such as illumination variation, head pose, and subject-dependence

例如照度變化，頭部姿勢和主體依賴性

Sensor focuses on face emotion in static images and video sequences

The first group is detailed-face sensors, which detect a small dynamic change of a face component, such as eye-trackers

The second is non-visual sensors, such as audio, depth, and EEG sensors, which provide extra information in addition to visual dimension and improve the recognition reliability for example in illumination variation and position shift situation.

The last is target-focused sensors, such as infrared thermal sensors, which can facilitate the FER systems to filter useless visual contents and may help resist illumination variation.

fear, disgust, anger, surprise, happiness, and sadness, contempt, envy, pain and drowsiness

Some FER

systems are grouped into two types: spontaneous and pose-based. 自然與模仿

micro-expression and macro-expression detectors. 微表情

An ordinary camera-based FER system consists of three main stages: pre-processing, feature

extraction, and detection

geometric-based and appearance-based.

The former refers to the FER systems, which extract local facial features including shape, positions, and angles between various facial elements, i.e., ear, eye, mouth and nose, and the feature vector is illustrated based on the geometrical relationship.

Many classification

methods have been employed in the FER systems, such as support vector machine (SVM) [37], random forest [38], AdaBoost [39,40], decision tree [41], naïve Bayes [42], multilayer neural networks and K-nearest neighbours [43], hidden Markov model (HMM) [44] and deep neural networks [45].

subject-depended head-pose  
SVM🡺HOG Regression-forest🡺Multiple-label dataset augmentation, non-informative patch