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Facial expression recognition in the wild

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Abstract

Recently, the study of facial expression has grown up but it remains limited to narrow small vocabularies of emotion into videos.In this study, we tackle the challenge of recognizing emotions from the video which includes activities "in-the-wild". We propose a solution that takes a short video clip along with brief sentences, that describe the main activity in the video.It is possible to set the relation ship between the actions and emotions since we have a paired videos and sentences.To recognize the facial expression we modify our previous work to automatically detect and segment the region of interest (ROI) of forehead/eyes and mouth.We then combine a classifier based on clustering.Our proposed classifier is able to train online if a new class (emotion) is added.For future work, we plan to evaluate our method on a Hollywood database and show that it is able to improve the acuuracy rate of the expressions and actions.

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Introduction

Despite a recent push towards emotion recognition, it remains limited to narrow small vocabularies of emotion into video. In this study, we tackle the challenge of recognizing the emotions from the video which includes activities "in-the-wild". The proposed method improves the accuracy rates of each expression.

Objectives

-Recognition of frontal face in the video.
-Recognition of face parts(forehead/eyes and mouth).
-Determine the accuracy rate for each expression.

Surprise   Disgusted   Angry
Afraid   Happy   Neutral   Sad
Figure 1.ROI's face..
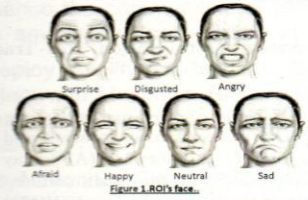
Methods and Materials

-Viola-Jones Algorithm for face detection
-Principal Component Analysis (PCA) to compress the length of vectors.
-Classifier based on clustering.

Preliminary Results

Here, we used a database (1) to learn the model because it contains the frontal face. To characterize the face, we take the proposal of (2) and ussing the classifier based on clustering. It is possible to improve the accuracy rates of each expression.

Expected Results

-Selecting frontal face from the image automatically.
-Set the relationship between the actions and the facial expressions in a video.

Conclusion and Discussion

-We have proposed an algorithm for recognizing facial expressions, performing an automatic extraction of facial regions of interest in a video.
-The proposed algorithm is able to provide 2 regions of interest; the first one is forehead /eyes and the second one is mouth.
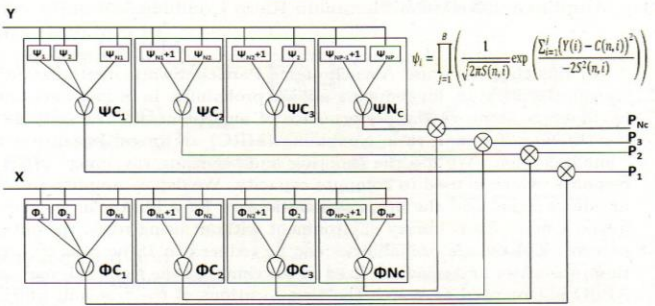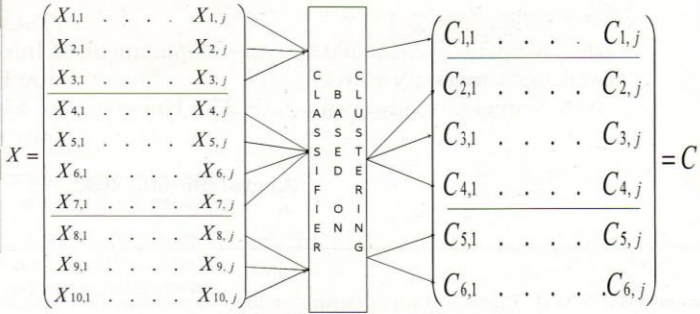
$$X = \begin{pmatrix} X_{1,1} & \cdots & X_{1,j} \\ X_{2,1} & \cdots & X_{2,j} \\ X_{3,1} & \cdots & X_{3,j} \\ X_{4,1} & \cdots & X_{4,j} \\ X_{5,1} & \cdots & X_{5,j} \\ X_{6,1} & \cdots & X_{6,j} \\ X_{7,1} & \cdots & X_{7,j} \\ X_{8,1} & \cdots & X_{8,j} \\ X_{9,1} & \cdots & X_{9,j} \\ X_{10,1} & \cdots & X_{10,j} \end{pmatrix}$$

CLASSIFIER BASED ON CLUSTERING

$$\begin{pmatrix} C_{1,1} & \cdots & C_{1,j} \\ C_{2,1} & \cdots & C_{2,j} \\ C_{3,1} & \cdots & C_{3,j} \\ C_{4,1} & \cdots & C_{4,j} \\ C_{5,1} & \cdots & C_{5,j} \\ C_{6,1} & \cdots & C_{6,j} \end{pmatrix} = C$$

$$\psi_i = \prod_{j=1}^{8} \left(\frac{1}{\sqrt{2\pi S(n,i)}} \exp\left(\frac{\sum_{i=1}^{i}(Y(i) - C(n,i))^2}{-2S^2(n,i)} \right) \right)$$

Table 1. Preliminary Results , accuracy rates for each expression.

Expression			Joint probability			Joint probability			Joint probability
Afraid	_28.96%_	_100%_	_100%_	7.35%	0.0%	0.0%	15.68%	0%	0%
Angry	- 14.64%	0.0%	0.0%	3.61%	0.0%	0.0%	9.78%	0.0%	0.0%
Disgusted	21.42%	0.0%	0.0%	1.71%	0.0%	0.0%	18.29%	0.0%	0.0%
Happy	8.37%	0.0%	0.0%	0.79%	0.0%	0.0%	_45.39%_	_100.0%_	_100.0%_
Neutral	4.86%	0.0%	0.0%	4.2%	0.0%	0.0%	2.62%	0.0%	0.0%
Surprise	1.18%	0.0%	0.0%	_81.78%_	_99.9%_	_100%_	3.01%	0.0%	0.0%
Sad	20.57%	0.0%	0.0%	0.57%	0.01%	0.0%	5.23%	0.0%	0.0%

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