

## A Geometric Based Hybrid Approach for Facial Feature Localization

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**Abstract :** Biometric face recognition technology (FRT) has gained a lot of attention due to its extensive variety of applications in both security and non-security perspectives. It has come into view to provide a secure solution in identification and verification of person identity. Although other biometric based methods like fingerprint scans, iris scans are available, FRT is verified as an efficient technology for its user-friendliness and contact freeness. Accurate facial feature localization plays an important role for many facial analysis applications including biometrics and emotion recognition. But, there are certain factors, which make facial feature localization a challenging task. On human face, expressions can be seen from the subtle movements of facial muscles and influenced by internal emotional states. These non-rigid facial movements cause noticeable alterations in locations of facial landmarks, their usual shapes, which sometimes create occlusions in facial feature areas making face recognition as a difficult problem. The paper proposes a new hybrid based technique for automatic landmark detection in both neutral and expressive frontal and near frontal face images. The method uses the concept of thresholding, sequential searching and other image processing techniques for locating the landmark points on the face. Also, a Graphical User Interface (GUI) based software is designed that could automatically detect 16 landmark points around eyes, nose and mouth that are mostly affected by the changes in facial muscles. The proposed system has been tested on widely used JAFFE and Cohn Kanade database. Also, the system is tested on DeitY-TU face database which is created in the Biometrics Laboratory of Tripura University under the research project funded by Department of Electronics & Information Technology, Govt. of India. The performance of the proposed method has been done in terms of error measure and accuracy. The method has detection rate of 98.82% on JAFFE database, 91.27% on Cohn Kanade database and 93.05% on DeitY-TU database. Also, we have done comparative study of our proposed method with other techniques developed by other researchers. This paper will put into focus emotion-oriented systems through AU detection in future based on the located features.

**Keywords :** biometrics, face recognition, facial landmarks, image processing

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