1. Emotion detection based on upper facial region using landmarks. Dataset used for training- FER2013. Link- [Sensors | Free Full-Text | Development of Real-Time Landmark-Based Emotion Recognition CNN for Masked Faces (mdpi.com)](https://www.mdpi.com/1424-8220/22/22/8704)
2. One of difficulties in FER is the effective capture of geometrical and temporary information from landmarks. This paper proposes a graph convolution neural network that utilizes landmark features for FER, which is called in the paper as a directed graph neural network (DGNN).

Link-[Electronics | Free Full-Text | Facial Landmark-Based Emotion Recognition via Directed Graph Neural Network (mdpi.com)](https://www.mdpi.com/2079-9292/9/5/764)

1. In this framework, in the training process, they first extract facial landmarks, and feed them into a shallow network for recognition/classification. They show that just by using 68 facial landmark points, it's possible to achieve state-of-the-art FER results, thus opening the possibility to further study human emotion cognition process. On the other hand, this framework also produce better results than typical deep CNN-based methods with fast implementation as claimed in the paper

Link-[Facial Expression Recognition based on Landmarks | IEEE Conference Publication | IEEE Xplore](https://ieeexplore.ieee.org/document/8997580)

1. The proposed model computes distance-based features utilizing the inter-spaces between facial landmarks generated by a face mesh algorithm from pre-processed images. These features are normalized and ranked to find the optimal features for classifying emotions. The experimental results exhibit that the proposed model can effectively classify different emotions in the IIITM Face dataset with an overall accuracy of 61% using the SVM classifier (vertically oriented with different facial attributes). The model also classifies emotions posed in front, up, and down orientations with 70%, 58%, and 55% accuracy, respectively. The efficacy test of the model on laterally oriented faces from the KDEF database results in an overall accuracy of 80%.

Link-[Facial Landmark-Based Human Emotion Recognition Technique for Oriented Viewpoints in the Presence of Facial Attributes | SN Computer Science (acm.org)](https://dl.acm.org/doi/abs/10.1007/s42979-023-01727-y)

1. In this work, they postulate a fundamentally different approach to solve emotion recognition task that relies on incorporating facial landmarks as a part of the classification loss function. To that end, they extend a recently proposed Deep Alignment Network (DAN), that achieves state-of-the-art results in the recent facial landmark recognition challenge, with a term related to facial features.

Link- [Tautkute\_I\_Know\_How\_CVPR\_2018\_paper.pdf (thecvf.com)](https://openaccess.thecvf.com/content_cvpr_2018_workshops/papers/w36/Tautkute_I_Know_How_CVPR_2018_paper.pdf)

1. This paper aims at exploring a contour-based shape analysis from the viewpoint of geometric characteristics towards facial expression recognition. Since the facial landmark detection accuracy dramatically affects the final classification, a simple contour detection algorithm is used for identifying facial landmarks accurately. Spatial local and relative geometric features extracted with the neutral face as the reference are projected to the lower-dimensional space using stepwise linear discriminant analysis. The proposed system is tested and validated using backpropagation-based artificial neural network on JAFFE and MMI dataset with an average accuracy of 95.53% and 94.98%, respectively.

Link- <https://www.inderscience.com/info/inarticle.php?artid=121799>

1. This paper introduces a hybrid convolutional neural network aided by a local binary pattern to extract features in an accurate way, especially for masked faces. The basic seven emotions classified into anger, happiness, sadness, surprise, contempt, disgust, and fear are to be recognized. The proposed method is applied on two datasets: the first represents CK and CK +, while the second represents M-LFW-FER. Obtained results show that emotion recognition with a face mask achieved an accuracy of 70.76% on three emotions. Results are compared to existing techniques and show significant improvement.

Link- [An automatic improved facial expression recognition for masked faces | Neural Computing and Applications (springer.com)](https://link.springer.com/article/10.1007/s00521-023-08498-w)