

VNUHCM - University of Science
Faculty of Information Technology
Advanced Program in Computer Science

CS412 - Project Plan

Face expression recognition (1)

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1 Introduction

We choose to do Face expression recognition. Our implement will based on paper Robust Facial Expression Classification Using Shape and Appearance Features of SL Happy and Aurobinda Routray [1]. We adopt the preprocessing process, the feature extraction. But we do not intend to work on extract active patches. For the model, we plan to implement 2 model, a Support Vector Machine (as in [1]) and a simple Neural network.

2 Project Details

The purpose of this project is implement the system to recognize facial expression, including, but not limited to anger, disgust, fear, happiness, sadness and surprise.

Input: A face of someone.

Output: The facial expression.

We plan to do the project in 2 state. At first, we follow the tutorial, use pre-implement function (such as `cv2.goodFeaturesToTrack()`) and simple model to get the code run and solve the problem. Then, we implement LBP, PHOG, SVM as in [1] as well as improve the neural network.

2.1 Theory

Face expression recognition is a machine learning classification problems.

2.2 Methodology

2.2.1 Preprocessing

- Noise filter using Gaussian kernel
- Face detection using Haar Cascades (have been implemented in Opencv2) [2]
- Extract the face then resize to 96x96

2.2.2 Feature selection

This step we select feature to represent image. For basic level, we try to implement the basic feature selection base on Open CV tutorial, such as Harris Corner Detection, Shi-Tomasi Corner Detector, Good Features to Track. Then, we try to implement Local binary patterns (LBP) and pyramid of histogram of gradients (PHOG).

2.2.3 The model

The model is a classifier model, which take feature vector as a input and output the class it belong to. There are 6 classes anger, disgust, fear, happiness, sadness and surprise.

For basic level, we implement a neural net, multi-layer perceptrons as the tutorial [3].

Then, we implement the One-Against-One Support Vector Machine. We need total 15 OAO SVM for 6 classes.

2.3 Data, Scenarios, and Models

Dataset: Cohn-Kanade (CK and CK+) database [4]

2.4 Time plan for project

week 1: Get used to OpenCV
week 2: Do the preprocessing
week 3: Feature selection (simple one)
week 4: Implement the very simple classifier.
Week 5: Try to put thing together and make it run.
Week 6: Improve feature selection (using idea in [1])
Week 7: Implement SVM as in [1]

References

- [1] S. L. Happy and A. Routray, “Robust facial expression classification using shape and appearance features,” in *Advances in Pattern Recognition (ICAPR), 2015 Eighth International Conference on*, pp. 1–5, Jan 2015.
- [2] “Face detection using haar cascades.” http://docs.opencv.org/trunk/d7/d8b/tutorial_py_face_detection.html. Accessed: 2016-10-30.
- [3] “Neural networks.” http://docs.opencv.org/2.4/modules/ml/doc/neural_networks.html. Accessed: 2016-10-30.
- [4] 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,” in *2010 IEEE Computer Society Conference on Computer Vision and Pattern Recognition - Workshops*, pp. 94–101, June 2010.