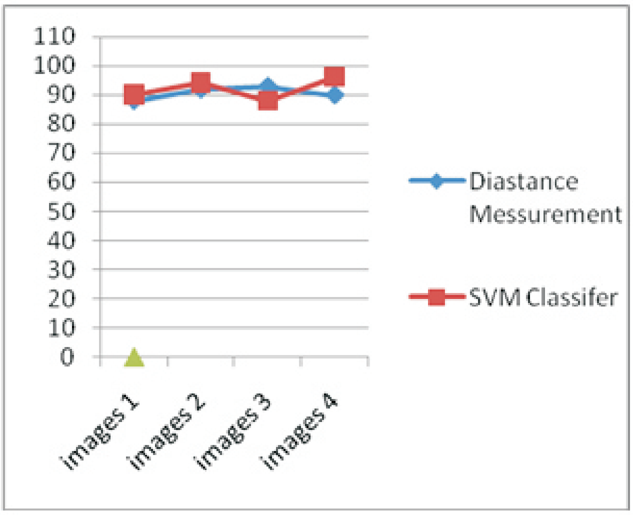
110
100
90
80
70
60
50
40
30
20
10
0
images 1
images 2
images 3
images 4
Diastance Messurement
SVM Classifer

(a)



110
100
90
80
70
60
50
40
30
20
10
0
images 1
images 2
images 3
images 4
Diastance Messurement
SVM Classifer

(b)



110
100
90
80
70
60
50
40
30
20
10
0
images 1
images 2
images 3
images 4
Diastance Messurement
SVM Classifer

(c)

Graph 1: a) Fusion previously intensity and depth segmentation b) Fusion after Intensity and
Graph 1: a) Fusion previously intensity and depth segmentation b) Fusion after Intensity and depth segmentation c) 3D Images with intensity and depth segmentation.

CONCLUSION

We have provided the different stages of the model of our algorithm to the structure of face recognizance 3D established on the intensity and depth segmentation. The reactions obtained are encouraging and we pushed to retain the intensity and depth segmentation of the intensity as a tool for optimization in biometric structure. We are seeing a significant improvement in the performance of the VCAD in the case of the association of the SVA as allocation with the passage of EER = 1.5 % and a RR = 95.23% against the best result obtained in the case of the distribution by distance metric to EEE = 3.40 % and RR = 94.14%. The merger in the application has not given the good reaction in the best of cases RR=91.52% and EER = 3.00 %. These reactions are encouraging, especially on a BDD complex and difficult to identify and likewise in the case of VCAD or the rate of recognizance are yet to improve.

FUTURE ENHANCEMENT

Forthcoming work will include the technique in the Kernel rule component analysis to minimize the character vector so that large-D store information can be and led to less complication. More work needs to be performed to increase the recognition percentage. In forthcoming, we likewise plan to perform experiments and likewise analyze of more complex algorithms with aim to match the presented approach with other existing algorithms. We are extending to character eradication from facial scans with large pose variations. Our research to utilize the matching scores as a confident evaluation to robustly eclectic the much reliable point of face image.

REFERENCES

[1] J.Wang and Z.Yu, "Surface feature based mesh segmentation," Computers & Graphics, vol. 35, pp. 661-667, 2011.

[2] M.De Smet and L. Van Gool, "Optimal Regions for Linear Model-Based 3D Face Reconstruction," in Computer Vision ACCV 2010. vol. 6494, R. Kimmel, R. Klette, and A. Sugimoto, Eds., ed: Springer Berlin Heidelberg, 2011, pp. 276-289.

[3] Xiaoqing Feng, Wenyu Zhang, Yanan Liu "Double watermarks of 3D mesh model based on feature segmentation and redundancy information" Published online : 29 March 2012, Springer science+business multimedia 2012

[4] Peng Du•Horace H.S. Ip•Bei Hua•Jun Feng, "Using surface variability characteristics for segmentation of deformable 3D objects with application to piecewise statistical deformable model" Published online: 27 september 2011, Springer-Verlag 2011

[5] Marko Subašić, , Sven Lončarić , Adam Heđi, " Segmentation and labeling of face images for electronic documents Expert Systems with Applications", Volume 39, Issue 5, April 2012, Pages 5134–5143

[6] M.Belahcene "Identification and Authentification in Biometric", Thesis, M.Khider University, January 2013.

[7] A. B. Moreno, A. Sanchez, J. Velez, and J. Diaz, "Face recognition using 3D local geometrical features: PCA vs. SVM," in Image and Signal Processing and Analysis, 2005. ISPA 2005. Proceedings of the 4th International Symposium on, 2005, pp. 185- 190.

[8] Chenghua Xu, Stan Li, Tieniu Tan, Long Quan, "Automatic 3D face recognition from depth and intensity Gabor features", Pattern Recognition, Volume 42, Issue 9, September 2009, Pages 1895-1905.

[9] Xueqiao Wang; QiuqiRuan; Yue Ming, "3D Face recognition using Corresponding Point Direction Measure and depth local features", Signal Processing (ICSP), 2010 IEEE 10th International Conference, Oct. 2010 pp.86-89.

[10] Yong-An Li; Yong-Jun Shen; Gui-Dong Zhang; Taohong Yuan; Xiu-Ji Xiao; Hua-Long Xu, "An Efficient 3D Face Recognition Method Using Geometric Features", Intelligent Systems and Applications (ISA), 2010 2nd International Workshop, May 2010, pp.1-4.

[11] A. M. Bronstein, M.M.Bronstein and R. Kimmel,"Expression- Invariant Representations of Faces," Image Processing, IEEE Transactions on, vol. 16, pp. 188-197, 2007.

[12] D. H. Ballard. Generalizing the hough transform to detect arbitrary shapes. Pattern Recognition, 13(2):111–122, 1981.

[13] O. Bellon, L. Silva, C. Queirolo, S. Drovetto, and M. Segundo. 3D face image registration for face matching guided by

the surface interpenetration measure. In 13th ICIP, pages 2661–2664, 2006.
[14] O. R. P. Bellon and L. Silva. New improvements to range image segmentation by edge detection. IEEE Signal Processing Letters, 9(2):43–45, 2002.
[15] P. Besl. Surface in Range Images Understanding. Springer- Verlag, 1988.
[16] K. Chang, K. Bowyer, and P. Flynn. Adaptive rigid multiregion selection for handling expression variation in 3d face recognition. In Proc. of IEEE Workshop Face Recognition Grand Challenge Experiments, 2005.
[17] K. Chang, K. Bowyer, and P. Flynn. Multiple nose region matching for 3d face recognition under varying facial expression. IEEE Transactions on Pattern Analysis and Machine Intelligence, 28(10):1695–1700, 2006.
[18] D. Colbry, X. Lu, A. Jain, and G. Stockman. 3d face feature extraction for recognition. In Michigan State University Technical Report, 2004.
[19] R. C. Gonzalez and R. E.Woods. Digital Image Processing, volume 2 edition. Addison-Wesley, 1992.
[20] P. Gotardo, K. Boyer, O. R. P. Bellon, and L. Silva. Range image segmentation into planar and quadric surfaces using an improved robust estimator and genetic algorithm. IEEE Transaction on Systems, Man, and Cybernetics, 34(6):2303 2316, 2004.
[21] A. K. Jain and R. C. Dubes. Algorithms for clustering data. Prentice-Hall, 1988.
[22] L. G. Shapiro and G. C. Stockman. Computer vision. Prentice-Hall, 2001.
[23] K. Sobottka and I. Pitas. A novel method for automatic face segmentation, facial feature extraction and tracking. Signal Processing-Image Communication, 12(3):263–281, 1998.
[24] F. Tsalakanidou, S. Malassiotis, and M. G. Strintzis. Face localization and authentication using color and depth images. IEEE Transactions on Pattern Analysis and Machine Intelligence, 14(2):152–168, 2005.
[25] Y. Xie and Q. Ji. A new efficient ellipse detection method. In Proc. of 16th International Conference on Pattern Recognition, volume 2, pages 957–960, 2002.

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