Face Emotion Recognition

Peng Tu

Arriaga O, Valdenegro-Toro M, Plöger P. **Real-time Convolutional Neural Networks for Emotion and Gender Classification[J].** 2017.

1. Preparatory Work

Runtime Environments: python3.6.1 + tesorflow1.8.0

Paper: http://arxiv.org/abs/1408.3750v1

Code: https://github.com/oarriaga/face_classification.git

Datasets:

Name -- emotion

Describe -- The dataset consists 3,191 examples. It included 2,555 examples of training set and 636 examples Of testing set.

Facial Expression Kinds -- 0=anger, 1=contempt, 2=disgust, 3=fear, 4=happiness, 5=neutral, 6=sadness, 7=surprise

Data Distributions (training set) -- anger : 232, contempt : 13, disgust : 20, fear : 48, happiness : 690, neutral : 944, sadness : 279, surprise : 329

Data Distributions (testing set) -- anger : 57, contempt : 3, disgust : 5, fear : 12, happiness : 172, neutral : 236, sadness : 69, surprise : 82

2. Lab Proc

. Network Structure

The paper proposes a classification model, it designed with the idea of creating the best accuracy while require fewer parameters.

We knew it' s significant for the classification network to design fully connected layers in the last of it, that would generates numerous redundant parameters. The model used Global Average Pooling to completely remove any fully connected layers. This was achieved by having in the last convolutional layer the same number of feature maps as number of classes, and applying a softmax activation function to each reduced feature map.

Moreover, this model combines the use of residual models and depth-wise separable convolution. Residual modules modify the desired mapping between two subsequent layers, so that the learned features become the difference of the original feature map and the desired features. Consequently, the desired features H(x) are modified

in order to solve an easier learning problem F(x) such that: H(x) = F(x) + x.

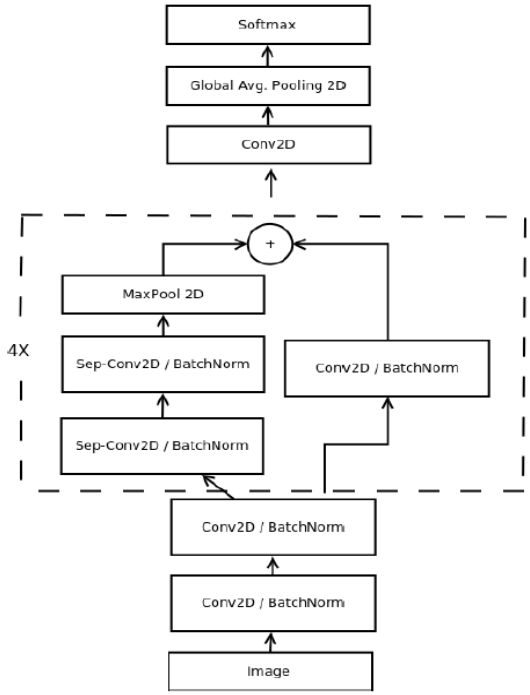


Fig. 1 The paper proposed network architecture

. Preprocessing

Data Augmentation and Normalization:

normalization, width shift, height shift, zoom, horizontal flip.

. Instructions

Run emotion demo--

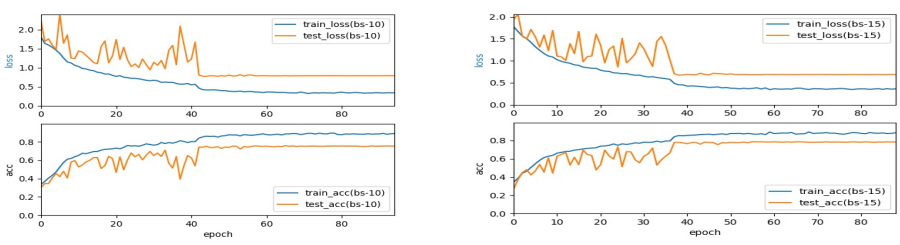
cd root/face_classifications/src && python3 image_emotion_gender_demo ../images/test_image.jpg

To train new models for emotion classification--

The emotion datasets are face_classifications/datasets directory inside this repository.

cd root/face_classifications/src && python3 train_emotion_classifier.py

. The curve of loss and accuracy



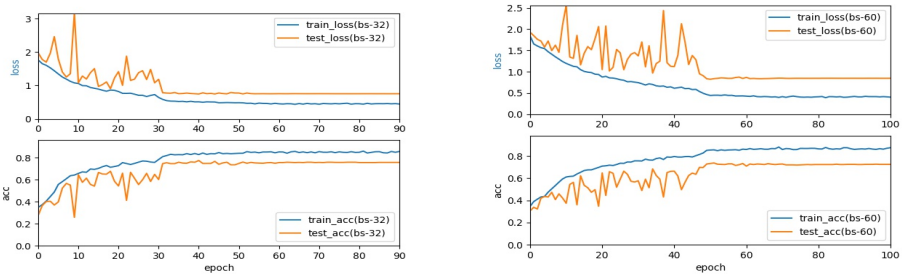


Fig. 2 The curve under different bs(batch size)

. Testing

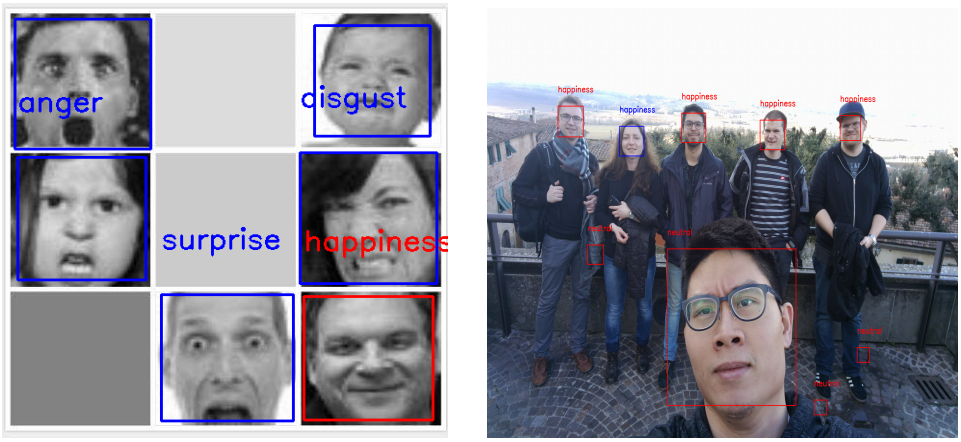


Fig. 3 Result(left side picture from fer2013, and right from this paper)