Expression Recognition using Curriculum Learning Method

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I. INTRODUCTION

During the last few years, the interest in facial expression recognition has been increasing.

In order to solve the challenges of overfitting and influence of expression-unrelated situation in deep expresson recognition, we apply curriculum learning strategy when training.

II. METHOD AND EXPERIMRNT

A. CNNs

In our experiment, we use two CNNs including *Pre-trained CNN* and *Result CNN*. The *Pre-trained CNN* is used to design curriculum and the *Result CNN* is what we get in the end.

B. Curriculum Design

The *pre-trained CNN* is trained on laboratory-controlled dataset, Extended CohnKanade (CK+) dataset, allowing it to learn the feature in the ideal conditions. Then, we use *pre-trained CNN* do expression classification task on in-the-wild dataset, Static Facial Expressions in the Wild 2.0 (SFEW 2.0), to divide the SFEW 2.0 into three small subsets according to the classification result.

C. Pre-processing

For in-the-wild dataset SFEW 2.0, the samples contain a lot of noise, thus it is necessary to process it at first. The input and results of the procedures can be seen in Fig.1.

Figure 1: Example of face detection and face alignment, followed by resizing and normalizing on SFEW 2.0

D. Optimization

The training starts with easiest subset. If the result on validation data doesn't improve in m epochs, we will start learning the next course. At this time, the next difficulty subset will merge into current subset. Importantly, in order to low down the impact of difficulty subset, we need to low down the learning rate.

III. RESULT AND DISCUSSION

The result shows the accuracy can arrive at 56.15%, which surpass the baseline of competition on SFEW 2.0 of 35.96%. By the way, without curriculum learning method, the accuracy is only 27.38%

Fig.2 shows the confusion matrices of *Result CNN* on seven different emotions. The figure illustrates there is still some room for its improvement on disgust and fear expression.

	Angry	Disgust	Fear	Happy	Neutral	Sad	Surprise
Angry	**56.82%**	0.00%	0.00%	5.89%	8.75%	4.29%	24.25%
Disgust	23.05%	**4.35%**	4.13%	34.25%	11.83%	3.28%	19.11%
Fear	28.15%	0.00%	**2.17%**	7.68%	23.25%	14.37%	24.38%
Happy	11.26%	0.00%	12.49%	**62.58%**	7.24%	0.00%	6.43%
Neutral	6.32%	0.00%	6.28%	8.29%	**46.26%**	9.22%	23.61%
Sad	23.28%	0.00%	1.27%	9.25%	13.99%	**37.25%**	14.96%
Surprise	6.24%	5.24%	12.38%	14.27%	14.58	0.00%	**47.29%**

Figure 2: Confusion matrices of *Result CNN* on SGEW 2.0

IV. CONCLUSION

In this paper, we have adapted curriculum learning training strategy in deep expression recognition field. Our proposed method achieves great result on SFEW 2.0 dataset, indicating the great potential of curriculum training strategy.

V. REFERENCE

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