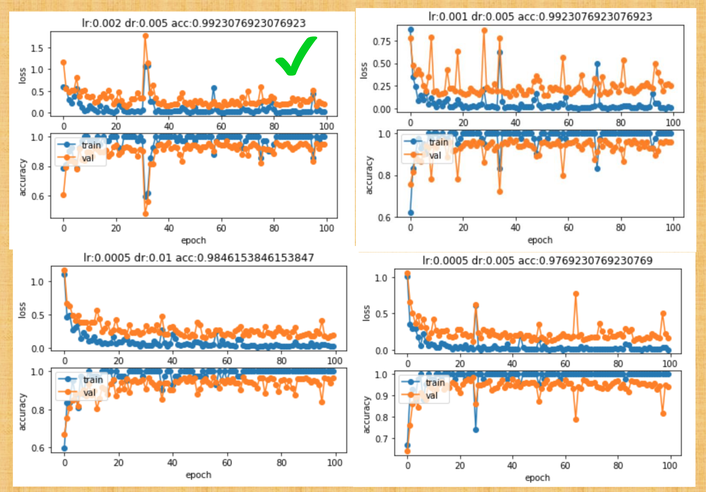
Facial Expression Prediction

INTRODUCTION

Facial expressions can be a key to understanding the human emotions. Based on this idea, our aim is to train a neural network which shall be able to predict the emotions by learning from a dataset of images of human facial expressions.



DATASET

The Extended Cohn-Kanade Dataset (CK+)

PROCESS

❖ *DATA PRE_PROCESSING*

- Filter labelled images from CK+ dataset
- Picked last 3 pick expression frames and one neutral frame.
- Aligned selected images using dlib framework.
- Split aligned dataset into training, testing and validation set with the ratio of **8:1:1**.
- Augmented training dataset by flipping images horizontally.
- Testing and validation dataset left untouched as aligned original dataset.

❖*TRAINING*

➢ PHASE 1

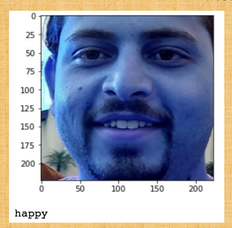
- Used pytorch implemented openface/facenet pre-trained network to start with the first phase.
- Used L2 loss to train Convolutional Neural Network to imitate facenet.
- **2092** training samples with **131** validation samples has been used.
- Adam with **learning rate 0.001** and **batch size of 50** has been used with **100 epochs**.

➢ PHASE 2

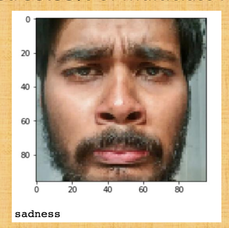
- Added two Fully Connected Network after the network learned in phase 1.
- Loaded pre trained model from phase1.
- Tuned hyper-parameters like learning rate and weight decay for phase2.
- Adam with **learning rate 0.002**, **batch size of 50** and **weight decay 0.005** has been used.
- Stopped at validation accuracy of **96.95%**.
- Tested the model on untouched training set, and the result was **99.23%.**
- Saved the model.

❖*PREDICTION*

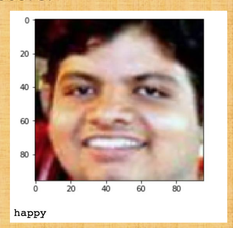
- Prediction on Test set gives a whooping **99.23%** accuracy.
- We also tested on real time images and with some old images and it predicts correct most of the time.
- Achieved **99.55%** of multiclass roc score.



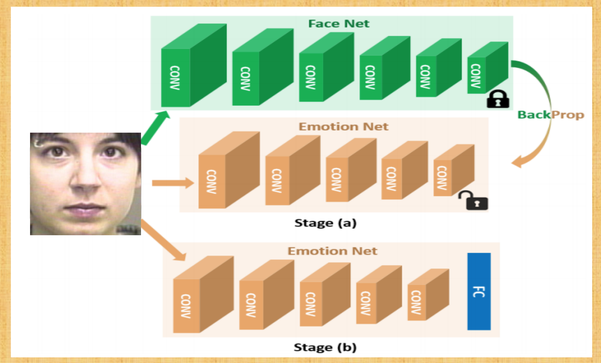
SHAYAN

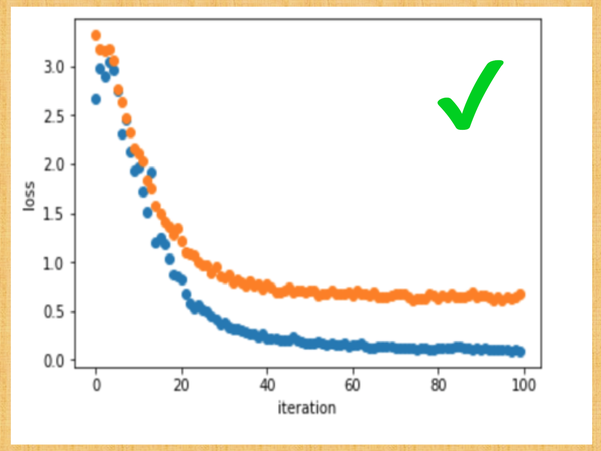


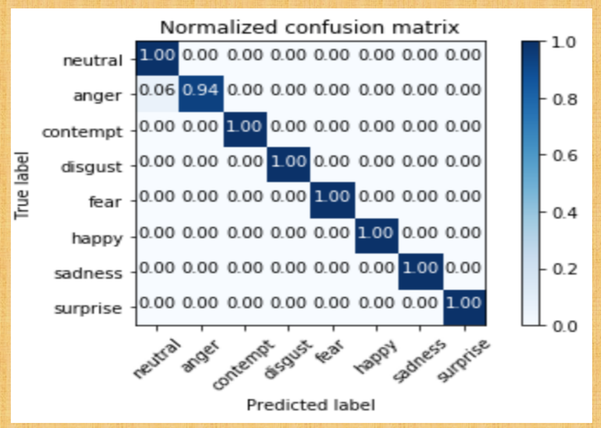
ABHIJEET



JYOTIRMAY







❑ CITATION

- FaceNet2ExpNet: Regularizing a Deep Face Recognition Net for Expression Recognition Hui Ding1 , Shaohua Kevin Zhou2 and Rama Chellappa1 1 University of Maryland, College Park 2 Siemens Healthcare Technology Center, Princeton, New Jersey
- http://dlib.net/
- https://github.com/thnkim/OpenFacePytorch
- P. Lucey, J. F. Cohn, T. Kanade, J. Saragih, Z. Ambadar and I. Matthews, "The Extended Cohn-Kanade Dataset (CK+): A complete dataset for action unit and emotion-specified expression," *2010 IEEE Computer Society Conference on Computer Vision and Pattern Recognition - Workshops*, San Francisco, CA, 2010, pp. 94-101.
doi: 10.1109/CVPRW.2010.5543262. URL: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5543262&isnumber=5543135