

## A Novel Method for Face Detection

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**Abstract :** Facial expression recognition is one of the open problems in computer vision. Robust neutral face recognition in real time is a major challenge for various supervised learning based facial expression recognition methods. This is due to the fact that supervised methods cannot accommodate all appearance variability across the faces with respect to race, pose, lighting, facial biases, etc. in the limited amount of training data. Moreover, processing each and every frame to classify emotions is not required, as the user stays neutral for the majority of the time in usual applications like video chat or photo album/web browsing. Detecting neutral state at an early stage, thereby bypassing those frames from emotion classification would save the computational power. In this work, we propose a light-weight neutral vs. emotion classification engine, which acts as a preprocessor to the traditional supervised emotion classification approaches. It dynamically learns neutral appearance at Key Emotion (KE) points using a textural statistical model, constructed by a set of reference neutral frames for each user. The proposed method is made robust to various types of user head motions by accounting for affine distortions based on a textural statistical model. Robustness to dynamic shift of KE points is achieved by evaluating the similarities on a subset of neighborhood patches around each KE point using the prior information regarding the directionality of specific facial action units acting on the respective KE point. The proposed method, as a result, improves ER accuracy and simultaneously reduces the computational complexity of ER system, as validated on multiple databases.

**Keywords :** neutral vs. emotion classification, Constrained Local Model, procrustes analysis, Local Binary Pattern Histogram, statistical model

**Conference Title :** ICCEA 2015 : International Conference on Computer Engineering and Applications

**Conference Location :** Singapore, Singapore

**Conference Dates :** September 10-11, 2015