IDENTIFICATION OF ANIMAL USING IRIS RECOGNITION

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ABSTRACT

Animal detection is a very emerging and important area due to a large number of real life applications. Various animal warning systems and detection methods are used for indicating the presence of animals on the residential area or roads. Applications which are very important in real life are preventing animal vehicle collision on preventing, roads dangerous animal intrusion in residential area, knowing locomotive behavioural of targeted animal etc. All these applications can be narrowed down to three areas namely identification, detection and tracking of animals. In this paper we implement the animal detection model with the help of iris information of the animal groups. First features of the animal eye image are obtaining using threshold segmentation method and these features are store with the animal name in the database. After creating the database KNN algorithm is used to find out the animal type form the input iris image using database of the features.

Keywords- Animal Tracking, Iris Segmentation, Feature Subset Selection, K Nearest Neighbor, Active Feature Selection.

I. INTRODUCTION

Animal detection is a very important and emerging area due to a large number of real life applications. Various animal detection methods and warning systems are used for indicating the presence of animals on the roads or residential area. Applications which are very important in real life are preventing animal vehicle collision on roads, preventing dangerous animal intrusion in residential area, knowing locomotive behavioural of targeted animal etc. All these applications can be narrowed down to three areas namely detection, tracking and identification of animals.

The very first area that is detection of animals is applied in various fields of real life applications. As an example hundreds of camel-vehicle accidents were reported every year causing numerous deaths and loss of property running into millions of Saudi Riyals. To address this problem, a deployable and intelligent Camel Vehicle Accident Avoidance System (CVAAS) was designed using global positioning system technology [1]. Researchers in [2] developed an algorithm for light detection and ranging (LIDAR) data to enable fisherman to find the right location of fishes in deep sea. For maintaining human safety and security by detecting possible dangerous animal intrusions into the residential area, researchers in [3] used micro-Doppler signals.

This thesis will advance the idea that recognition entails hypothesis testing. Hence, recognition is considered a generative process, where prior knowledge guides information sampling during recognition attempts. When a hypothesis is confirmed, it produces recognition. Furthermore, the hypotheses of this generative process do not need to be conscious, whereas the output of confirmed hypotheses often seems to be explicit recognition.

Specifically, you can be unaware of the process which preceded recognition, even though that process was governed by systematic information sampling in accordance with a memory trace.

II. RELATED WORK

There are still major research issues in the area of iris image acquisition. One issue involves imaging the iris with a sensor system that allows the person to be more "at a distance" and "on the move." Matey and Kennell [4] present a comprehensive tutorial on the issues involved in acquiring iris images at a distance of greater than 1m. The tutorial includes a partial list of commercial iris recognition devices released between 1995 and 2008 and a description of several successful applications of iris biometrics. The authors describe acquisition issues including the wavelength of light used, the type of light source, the amount of light reflected by the iris back to the sensor, required characteristics of the lens, signal-to-noise ratio, eye safety, and image quality. Capture volume, residence time, and sensitivity to subject motion are also discussed.

Wheeler et al. [5] describe a prototype "standoff" iris recognition system designed to work at sensor-to-subject distances of up to 1.5m. The system uses two wide-field-of-view cameras to perform face location in the scene and an iris camera and illuminator to image the iris. Dong et al. [6] discuss the design of a system to image the iris "at a distance," allowing a standoff of 3 m. Although current commercial iris biometrics systems all use near-infrared (NIR) illumination and most research assumes NIR imaging similar to that used in current commercial sensors, Proenca [7] argues for visible-wavelength imaging as the more appropriate means to achieve "at a distance" and "on the move" imaging.

Boddeti and Kumar [8] investigate the use of wavefront-coded imagery for iris recognition. This topic has been discussed in the literature before, but Boddeti and Kumar use a larger dataset and present experiments to evaluate how different parts of the recognition pipeline (e.g., segmentation, feature extraction) are affected by wave front coding. They propose using un-restored image outputs from the wave front coded camera directly and test this idea using two different recognition algorithms. They conclude that wave front coding could help increase the depth of field of an iris recognition system by a factor of 4 and that the recognition performance on un-restored images was only slightly worse than the performance on restored images.

There is little published work dealing with imaging the iris under different wavelength illumination. Ross et al. [14] look at imaging the iris with illumination in the 950–1,650nm range, as opposed to the 700–900nm range typically used in commercial systems. They suggest that it is possible to image different iris structure with different wavelength illumination, raising the possibility of multispectral matching as a means to increased recognition accuracy.

III. IRIS THRESHOLD SEGMENTATION

Iris modelling is to character iris properties and provide clues to feature extraction. To most of our knowledge, although colour is important for iris patterns of westerners, most personal identification systems based on iris recognition use intensity images. Moreover, gray value of iris images captured via different devices is different. Although texture plays an important role, texture feature extraction is computational complex. So structure (gray level distribution), is most important for iris modelling. If an iris image is seen as a surface, it can be found that iris (include pupil) is like an inverse hat (See Fig.3.1). Thus, an inverse-hat model is adopted. It indicates that the centre of an iris is of low gray value and the surrounding parts are of high gray value.

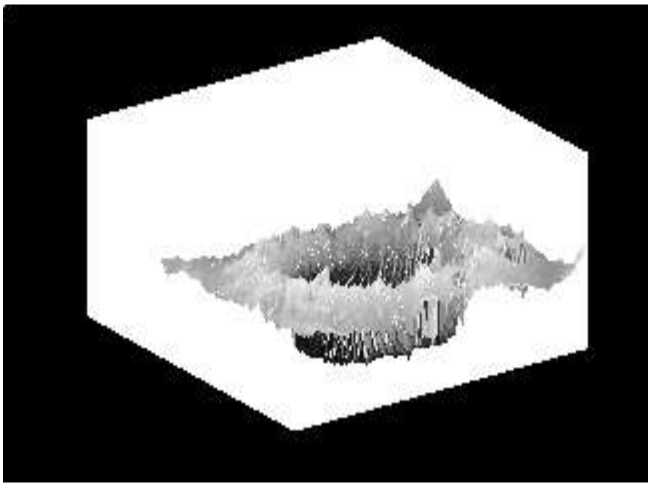

Figure 1: Inverse-Hat Models

3.1 Feature Extraction

Feature extraction is to extract quantized features to represent iris patterns. As we know, spatial gray level co-occurrence matrix (GLCM) is a widely used feature for structural patterns; however, GLCM is a statistical feature and computational complex. Based on the proposed inverse-hat model, four types of features are extracted and introduced as follows.

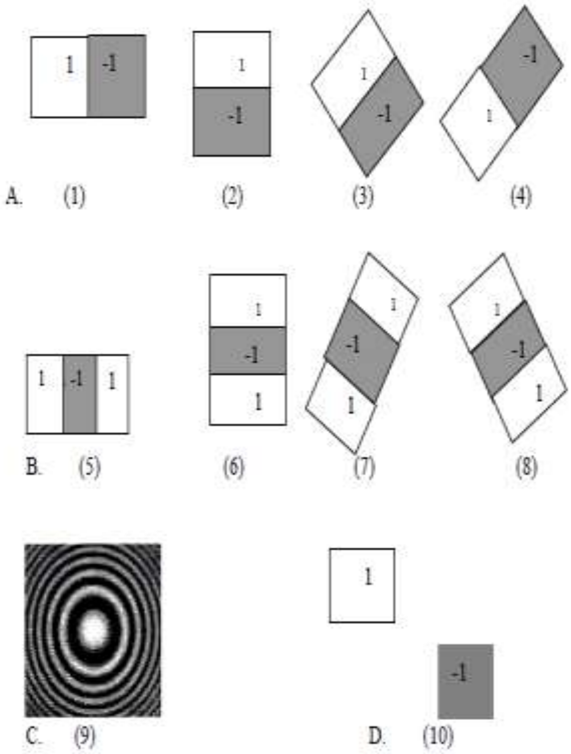

Figure 2: Four Types of Features

In Fig. 2, four types of features are contrast feature (denoted by A, including 1, 2, 3, 4), symmetric feature (denoted by B, including 5, 6, 7, 8), isotropy feature (denoted by C, including 9) and disconnected feature (denoted by D, including 10), respectively. They are computed as follows. The feature, denoted by *f*, is the difference (d) of two regions normalized by the variance (v) of the total image and is computed as follows. (1) Compute d. For type A, B and D, d = (sum of gray values in region denoted by 1) – (sum of gray values in region denoted by -1). For type C, d is difference of two rings and computed as follows.

$$s_i = \int_{r_i}^{r_{i+1}} \int_0^{2\pi} I(\rho,\theta) d\rho d\theta \quad (1)$$

$$d_{i,j} = s_i - s_j \quad (2)$$

Circle generation used in Eqn. (1) is computed using Bresenham algorithm (a famous method in computer graphics).

(2) Computer the variance *v* of the image. To obtain high speed, we use a short session to introduce a fast algorithm for variance computation. Let *h* (*i*) be the histogram of the images and I be an image, then

$$\begin{aligned} Var(I) &= E(I)^2 - (EI)^2 \\ &= \frac{1}{N}\sum_{i,j} I(i,j)^2 - (\frac{1}{N}\sum_{i,j} I(i,j))^2 \\ &= \frac{1}{N}\sum_{i=1}^{255} h(i)i^2 - \frac{1}{N^2}(\sum_{i,j} I(i,j))^2 \end{aligned} \quad (3)$$

Because i^2 (i = 0,1,...,255) can be made a lookup table, after carefully computation, it needs, at most, only 2*M*N+256 integer additions, 256 integer multiplications and 2 divisions. Here M and N are the size of an image. (3) The feature is $f = d / v$. Finally, a feature set is built though changing the size of the regions shown in Fig 2.

3.2 Proposed Work

Most of the iris detection frameworks use the eye to estimate the type of the input animal image to have a better accuracy. In proposed method shown in the figure 3. Proposed Methodology is divided into two parts. They are as follows:

I. Training/Database Creation
II. Type Evaluation

The overall diagrammatic representation of the proposed work is as shown below:-

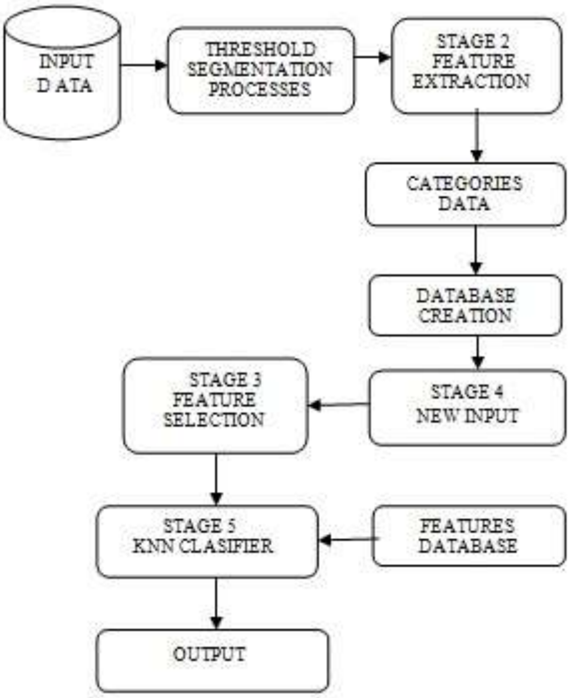

Figure 3: Diagrammatic Representation of Work Flow

The proposed methodology consists of two phases:-

1) Training Phase

2) Evaluation Phase

3.3 Training Phase

In training phase firstly the complete system is trained. Input images are used to create the database, threshold based segmentation is applied to the input age. Irish segmentation is explained in the previous chapter. After applying the segmentation different features of the iris image are calculated. Feature calculated from the input image to detect the animal type are Area of the eye, major axis, miner axis, parameter of the of eye and eccentricity of the image. Ones the features are detected from the input image we store them with the name of the animal whose eye image is taken as the input. This procedure is repeats for thousands of input images to create the database and to get the optimized results.

3.4 Evaluation Phase

In the evaluation model Input image is give to the system. Threshold based segmentation is used to extract the feature the images this images is pass to the KNN algorithms and database created in the previous step. A KNN algorithm takes the input from both database and system and finds the similar features from the database and generates animal type as the output of the system. Now the active features are given as input to the system as shown below:-

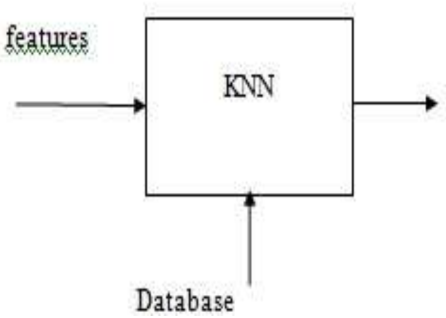

Figure 4: Diagrammatic Representation of Evaluation Phase

Now the active features are given as input to the system. Here KNN algorithm is applied to the input which gives the output as type of the animal stored in the database.

IV. MODELING RESULT

The animal detection system developed in the MATLAB software to obtain the effective results from the system. Outputs of the system are shown below.

Figure 5: Classified into Category; Cat, Time Needed 0.77s

Figure 6: Original Image

Figure 7: Detected Iris Region

Figure 8: Classified into Category; Goat, Time Needed 0.17s

Figure 9: Original Image

Figure 10: Detected Iris Region

Figure 5 and 8 shows the classification of the animal category. It also denotes time required for the classification 0.77s and 0.17s respectively. Figure 6 and 9 are the original images of the categorized animals. In figure 7 and 10 the Iris region is detected from original images of animals.

From this detected iris region we can easily recognized the animal.

V. CONCLUSION

The proposed method brought forward by means of this paper work effectively and efficiently in recognition of animal type. Various efficient algorithms are used in the work, thus giving fruitful results. The overall research work consisted of two phases' viz. training and evaluation wherein training phase consists of training of the system by user itself feeding the database with features of the iris image with the animal name. Hence, the results obtained by this research work is a far more better than the previous works and the proposed method does excellent job in detecting animal type with high accuracy rate.

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