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Recognition of Facial Emotions Structures Using Extreme Learning Machine Algorithm

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Abstract: *Recognition of natural emotions from human faces is an interesting topic with a wide range of potential applications like human-system interaction, automated systems, image and video retrieval, smart environments, and driver warning systems. Traditionally, facial emotion recognition systems have been initiated on laboratory controlled data, which is not representative of the environment faced in real-world applications. To robustly recognize facial emotions in real-world natural situations, this paper proposes an approach called Extreme Sparse Learning (ESL), which has the ability to combine and learn both dictionary (set of basis) and a non-linear classification model. The proposed approach combines the discriminative power of Extreme Learning Machine (ELM) with the reconstruction property of sparse representation to enable the accuracy of classification when presented with noisy signals and imperfect data recorded in natural settings. Additionally, this work presents a new local spatiotemporal descriptor that is distinctive and pose-invariant. The proposed framework is able to achieve the modern recognition accuracy on both acted and actual facial emotion databases.*

Keywords: **Extreme Sparse Learning, robustly, Extreme Learning Machine**

INTRODUCTION

Facial emotion recognition in uncontrolled environments is a very challenging task due to large intra-class variations caused by factors such as illumination and pose changes, occlusion, and head movement. The accuracy of a facial emotion recognition system generally depends on two major factors: (i) extraction of facial features which are robust under intra-class variations (e.g. pose changes), but are distinctive for various emotions.(ii) design of a classifier that is capable of distinguishing different facial emotions based on noisy and imperfect data (e.g., illumination changes and occlusion).

Face detection is an essential application of visual object detection and it is one of the main components of face analysis and understanding with face localization and face recognition. It becomes a more and more complete domain used in a large number of applications, amid which we find security, new communication boundary, biometrics and many others. The purpose of face detection is to detect human faces in still images or videos, in different situations. Many algorithms implement the face-detection task as a binary pattern classification task. That is, the contented of a given image is changed into trained classifier or extracts the facial feature, after which a trained the classifier faces decides whether that particular part of the region of the image is face or non face. Frequently, a window-sliding method is in work. That is, the ELM classifier is used to categorize usually square or rectangular the portions of an image, at all locations and scales, as moreover faces or non-faces.

2. EXISTING SYSTEM

Traditionally, facial emotion recognition systems have been evaluated on laboratory controlled data, which is not representative of the environment faced in real world applications. A comprehensive literature survey on facial emotion recognition can be found. However, most of the existing techniques are applicable only for laboratory-controlled data and are not able to deal with natural settings. Although facial emotion recognition has been extensively studied in the past, most of the existing feature extraction approaches require frontal facial images and even small changes in facial pose may reduce their effectiveness. Only a few researchers have attempted to solve the facial pose challenge. Since the dynamics of facial emotion is critical for a reliable facial emotion analysis, a variety of approaches focus on motion and OF based feature extraction. To the best of our knowledge, none of the existing methods can learn a non-linear classifier in the context of simultaneous sparse coding and classifier training.

2.1 DISADVANTAGES

The existing system does not represent the real time environment. This system is used in laboratory-controlled data and they are not able to deal with natural settings. It also has low accuracy for the given images.

3. PROPOSED SYSTEM

The proposed system combines the discriminative power of Extreme Learning Machine (ELM) with the reconstruction property of sparse representation to enable accurate classification when presented with noisy signals and imperfect data recorded in natural settings. The proposed system robustly represents the facial emotions using a novel spatiotemporal descriptor based on Optical Flow (OF), which is distinctive and pose-invariant. Robustness to pose variations is achieved by extracting features that depend only on relative movements of different facial regions. A pose-invariant OF-based spatiotemporal descriptor, which is able to robustly represent facial emotions even when there are head movements while expressing an emotion. The proposed descriptor is capable of characterizing both the intensity and dynamics of facial emotions. However, our proposed dynamic descriptor is different from existing OF based representations in three aspects: (i) we propose a new set of spatiotemporal features to capture the dynamic information hidden in a flow field, (ii) the extracted features are encoded effectively to achieve pose-invariance, and (iii) only the statistics of the extracted features is retained as discriminative information for further processing. We propose a dictionary-based classification method called Extreme Sparse Learning (ESL) to recognize facial emotions in real-world natural situations. The proposed approach combines the discriminative power of Extreme Learning Machine (ELM) with the reconstruction capability of sparse representation. The key motivation behind the use of sparse representation is its inherent ability to reconstruct the original signals from noisy and imperfect samples (in this context, imperfect data may refer to cases with large pose variations, occlusion, and illumination changes) based on a learned dictionary. The proposed framework is able to achieve state-of-the-art recognition accuracy on both acted and spontaneous facial emotion databases

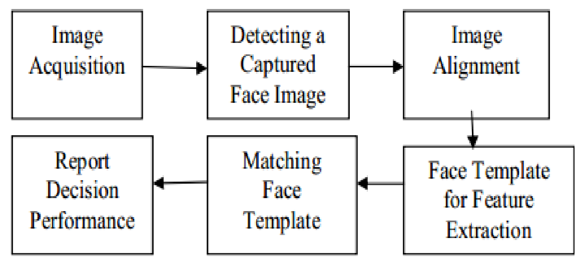

Figure.1 Architecture for proposed system

Facial recognition is an important field within biometrics and computer vision. With biometrics, we can more reliably identifying or verify a person. In this context, facial recognition can provide a user friendly way of recognizing a person by capturing the persons face using a camera attached to computer systems. Facial recognition is achieved by means of comparing the rigid features of face, which do not change over a period of time. Once the face image has been normalized, the features can be extracted and detection of the face and then recognize the face images by using proposed algorithm. In feature extraction, a mathematical representation called a biometric template or biometric reference is engender, which is accumulate in the database manage initial recognition step. Proposed algorithms of face recognition can be varied in different way to transfer a face image into simple mathematical equation and then perform the task in recognition. Then process of recognition and the maximum recognition features can be extracted and can template matched can be matched individually and can be processed ELM was initially proposed for pattern single hidden layer feed forward neural networks and has recently been extended to kernel learning as well: ELM provides a united learning platform with widespread type of feature mappings and can be applied in regression and multi-class classification applications directly. From the optimization technique point of view ELM has milder optimization constraints compared to SVM, LS-SVM and so on. In theory ELM can approximate any objective permanent function and classify any disjoint regions. In theory evaluate to ELM, SVM, LBP, LTP, LDA, KNN can be achieved different explanation and achieve the more computation difficulties.

The fundamental nature of ELM is that

(i). Hidden layer of ELM should not be iteratively tuned.

(ii). According to feed forward neural network theory both the training error and the norm of weights need to be minimized.

(iii). The hidden layer feature mapping need to satisfy the universal approximation condition.

3.1 ADVANTAGES

- To achieve high accuracy.
- To detect different facial regions.
- To reconstruct the original signals from noisy and imperfect samples.

4. CONCLUSION

In this paper, we proposed a novel classification scheme called ESL, which is motivated by the recent advancements in the field of sparse representation and supervised dictionary learning. ESL incorporates reconstruction properties of sparse representation and discriminative power of a nonlinear ELM for robust classification. In addition, we proposed a novel OF-based spatio-temporal descriptor for pose invariant facial emotion detection. We have performed extensive experiments on both acted and spontaneous emotion databases to evaluate the effectiveness of the proposed feature extraction and classification schemes under different scenarios. Our results clearly demonstrate the robustness of the proposed emotion recognition system, especially in challenging scenarios that involve illumination changes, occlusion, and pose variations. The limitations include the higher computational cost for both feature extraction and classification as well as the need to optimize many parameters. Furthermore, there is still a large room for improvement in the recognition accuracy when dealing with natural or spontaneous emotions. Possible ways to improve the proposed emotion recognition framework include:(i) combining the proposed spatio-temporal descriptor with static (appearance) based features to deal with failure in motion feature (e.g., optical flow) extraction, (ii) use of motion exaggeration techniques to improve the recognition accuracy for subtle facial emotions, and (iii) enhancing the OF correction model to remove the effect of facial muscle movement caused due to the person speaking.

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REFERENCES

[1] K. Huang and S. Aviyente, “Sparse Representation for Signal Classification,” in Adv. NIPS, 2006.

[2] J. Wright, A. Y. Yang, A. Ganesh, S. S. Sastry, and M. Yi, “Robust Face Recognition via Sparse Representation,” IEEE Trans. PAMI,vol. 31, no. 2, pp. 210–227, 2009.

[3] D. H. Kim, S. U. Jung, and M. J. Chung, “Extension of Cascaded Simple Feature based Face Detection to Facial Expression Recognition,” Pattern Recog. Letters, vol. 29, no. 11, pp. 1621–1631, 2008.

[4] W. Gu, C. Xiang, Y. V. Venkatesh, D. Huang, and H. Lin, “Facial Expression Recognition using Radial Encoding of Local Gabor Features and Cassifier Synthesis,” Pattern Recog., vol.45,no.1,pp.80–91,2012.

[5] T. Wehrle, S. Kaiser, S. Schmidt, and K. R. Scherer, "Studying the Dynamics of Emotional Expression Using Synthesized Facial Muscle Movements," J. Pers. Soc. Psychol., vol. 78, no. 1, pp. 105–119, 2000.

[6] P. S. Aleksic and A. K. Katsaggelos, "Automatic Facial Expression Recognition using Facial Animation Parameters and Multistream HMMs," IEEE Trans. Inf. Forensics Security, vol. 1, no. 1, pp. 3–11, 2006.

[7] Y. Zhang and Q. Ji, "Active and Dynamic Information Fusion for Facial Expression Understanding from Image Sequences," IEEE Trans. PAMI, vol. 27, no. 5, pp. 699–714, 2005.

[8] I. Kotsia and I. Pitas, "Facial Expression Recognition in Image Sequences Using Geometric Deformation Features and Support Vector Machines," IEEE Trans. IP, vol. 16, no. 1, pp. 172–187, 2007.

[9] G. Zhao and M. Pietikainen, "Dynamic Texture Recognition Using Local Binary Patterns with an Application to Facial Expressions," IEEE Trans. PAMI, vol. 29, no. 6, pp. 915–928, 2007.

[10] T. Wu, S. Fu, and G. Yang, "Survey of the Facial Expression Recognition Research," Advances in Brain Inspired Cognitive Systems, vol. 7366, pp. 392–402, 2012.