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Drunk Person Identification using Thermal Infrared Images

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Abstract: Drunk person identification is carried out using thermal infrared images. Two different methods for identifying drunk person face. The features used in first method are simply the pixel values of specific points on the face. It is proved that cluster of a specific person moves in the feature space as the person consumes alcohol. The Fisher linear discriminate approach is used for space dimensionality reduction. In feature, space is found to be of very low dimensionality. The majority of the clusters moves towards the same direction, which can be easily separated into the 'sober' and 'drunk' regions. The 'drunk' feature space is introduced. The second method is thermal differences between various locations on the face are evaluated. It identify that specific areas in the face of a drunk person present an increased thermal evaluation. These best approach for identifying a drunk person. The concept behind this second proposed method relies on a physiology-based face identification procedure.

Keyword: Biometrics, Thermal Infrared Signatures, Drunk Person Verification.

I. INTRODUCTION

Biometrics is a research area with numerous publications last few years. Research has been carried out in several biometric problems, such as face and fingerprint recognition, facial expression classification and iris identification with high rate of success. Research in face recognition towards the visible spectrum for a variety of reasons. The availability of low cost cameras in the visible portion of the electromagnetic spectrum and the fact that face recognition is one of the primary activities of the human visual system. The machine recognition using visible light is difficult due to the fact that the acquired images change. To acquiring information from faces in thermal infrared spectrum (Socolinsky and Selinger, 2002; Buddharaju et al., 2007; Khan et al., 2006; Zhao and Grigat, 2005). The main reason for that temperature on various positions of 3 the face depends on the physiological as well as the psychological conditions of the specific person. Which in turn is strictly related to the distribution of the blood vessel network on it. A few literature regarding drunk person identification. Some researchers have worked in person identification and face recognition using thermal infrared image studying the physiological and psychological properties of the person. These approaches have not been applied for drunk person recognition and identification.

In this paper, two different methods to find problem of identifying drunk people using thermal images. The first method is based on the fact representation of a specific person into the feature space (cluster of feature vectors) moves as the person consumes alcohol. The local difference pattern for drunk person is different than the sober. The space is easily reduced to two dimensions and it is proved that the clusters of the persons move towards the same direction with alcohol consumption. The feature space is separated into two regions:(i) the one containing the clusters of the sober and the clusters of the drunk persons. This feature space is called 'the drunk space'.(ii) The fact that the thermal differences between specific locations on the face increase as the person consumes alcohol. This purpose each face image was separated into small square areas of 100 pixels (10 × 10) thus producing a matrix (8 × 5) of squared regions for each person. Each squared region the mean pixel value was evaluated for the sober and the drunk person. Our purpose to identify the regions of the drunk person which presented increased temperature with respect to other regions. Relative temperatures are monitored, the identification approach is independent of the auto-ranging capability of the thermal infrared significance. According to the second method the image of the sober person is not needed. Only, the face of the drunk person is helpful for deciding its situation. The cluster separability is addressed while the dimensionality of the feature space is examined and dimensionality space reduction is carried out using a linear transformation.

For identifying the drunk person we can take thermal image as first. Then we can apply Feature formation using simple pixel value algorithm. Also we can use the two different methods. One is Cluster separability, which is important to find out if the cluster which corresponds to the same person moves in the feature space as the person consumes alcohol. Only in this case the 20-point feature will be suitable for drunk person identification.Second method is Space dimensionality and dimensionality reduction. The dimensionality of the feature space is studied so that its projection

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into the two most important dimensions gives the possibility to visually monitor the cluster movement for each separate person. By evaluating algorithm we can give the output the person is drunk or not-drunk.

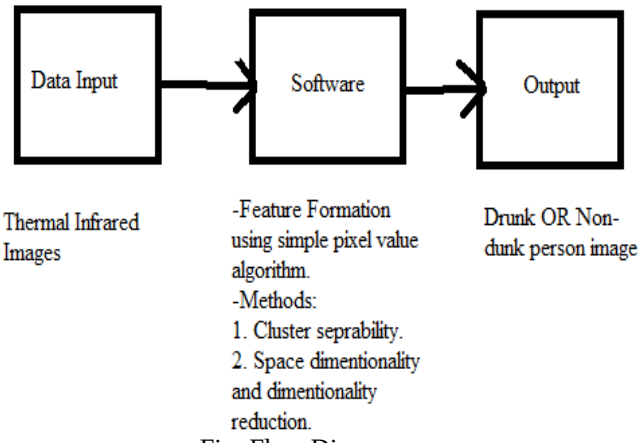
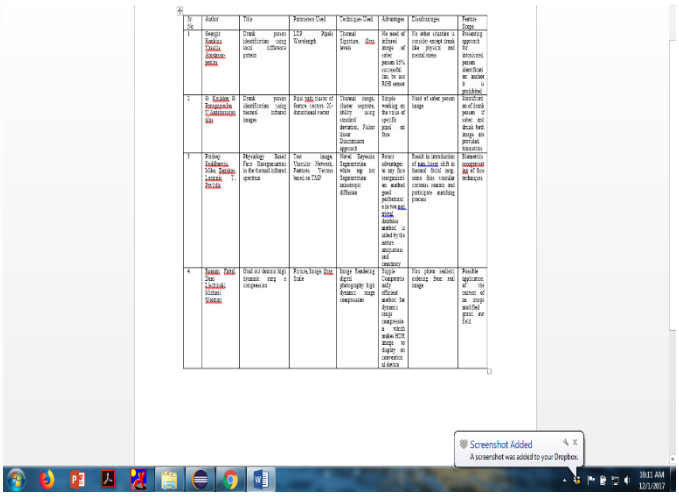


Fig: Flow Diagram

II. LITERATURE SURVEY

We present the approach for face recognition based on the physiological information extracted from thermal facial images. In this paper, we present a novel approach to the problem of facial recognition that realizes the full potential of the thermal infrared band. It consists of a statistical face segmentation and physiological feature extraction algorithms tailored to thermal phenomenology. Drunk person identification is carried out using thermal infrared images. There are two approaches for drunk person identification. The first approach are simply the pixel values person face. It is proved that the cluster of a specific person moves in the feature space the person consumes alcohol. The feature space is found to be of very low dimensionality. The second approach are thermal differences between various locations. Infrared thermal images with normal expression and international expression of happiness, sadness, disgust, and fear were captured. Face recognition is challenging task, when the lighting conditions cannot be controlled. In this paper, we present an automatic face recognition system in infrared (IR) spectrum instead of the visible band. This system exploits the feature extraction capabilities of the Discrete Cosine Transform (DCT) which can be calculated very fast. Using forehead region of thermal intra image there is new way of discriminating the sober from drunk person. For this purpose small kames 3*3 called local difference pattern are used.



III. PROPOSED WORK

1.Raw Data

The wavelengths operating in from 7.5 μm to 13.0 μm, which means that obtained information is the thermal infrared. In the experimental procedure 20 people were involved. Each person consumed alcohol, drinking 330 ml of beer four times in equal time intervals of 20 minutes. Before each beer consumption, a sequence of 50 frames was acquired from each person with time distance 100 m/sec between the frames.

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During the acquisition procedure, the lighting and temperature conditions in the room were kept unchanged. Actually, a very dim light was available from a neighbouring room for the researcher to be able to work. The Infrared camera is not affected by this light. The distance of each face from the camera was kept constant from acquisition to acquisition so that the images of the same person could be compared. The persons involved were healthy. The beer was chilled to the same temperature for all persons, while no food was consumed by anyone, before or during the experiment. The experiment was conducted once.

Figure 1 Four thermal images of a specific person corresponding to the first acquisition

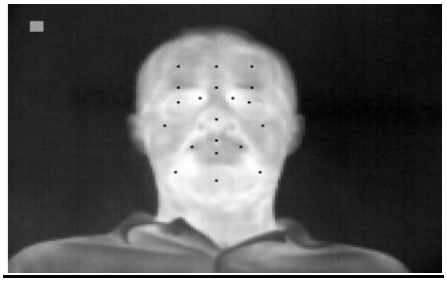

Figure 2 Twenty points were obtained on each face to monitor temperature changes with theconsumption of alcohol

2. Feature formations using simple pixel values

In the first method for drunk person identification a simple feature vector was formed by taking 20 different pixels on the face of person. These pixels obtained at the same position for all faces and acquisitions. Accordingly, pixels samples were obtained on the forehead, the nose, the eye brows, the chins and other pixelon the face. The selection of these pixel was made taking into consider in fact that these regions contain blood vessels which significantly contribute to the region temperature.

3. Face thermal changes in drunk people

In the second method for drunk person identification, the thermal differences between various locations on the face are examined. The final goal of the method is to determine if some regions of the face become hotter when consuming alcohol. It is very important to examine and find regions, which initially are cold, compared to specific other regions for the sober person and become hotter for the drunk person.

Algorithm :

Step1: Drunk person identification take 20 different point on the face of each person.

x = [181 169 203 166 217 175 171 189 169 206 152 144 243 165 225 147 247 149 247 127].

Step2: Find out if the cluster which corresponds to the same person.

Step3: The first cluster which corresponds to the sober person the standard deviation is

σ1 = [2.8238 3.0284 5.9333 2.0156 2.2467 2.0092 4.7983 4.3554 3.6372 1.3159
2.6174 2.2336 0.9625 5.6285 5.4040 2.7887 0 3.4632 0 2.7370]

while for the fifth cluster (person drunk after having consumed four beers) the standard deviation is:

σ5 = [1.2994 7.4469 3.6503 2.1667 4.1975 3.3006 10.4082 3.4112 2.2395 1.5653
4.3237 1.8679 1.2622 14.1372 6.1686 3.8903 2.2873 6.2559 0.2132 7.2303]

Step4: The conclusion from this experiment is that the cluster of a specific person moves with alcohol consumption. This is valid for all 20 persons.

$$S_B W_i = \lambda_i S_W W_i$$

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Where,W of eigenvectors wi, within-scatter-matrix (S_W),

Table 1 Standard deviation (scatter) of its cluster and their distances

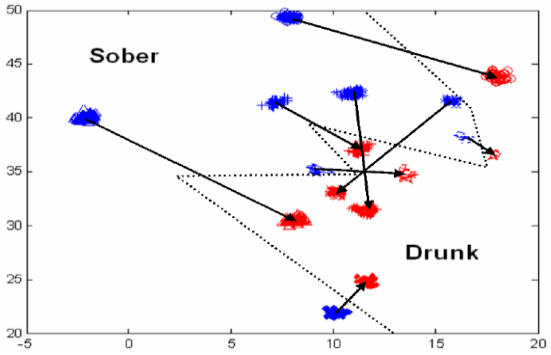
Cluster Pair	Distance	Standard Deviation
(1,3)	99.5	17.5
(1,5)	98.5	20.1
(3,5)	72.9	25.7

Step5: Dimensionality of the feature space is studied.

Step6: The direction of movement of the cluster of each person is exhibited.

1st	2.48
2nd	1.22
3rd	0.33
4th	0.74
5th	0.22

Step7: Output is : the person is 'drunk' and 'sober'.



IV. CONCLUSION

To obtain the statistical property of pixel on the forehead of person simple kernel pattern i.e. LDP is introduced. Infrared images are used due to increased temperature and activity of blood vassals of drunk person. Infrared camera are expensive compared to RGB sensors they still give facial characteristic that are unique for person. Expected that the extensive use of thermal cameras will decrease the cost. In thermal cameras there is no need for comparison for sober person introduce to decide about introduction. Infrared images are used for this purpose, since it is expected that the consumption of alcohol increases the activity of blood vessels on the face and the temperature in various locations differentiates compared to that of the sober person. The method although simple, presents a success of almost 85 percent.

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