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Face expression recognition in constrained and unconstrained environments

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The facial expression recognition (FER) systems have been used to recognize the mood of the persons. Because to determine the mood of a given person may be important in several practical applications; several efficient algorithms have been proposed to this end. Most of them achieve high recognition rates under controlled conditions, of lighting and position of the person with respect to the camera. Most FER system uses the Viola-Jones algorithm for face detection in both, images and video frames. However, because for FER systems the eyes and mouth regions provide the most relevant information, some segmentation schemes must be used to estimate the ROI used for feature extraction. Besides ROI estimation, the face orientation related to the camera is another important issue, because if the person is not looking straightforward to the camera, partial occlusion of the face may occur; or the presence of shadows due to poor illumination conditions. To reduce the problems described above, we propose an algorithm that is able to detect the face orientation in the frame under analysis, such that only if the face is perpendicular to the camera, the ROI is estimated. After the ROI estimation each region is segmented into a set of N×M blocks to get the feature vector using the modal value. The resulting features matrix is then applied to a PCA and LDA for dimensionality reduction. The proposed algorithm was trained using the KDEF data base which consists of 490 images which are divided into 7 facial expressions (Afraid, Angry, Disgusted, Happy, Sad, Surprise and Neutral) of 70 people. Finally, the proposed system is tested using the HOHA database which consists of 150 videos of 32 movies. The evaluation results show that the proposed system provides recognition rates of about 90%.
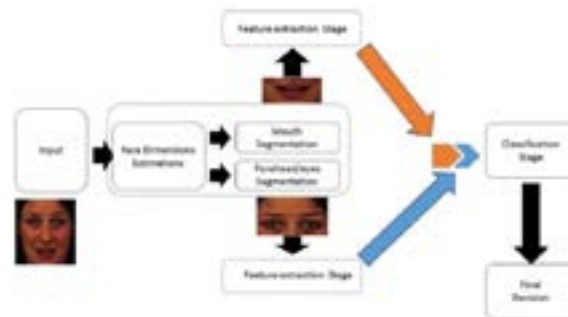

Figure: Facial expressions recognition (FER) Future extension stages.

Recent Publications:

1. Hernandez Matamoros A, Bonarini A, Escamilla Hernandez E, Nakano M and Perez Meana H (2016) Facial expression recognition with automatic segmentation of face regions using a fuzzy based classification approach. Knowledge Based Systems 110(15):1-14.

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Biography

Hector Perez Meana received his PhD degree in Electrical Engineering from the Tokyo Institute of Technology, Tokyo, Japan, in 1989. He is the Dean of the Graduate Studies and Research Section of the Mechanical and Electrical Engineering School, Culhuacan Campus, of the National Polytechnic Institute of Mexico. In 1991 he received the IEICE excellent Paper Award, and in 2000 the IPN Research Award and the IPN Research Diploma. In 1998 he was Chair of the ISITA'98, and in 2009 the General Chair of The IEEE Midwest Symposium on Circuit and Systems (MWSCAS). He has published more than 150 papers in indexed journals and two books. He also has directed 20 PhD theses. He is a senior member of the IEEE, member of the IEICE, The Mexican Researcher System and The Mexican Academy of Science. His principal research interests are adaptive systems, image processing, pattern recognition, watermarking and related fields.

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