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MUA3D: Malaysian Ethnicity Recognition

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ABSTRACT

From a human face, one can tell that person's emotion, gender and ethnicity. The ethnicity recognition score contributes to increase the matching score in the face recognition. This paper presents Malaysian ethnicity recognition using a new face database, MUA, developed by a biometric research group, Sarawak Biometric (SARAB). This database contains data from three main ethnic groups in Malaysia mainly Malay, Chinese and Indian. In addition, MUA also contains data for the biggest ethnics in Sarawak, the Ibans or called Sea Dayaks. We used 200 face data from MUA. Several geometric features were extracted from the images. The classifier used is Support Vector Machine whereas the accuracy obtained for facial ethnicity classification is 92.01%.

Key words: Face recognition, face database, ethnicity classification, support vector machines, ethnic face database

1.INTRODUCTION

The success in face recognition area has paved the way for age detection, facial expression and gender classification. All of these face analysis works have brought benefits to other areas such as marketing, security and can be further extended to neuroscience and social psychology studies. However, a lesser number of works on the face analysis field of study focus on ethnicity recognition. The capability to distinguish age, gender, ethnicity and emotion displayed of others is also significant for the coordination of social behavior.

As we know, face carries spacious information about a person, such as race, gender, age, expression, and identity. The studies in psychology prove that when confronting human face usually will trigger three conscious neural evaluations, which are race, gender and age. Among them, a race is said to be the most outstanding attribute to be conceived by a series of social cognitive and perceptual tasks. However, the problem arises as the computational mechanism facing complexity to classify ethnicity based on the facial features.

This paper presents a new Malaysian Face Database called MUA, and the images for this database are captured by Kinect. The second objective is to recognize ethnicity using Support Vector Machines (SVM). Section 2 describes the related works on this field, followed by a discussion on the experiment settings in section 3. Then, the results and analysis are discussed in section 4. Finally, the conclusions are drawn.

2.RELATED WORKS

Several researches have been carried out to solve ethnicity/race based on facial features. For example, research in psychology has deliberated for behaviour interrelations of race perception such as other-race-effect (ORE) and attention model in [1], [2], [3], [4] and [5], which portray the existence of racially-discriminative facial features. Computational neuroscientist also has produced models to trigger and describe race perception in [6], [7], [8], [9] and [10]. Experiments in [11], [12] and [13] in addition revealed a notable visual factor of racial features.

As for the process of classification of ethnicity, we should begin with the elemental clarification and perception of the ethnic group itself. Based on the Oxford dictionary, ethnicity is a state of belonging to a social group that has a common national or cultural tradition. Based on [14], ethnicity is a complex social construct that influences personal identity and group social relations and [14] states that ethnicity is defined in terms of shared genealogy.

Nonetheless, to imply the basic algorithm tends to be varied and sophisticated. Firstly, the classification of race is still puzzling by a variety of perspectives, which lead to ambiguity in formulation and methodology. Secondly, in order to construct a competitive automatic race recognition, large-scale of database needed to be trained and established. Thirdly, as nowadays 3D facial fiducial data are much more favourable for computational recognition rather than human recognition.

Early studies have been done using an appearance-based methodology, which used the basis of colour, texture and shape-based algorithms. Although it is straightforward, computationally adequate, and competent performance, these approaches are said to precede the encoding procedure of the human visual system [15]. Additionally, it will appear as a downturn results when confronting with image manipulation such as changes in scale and illumination.

Consequently, later approaches use a feature-based track and also looks at both configure and shape aspect. [16] adopt 25 measurements from a head and facial landmarks to differentiate ethnic morphology between three groups, which are North-American Caucasians, African-Americans and Chinese. In another word, this study suggesting using information of distinctive characteristics for each ethnic to enhance recognition accuracy. In 2006, [17] introduced a