IMAGE QUALITY ASSESSMENT METHOD FOR FAKE IRIS DETECTION

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Abstract - In this paper we are doing a biometric technique method by iris recognition to check the iris is real or fake based on an image quality measure. Research and practical applications iris recognition is becoming a very active topic .The most reliable and accurate available biometric identification system is iris recognition method. Iris recognition system is used for the further segmentation and normalization for extracting its feature. In this paper Daughman's Algorithm segmentation process for Iris segmentation and an image quality is used to check whether the image is real or fake.

Keywords

Image quality assessment, biometric, visual saliency, Daughman segmentation, fake iris, VSI.

Introduction

Biometric recognition using iris is a mature technology used in many government and civilian applications such as e-passports, ID cards, and border control. However, during the past few years, biometric quality measurement has turn into a significant concern. In recent years, the increasing interest in the evaluation of biometric systems security has led to the development of numerous and very diverse initiatives that focus security measures as main field of research [1]. Fake user first detain the original identity of the real user and then they make the fake sample for verification ,but biometric system have more method to notice the fake users and that's why the biometric system is more protected, Because each person have their only one of its kind characteristics identification. Biometrics system is more protected than other security methods like password, PIN, or card and key. .Image quality assessment is might by belief that it is predictable that a fake image and real sample will have different quality obtaining. Predictable quality differences between real and fake sample may contain: color and luminance levels, general artifact, quantity of information, and quantity of sharpness, its value found in both type of images, structural distortions or natural appearance. In this paper we can find the iris is real or fake based on the image quality measure. Iris recognition is the foremost part of iris recognition system. There are four steps in iris recognition, segmentation, normalization, encoding and matching. Segmentation and normalization technique depends on performance of iris recognition system .iris information of iris pattern Iris segmentation refers to the method of extracting features that provide the information of iris model normalization refer to prepare a segmented iris image for the encoding process. The next step is the encoding technique.

Proposed Work

In this paper we are doing to check that the iris is real or fake based on the image quality value. First the eye image is selected from the UBIRIS database and segmented the iris portion from the eyes using the - Daugman's Iris Segmentation method [3].There are several steps used in Segmentation method like image acquisition, image preprocessing, template matching [4]. In this method first apply the filter then initialize center and radius of the iris ,construct the circle with given radius and center, then calculate the circle gradient ,if the gradient is maximum set as maximum gradient circle, otherwise change the center and radius.

Motion filter is used to create the distorted image from the segmented image. It results when the image being record change during the soundtrack of a single contact, either due to rapid movement or long exposure Image, filtering allow you to apply various belongings on photos. . Motion blur is achieved by blurring in only 1 direction. It's as if the camera is move from the top left to the bottom right, hence the name is motion filter, then created the visual saliency map, [5] The Saliency Map is a topographically given map that represent visual saliency of a corresponding visual scene it can be see that in the majority cases, changes of VS maps can be a good indicator of distortion degrees and thus, in this paper propose to use the VS map as a feature to characterize the image's local quality.

There are several method to create the VS map, in this paper use SDSP [6] method to create VS map. The main step of SDSP method is first find the frequency prior then location and color prior, based on the combination of three visual saliency map is created. In the quality distortion indicator, VS map does not work quite well for the distortion type CTC (Contrast Change). The root reason is that due to the normalization operations involved in VS computational models, the VS value at a pixel is a measure to reflect its relative distinctiveness to its surroundings, which makes VS weak to characterize image's absolute contrast However, such a quality degradation caused by contrast reduction cannot be reflected in their VS maps, since no significant difference can be observed in VS map, Fortunately, we can use an additional feature to recompense for the need of contrast sensitivity of VS. The simplest aspect of this type may be the gradient modulus (GM).

There are several different operators to compute the image gradient, such as the Prewitt operator, the Sobel operator, the Roberts operator and the Scharr operator [7] and here implement the Scharr gradient operator, which has been prove very dominant in several work . With Scharr gradient operator, the partial derivatives Gx (x) and Gy (x) of an image f (x) are calculated as:

$$G_x(\boldsymbol{X}) = \frac{1}{16}\begin{bmatrix} 3 & 0 & -3 \\ 10 & 0 & -10 \\ 3 & 0 & -3 \end{bmatrix} * f(\boldsymbol{X})$$

$$G_y(\boldsymbol{X}) = \frac{1}{16}\begin{bmatrix} 3 & 10 & 3 \\ 0 & 0 & 0 \\ -3 & -10 & -3 \end{bmatrix} * f(\boldsymbol{X})$$

GM map has a good potential capability in reflecting the local contrast loss of images. Therefore, VS and GM are matching and they replicate different feature of the HVS in assess the local value of the input image, it can also be seen that as a quality distortion indicator, VS map does not work quite well for the distortion type CCS (Change of Color Saturation) either. Actually, color distortion cannot be well characterize by gradient either since usually gradient is evaluate from the luminance channel of images. Thus, to make the IQA metric possess the ability to deal with color distortions, chrominance data should be give special considerations. Consequently, for RGB color images, we first transform them into an opponent color space [8].

$$\begin{bmatrix} L \\ M \\ N \end{bmatrix} = \begin{bmatrix} 0.06 & 0.63 & 0.27 \\ 0.30 & 0.04 & -0.35 \\ 0.34 & -0.6 & 0.17 \end{bmatrix} \begin{bmatrix} R \\ G \\ B \end{bmatrix}$$

The weights in the above conversion are optimized for the HVS. Then, the gradients are computed from L channels. M and N, two chrominance channels, will be used as features to characterize the quality degradation caused by color distortions.

With the extracted VS, GM, and chrominance features, we can define a VS-based index (VSI) for IQA tasks. Then check the resemblance between images f1 and f2. Denote by VS1 and VS2 the two VS maps extracted from images f1 and f2 using a specific VS model; denote by G1 and G2 the two GM maps; denote by M1 and M2 the two M channels; and denote by N1 and N2 the two N channels. The computation of VSI consists of two stages. In the first stage, the local similarity map is calculated, and in the second stage, group the similarity map into a single quality score. Then separate the similarity measurement between f1(x) and f2(x) into three components, one for VS, one for GM, and the other for chrominance. First, the similarity among VS1(x) and VS2(x) is distinct as:

$$S_{VS}(\mathbf{x}) = \frac{2VS_1(\mathbf{x}) \,.\, VS_2(\mathbf{x}) + C_1}{VS_1^2(\mathbf{x}) + VS_2^2(\mathbf{x}) + C_1}$$

Wherever $C1$ is a positive constant to increase the stability of SVS. Similarly, the GM values $G1(\mathbf{x})$ and $G2(\mathbf{x})$ are compared as:

$$S_G(\mathbf{x}) = \frac{2G_1(\mathbf{x}) \,.\, G_2(\mathbf{x}) + C_2}{G_1^2(\mathbf{x}) + G_2^2(\mathbf{x}) + C_2}$$

Where $C2$ is another positive constant. The similarity between the chrominance components is simply defined as:

$$S_C(\mathbf{x}) = \frac{2M_1(\mathbf{x}) \,.\, M_2(\mathbf{x}) + C_3}{M_1^2(\mathbf{x}) + M_2^2(\mathbf{x}) + C_3} \cdot \frac{2N_1(\mathbf{x}) \,.\, N_2(\mathbf{x}) + C_3}{N_1^2(\mathbf{x}) + N_2^2(\mathbf{x}) + C_3}$$

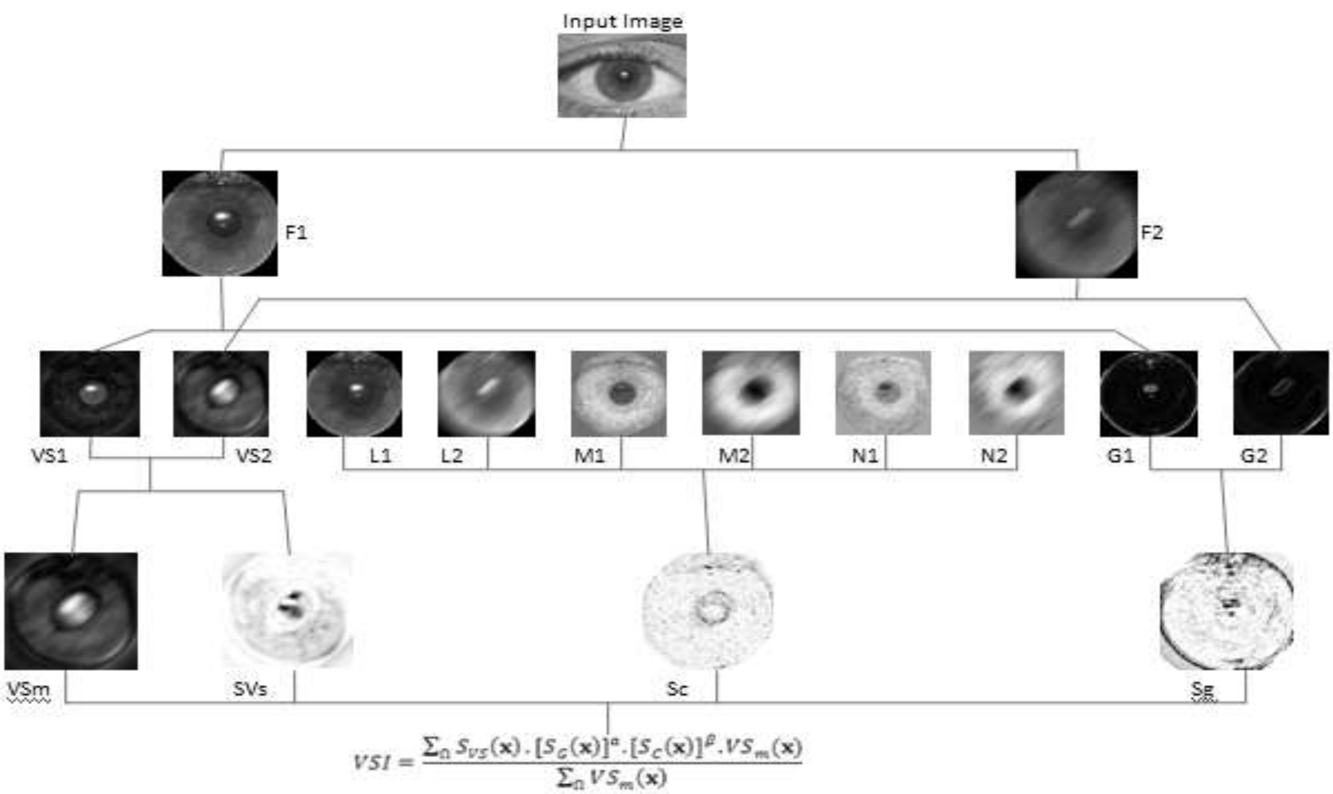
In our experiments, $C1$, $C2$ and C3 are all fixed so that the proposed VSI can be conveniently applied to all datasets. Then, $SV\,S(\mathbf{x})$, $SG(\mathbf{x})$ and $SC(\mathbf{x})$ are combined to get the local similarity $S(\mathbf{x})$ of $f1(\mathbf{x})$ and $f2(\mathbf{x})$. We define $S(\mathbf{x})$ as follows

$$S(\mathbf{x}) = S_{V\,S}\,(\mathbf{x}).\,[S_G(\mathbf{x})]^{\alpha}\,.\,[S_C(\mathbf{x})]^{\beta}$$

Where α and β are two parameters used to adjust the relative importance of VS, GM, and chrominance features. Having obtained the local comparison $S(\mathbf{x})$ at each point $\mathbf{x}$, the overall similarity between $f1$ and $f2$ can be calculated It has been widely accepted that different locations can have different contributions to the HVS' perception of the image quality and it would be better if the score pooling strategy could be correlated with human visual fixation. Consequently, in our VSI framework, it is natural to choose the VS map to characterize the visual importance of a local region Instinctively, for a given position $\mathbf{x}$, if anyone of $f1(\mathbf{x})$ and $f2(\mathbf{x})$ has a high VS value, it implies that this position $\mathbf{x}$ will have a large force on HVS when it evaluates the similarity between $f1$ and $f2$. Therefore, we use $VSm(\mathbf{x}) = \max(VS1(\mathbf{x}), VS2(\mathbf{x}))$ to weight the significance of $S(\mathbf{x})$ in the largely similarity. Actually, a similar form was used at last the VSI metric connecting $f1$ and $f2$ is term as:

$$VSI = \frac{\sum_{X\in\Omega} S(\mathbf{x})\ .\ V\,S_m(\mathbf{x})}{\sum_{X\in\Omega} V\,S_m(\mathbf{x})}$$

Based on these value easily identify that the image is real or fake. In VSI method .9 and above value image are real image. The UBIRIS database used in the VSI method, it can easily identify that that the iris is real or fake.



Experimental Results

In our paper we use the UBIRIS dataset is used to check the iris is real or fake. With the distinct need for consistent personal identification, iris recognition has become a significant enable technology in our society. Even though an iris pattern is obviously an ideal identifier, the increase of a high-performance iris recognition algorithm and transfer it from research lab to practical applications is at rest a challenging task. CASIA Iris Image Database (CASIA-Iris) develop by research group has been released to the international biometrics groups and updated from CASIA-IrisV1 to CASIA-IrisV3 since 2002. Iris images of CASIA-Iris-Interval were taken with self-developed close-up iris camera. The most important feature of iris camera is that have made a circular NIR LED array, with appropriate luminous flux for iris imaging.

Conclusion

In this paper, we proposed a biometric method for IQA, namely image quality assessment for fake Iris detection and it can conclude that daughman segmentation is suitable for segmentation, then create the VS map. It is based on the assumption that an image's VS map has a close relationship with its perceptual quality. In the visual saliency (VS) map is explored at two stages. At the stage of local quality map computation, the VS map is taken as an image feature; while at the quality score pooling stage, it is used as a weighting function to characterize the importance of a local image region. Several representative VS models were examined under our framework of VSI for IQA tasks, and among them the SDSP model performs the best.

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