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Facial Expression Recognization Based on Cognition and Local Binary Patterns

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Abstract: In this paper, a new expression recognition approach is presented based on cognition and mapped binary patterns. At first, the approach is based on the LBP operator to extract the facial contours. Secondly, the establishment of pseudo 3D model is used to segment face area into six facial expression sub-regions. In this context, the sub-regions and the global facial expression images use the mapped LBP method for feature extraction, and then use two classifications which are the support vector machine and softmax with two kinds of emotion classification models the basic emotion model and the circumplex emotion model. At last, we perform a comparative experiment on the expansion of the Cohn-Kanade (CK +) facial expression data set and the test data sets collected from ten volunteers. The experimental results show that the method can effectively remove the confounding factors in the image. And the result of using the circumplex emotion model is obviously better than the traditional emotional model. By referring to relevant studies of human cognition, we verified that eyes and mouth express more emotion.

Facial expression analysis is a remarkable and demanding problem, and impacts significant applications in various fields like human-computer interaction and data-driven animation. Developing an efficient facial representation from the original face images is a crucial step for achieving facial expression recognition. Facial representation based on statistical local features, Local Binary Patterns (LBP) is practically assessed. Several machine learning techniques were thoroughly observed on various databases. LBP features- which are effectual and competent for facial expression recognition are generally used by researchers Cohn Kanade is the database for present work and the programming language used is MATLAB. Firstly, face area is divided in small regions, by which histograms, Local Binary Patterns (LBP) are extracted and then concatenated into single feature vector. This feature vector outlines a well-organized representation of face and is helpful in determining the resemblance among images.

Keywords: Binary pattern, Facial Expression, Gausian Filter, Recognization.

I. INTRODUCTION

In human society, facial expressions play a significant role. As the carrier of information, facial expressions are able to contain numerous information that cannot be conveyed by voice in the process of interpersonal communication. Therefore, automatic facial expressions recognition has been becoming a growing topic in computer vision research in recent years. The automatic classification of facial expressions is a great significant for human-computer interaction technology, and also has potential application value in many fields such as computer-aided training, medical field and distance education. The traditional electronic intelligent teaching has the drawback that the interaction between students and teachers about teaching feedback can only be delivered via voice information. Emotional calculation based on facial expressions can solve the shortcomings of the traditional electronic teaching. In the medical field, the automatic recognition of facial expressions can help the doctor know the patient's feelings in time. In addition, the application of facial expressions recognition technology has also offered new developments in the fields of animation film and face image synthesis. Facial Expressions Recognition (FER) systems consist of face detection, facial feature extraction and expression classification. American psychologists Ekman and Friesen defined six basic human facial expressions, like happy, angry, surprise, disgust, etc. They also developed Facial Action Coding System (FACS) based on Action Units (AUs) to describe facial expressions.

II. LITERATURE REVIEW

In [2007], Nicolas Morize, Frédéric Amiel, Insaf Dris Hamed, Thomas Ea proposes the hardware and software of the GPS and GSM network were developed. The proposed GPS/GSM based System has the two parts, first is a mobile unit and another is controlling station. The system processes, interfaces, connections, data transmission and reception of data

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among the mobile unit and control stations are working successfully. These results are compatible with GPS technologies.
In [2003], Önsen Toygar and Adnan Acan proposes a vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This proposed to design a vehicle tracking system that works using GPS and GSM technology. This system built based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a moving Vehicle and report the status of the Vehicle on demand.

Ekman (1992, 1993), known for decades of facial expression and emotion research, has made Case for the existence of basic emotions (e.g., fear, joy, sadness, anger, disgust, and surprise), which are recognizable in facial expressions. A popular television series, *Lie to Me: The Truth is Written All Over our Faces* is based on Ekman's scientific study of human facial expressions (www.fox.com/lietome). This TV hit focuses on and follows a scientist who studies facial expressions to uncover lies and truth in difficult legal cases. As well, Ekman's work has received attention from other media sources such as Time Magazine and he has several mainstream books in publication. Thus, the growing interest in the structural and functional properties of facial expressions as well as individuals' ability to recognize facial expressions is being demonstrated in mainstream popular culture and seems to parallel research interests in the topic.

III. PROPOSED SYSTEM

In This process we propose a face descriptor, using the algorithm Local Binary Pattern (LBP), for facial expression recognition. Hence LBP is used to extract the feature information of emotion-related features by using the directional information and ternary pattern in order to take the fine edge in the face region while the face having the smooth regions. This proposed method has better than the other existing, by extracting the histogram-based face description methods that divide the face into a small blocks and then the sample codes uniformly. Then the grid to construct the face descriptor while sampling expression related information at different scales are classified.
Dimension reduction by extracting discriminating features is based on the idea of maximizing the total scatter of the data while minimizing the variance within classes. It can be seen that the feature values for the six classes are highly merged, which can result in a high misclassification rate. Please note that the actual number of features could be more than three, however, for the sake of visualization, the first three features were picked in order to create. Accordingly, this work employs a robust feature. This is easy to explain, has good predictive ability, and computationally, it is less expensive than other existing methods. As mentioned before that the existing HCRF utilizes diagonal covariance Gaussian distributions in the feature function and does not guarantee the convergence of its parameters to some specific values at which the conditional probability is modeled as a mixture of normal density functions. Because of this property, the existing HCRF losses a lot of information. This is one of the main disadvantages of the existing HCRF model. In order to solve this limitation, we explicitly involve full covariance Gaussian distributions in the feature functions at the observation level.
As for the classification module, a large number of methods have been employed for accurate expression classification. Authors exploited Artificial Neural Networks (ANNs) in order to classify different facial expressions and achieved a 73% recognition rate. However, ANN is a black box and has incomplete capability to explicitly categorize possible fundamental relationships. Besides, ANNs may take long time to train and may trap in a bad local minima. Moreover, authors employed Support Vector Machines (SVMs) for their FER system. But, in SVMs, the observation probability is calculated using indirect techniques; in other words, there is no direct estimation of the probability. Furthermore, SVMs simply disregard temporal dependencies among video frames, and thus each frame is expected to be statistically independent from the rest.
A set of three sub-experiments were performed in order to show the effectiveness of sub-components of SH-FER. For this purpose, from the first experiment, the best case was selected based on the recognition rate. Next, three sub-experiments were performed using the 10-fold validation rule. In the first case, ICA was utilized with HCRF instead of SWLDA. In the second case, ICA was coupled with LDA before feeding the features to HCRF.
We tested and validated the accuracy of wavelet transform along with and Support Vector Machines (SVMs) for crop/weed classification for real time selective herbicides systems. Unlike previous systems, the proposed algorithm involves a pre-processing step, which helps to eliminate lighting effects to ensure high accuracy in real-life scenarios. We tested a large group of wavelets (46) and decomposed them up to four levels to classify weed images into weeds with broad leaves versus weeds with narrow leaves classes. This employed to reduce the feature space by extracting only the most meaningful features. Finally, the features provided by SVMs for classification. The proposed method was tested on a database of 1200 sample s, which is a much larger database size than that studied previously (200-400 samples). Using confusion matrices, the crop/weed classification results obtained using different wavelets at different decomposition levels were compared, and this approach was also compared with existing techniques that use statistical and structural approaches. The overall classification accuracy obtained using the symlets wavelet family was 98.1%. These results represent an improvement of 14% in performance compared with existing techniques. Our objective in

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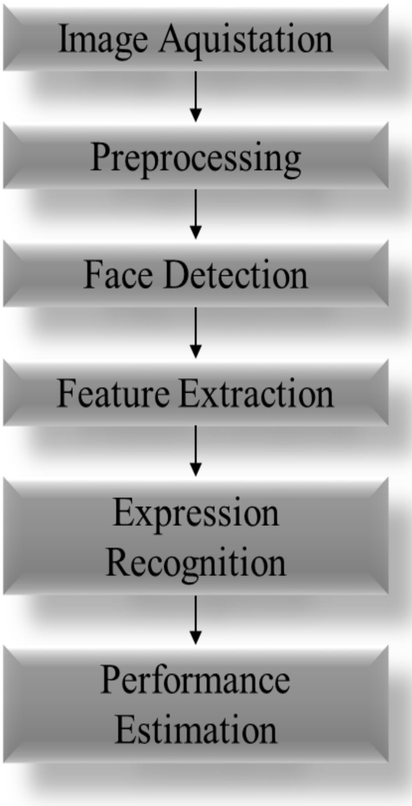
this research was to develop an accurate and efficient weed classification system that can distinguish broad and narrow leafed weed with high accuracy even when tested with a large dataset (i.e., 1200 samples) without making any prior assumptions about environmental factors. Our proposed technique employs a pre-processing step that utilizes global histogram equalization to normalize the histograms of all the images to illuminate the lighting effect. After pre-processing, wavelet transform is performed. Wavelet transforms convert images into frequency and time domains allowing both of these features to be distinguished. In this work, we evaluated and compared six different wavelet families: the symlets wavelet family consisting of 10 sub-wavelets, the Daubechies wavelet family consisting of 10 sub-wavelets.

Advantages:

- It has good predictive ability, and computationally.
- It is less expensive than other existing methods.
- The advantage of this method is that it is very efficient for seeking localized features.
- It also provided good recognition rates when used across multiple datasets.
- The proposed HCRF model also showed significant improvement over existing work in terms of recognition accuracy.



IV.RESULT

All the below figure shows that how we can give the system input, as we give the input the system gives us output which is shown in below figure. As per the input and output we can analyse the result of our project which is shown in below figure.

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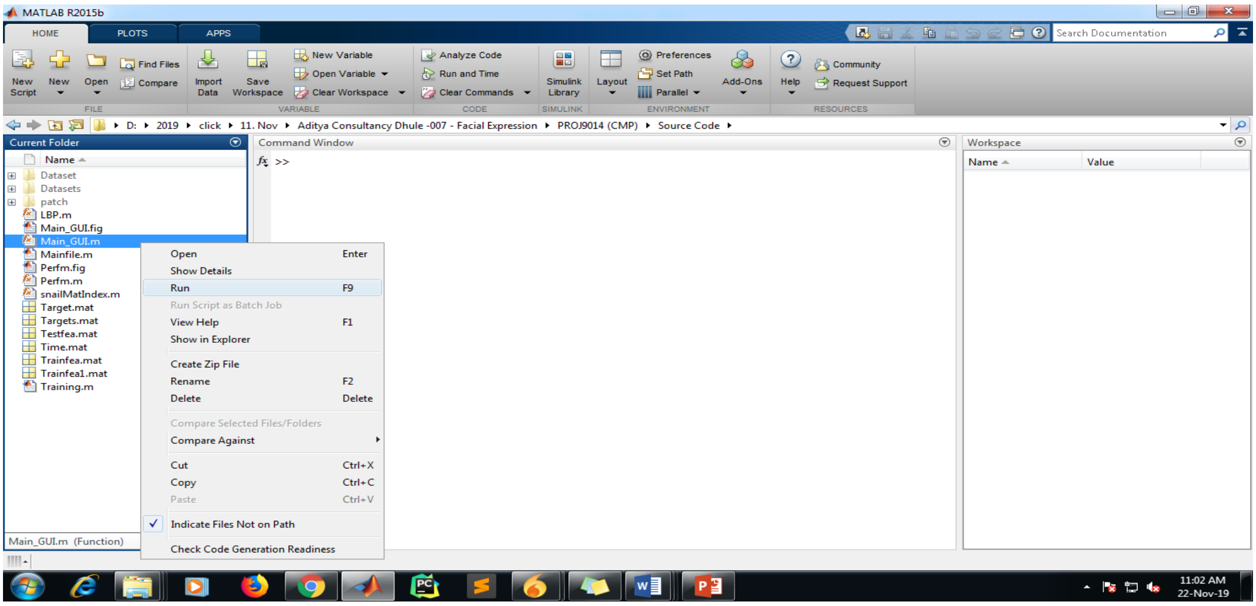
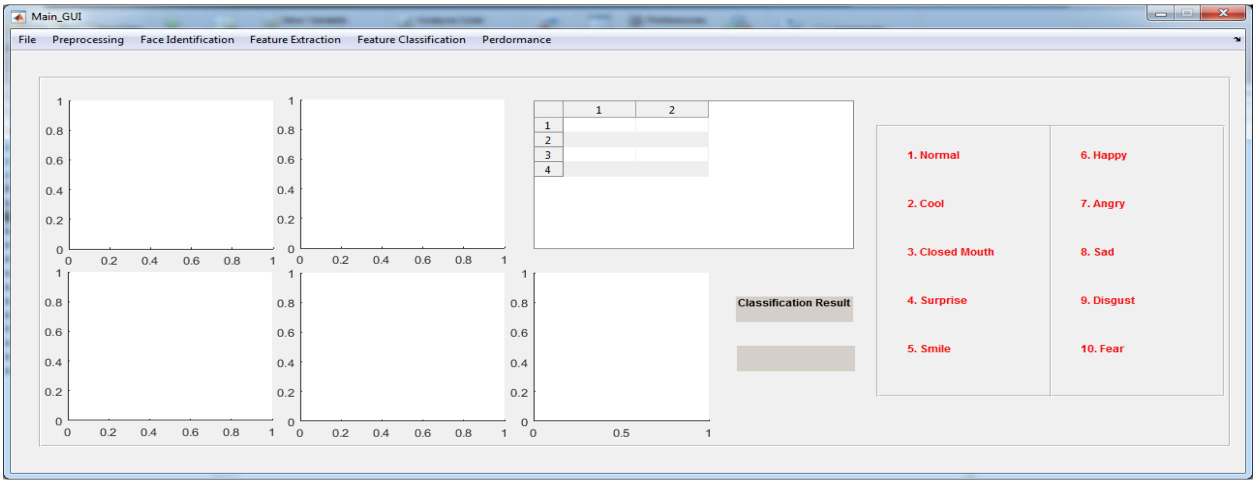


Figure 4.1



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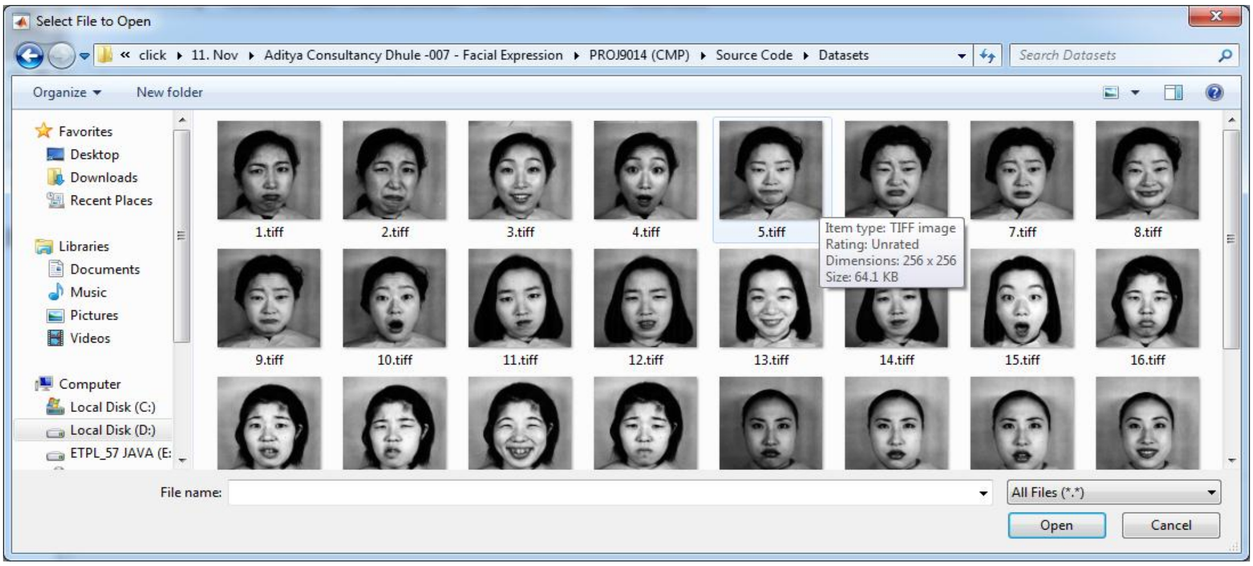

Figure 4.3

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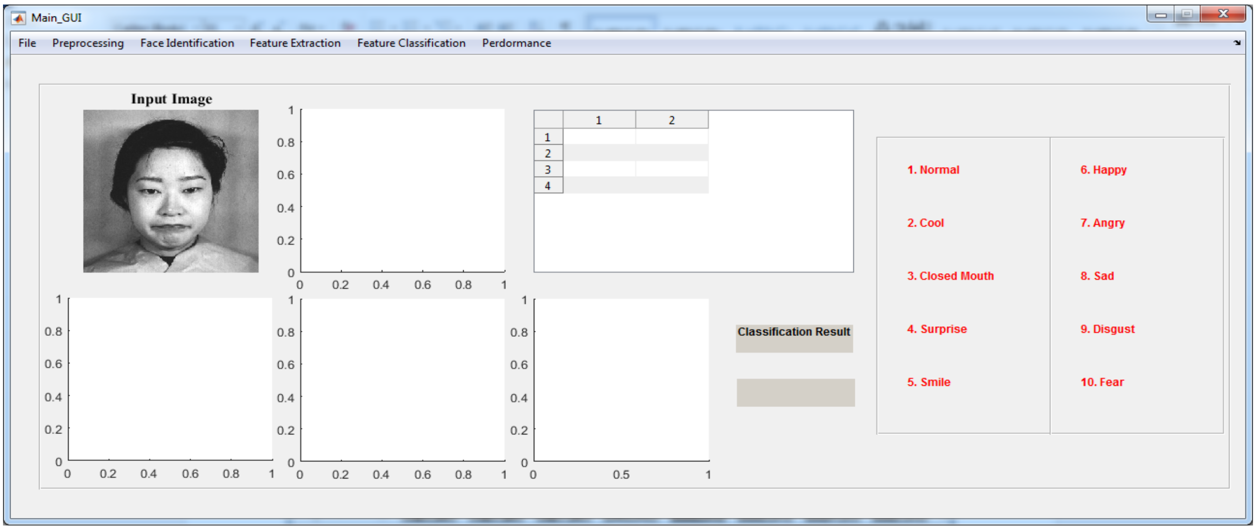

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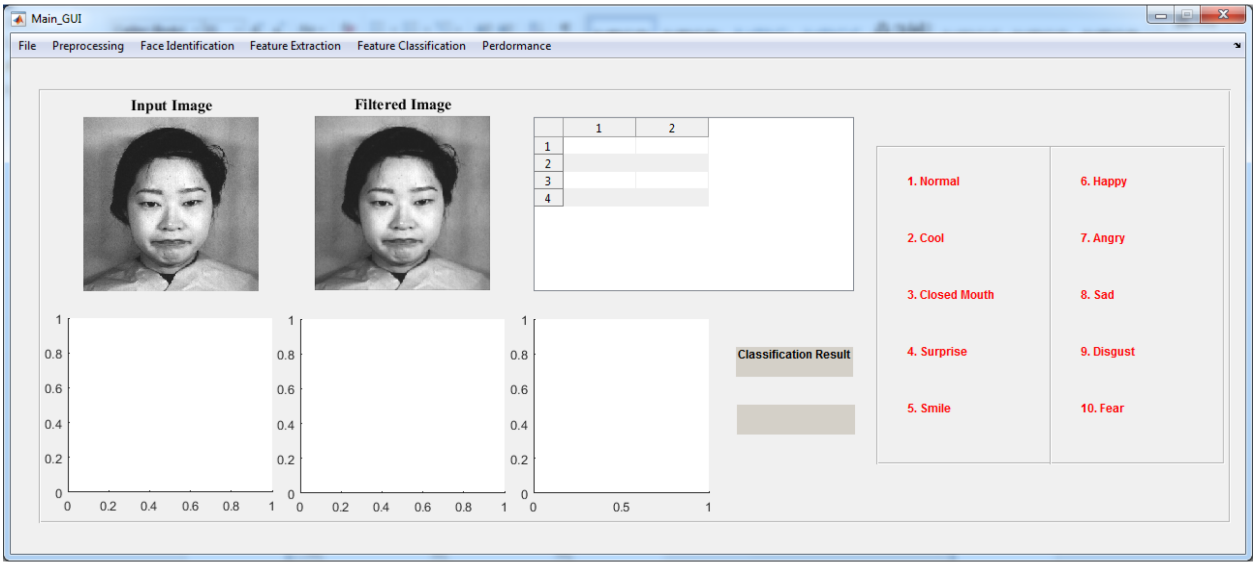

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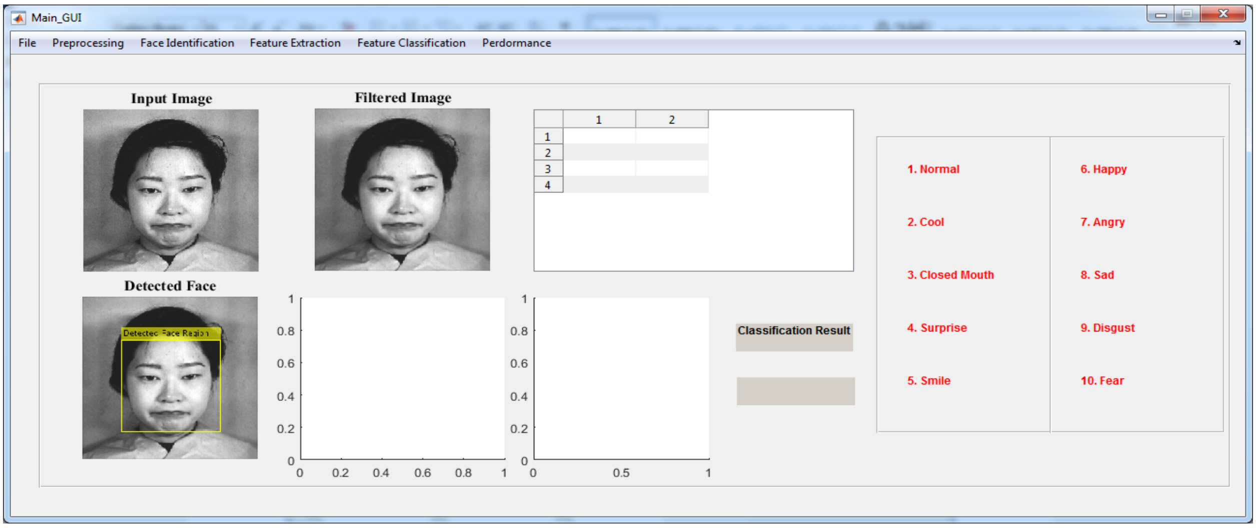

Figure 4.6

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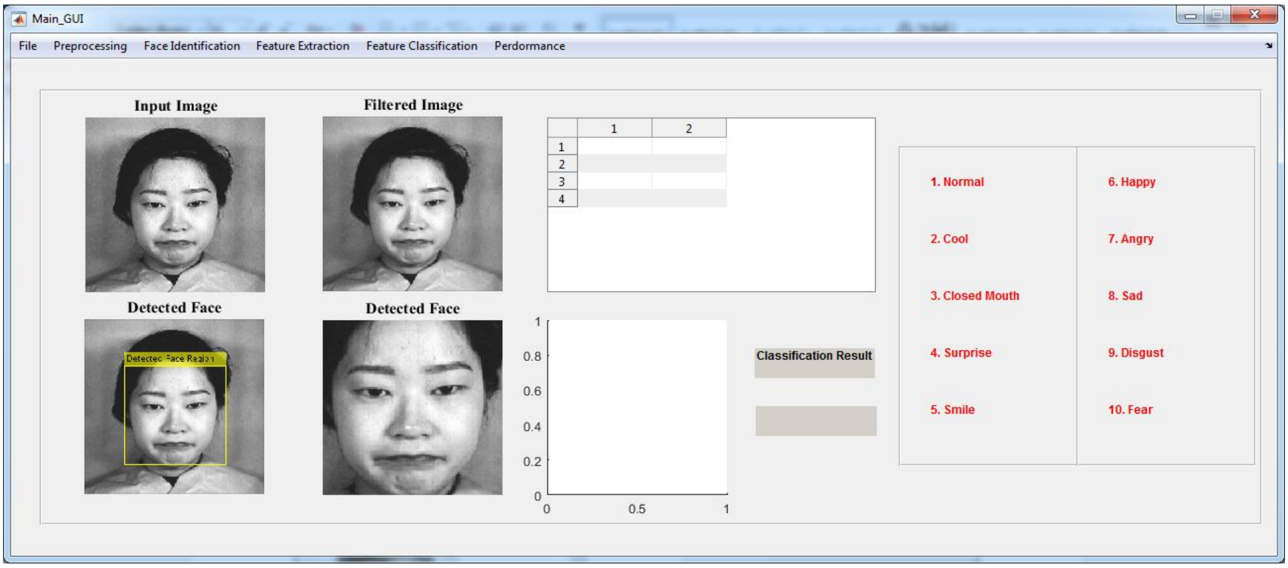

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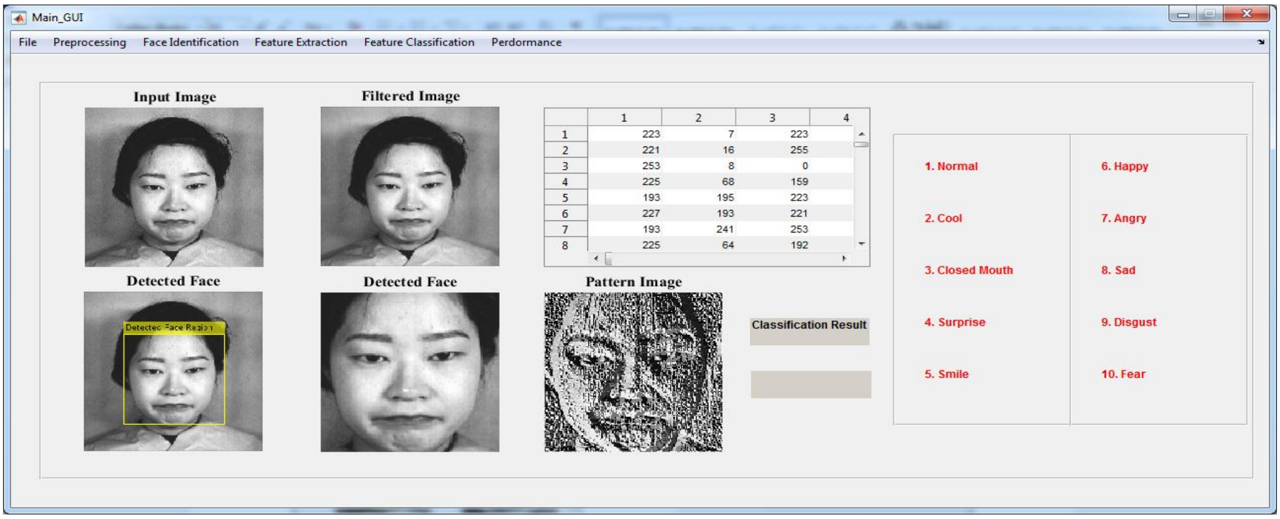

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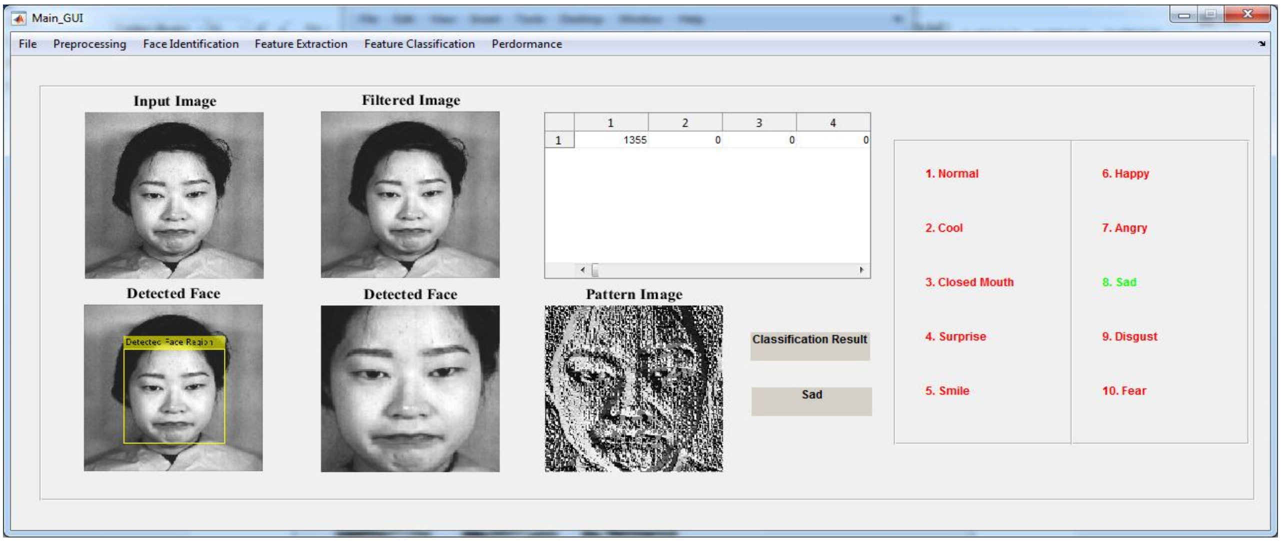

Figure 4.9

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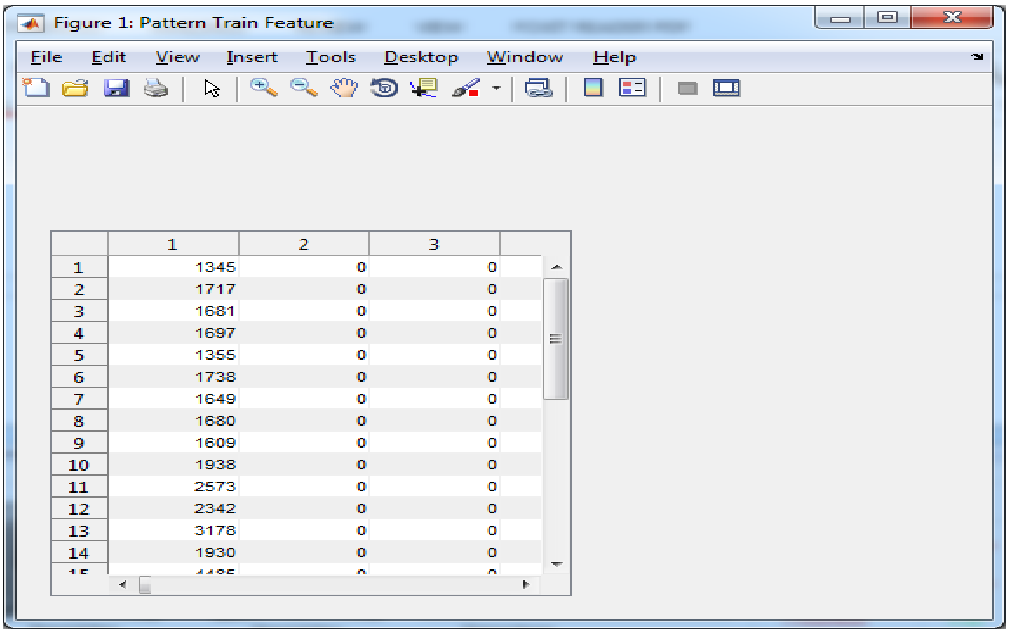

Figure 4.10

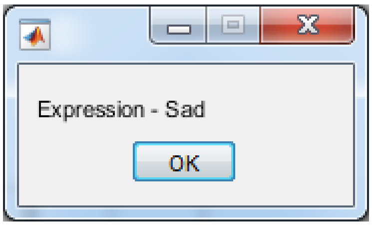

Figure 4.11

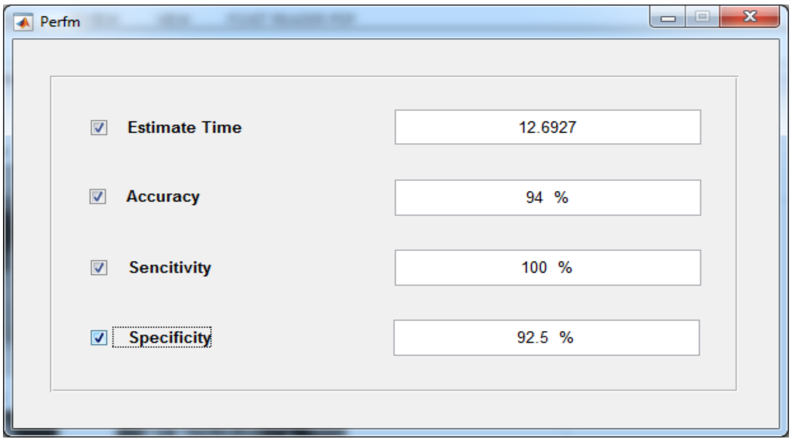

Figure 4.12

V. CONCLUSION

In this paper, we propose a model mainly improve the current work and find that the local facial features and expressions are correlated. We divide the facial area on the basis of the cognitive neurological theory to recognize and compare with the theory. It is conducive to the future expressions recognition with the existence of occlusion and other complex conditions. We use LBP codes to describe the images and take into account the distances between the points of the image distribution in binary space that can’t be measured directly in European distance. Finally, the basic emotion classification model and the circumplex emotion model based on dimension space theory are discussed and contrasted. And the recognition accuracy of the circumplex emotion model is higher, which will help us in the next step on the complex expression and micro-expression recognition progress.

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VI. FUTURE SCOPE

In this section we present the proposed approach for the task of texture classification. First, we introduce RLBP operator obtained by circularly shifting the weights of LBP operator. Further, the intrinsic structure of the patterns is utilized by incorporating the principle of uniform patterns to generate uniform RLBP (uRLBP). The dominant direction is defined as the index in the circular neighborhood for which the difference is maximum. As an image undergoes a rotation the dominant direction in a neighborhood also undergoes the rotation by the same angle.

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