Automatic Facial Makeup Detection

Y. Ligitha and A. Ramanan
Department of Computer Science, Faculty of Science, University of Jaffna
ligithay@gmail.com, a.ramanan@univ.jfn.ac.lk

1. Introduction

Recognising face images is a main research area based on many practical applications where human identification is needed.

Makeup can fall under two categories: Light makeup (the makeup cannot easily perceived since the applied colours correspond to natural skin colour), and heavy makeup (the makeup is easily perceptible).

Experiments are conducted on three challenging and unconstrained datasets : YouTube Makeup database (YMU), Makeup In the Wild database (MIW), and Virtual Makeup database (VMU)[1].

.

.

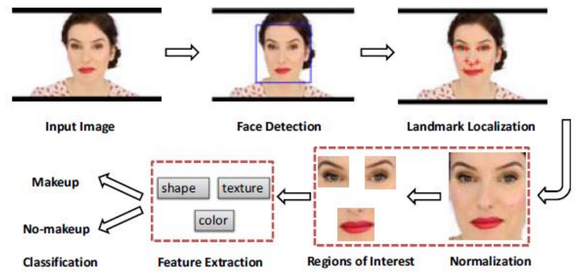
2. Objective

To detect makeup by selecting the best features that lead to the best classification result on images of human faces by image processing and pattern recognition techniques.

3. Methodology

- The Adaboost face detector in OpenCV is used to automatically detect the face[2].
- Given a face image, the proposed method first estimates the feature landmarks within the facial region and Haar-like filters are used for locating and characterising the appearance of each landmark.
- This is followed by cropping region of interest (ROI) by using Viola Jones algorithm (face, the regions around the left eye, the right eye, and the mouth).
- Then a set of shape, colour and texture features are extracted from the face and ROIs by using Hue Saturation Value (HSV) colour space, tessellation, Watershed transform, Canny edge detector and Local Binary Pattern (LBP) histogram[3] [4].
- Feature set is then fed to Support Vector Machine (SVM) classifier to detect the presence or absence of makeup in the input face image.

Methodology…



4. Testing Result

Table 1 : Test results as accuracy for colour descriptor

Technique	YMU	MIW	VMU
HSV	56.04%	51.30%	58.82%
Tessellate	49.47%	51.28%	60.72%
Watershed Transform	56.59%	56.49%	96.08%

Table 2 : Test results as accuracy for shape descriptor

Technique	YMU	MIW	VMU
Canny edge detector	52.20%	53.90%	90.20%

Table 3 : Test results as accuracy for texture descriptor

Technique	YMU	MIW	VMU
LBP histogram	68.13%	69.48%	62.75%

Table 4 : Overall accuracy obtained by using colour, shape, texture descriptors

DATASET	OVERALL ACCURACY
YMU	74.06%
MIW	75.49%
VMU	90.76%

5. Experimental setup

- The proposed method was tested on YMU, MIW, and VMU datasets.
- The proportion of YouTube makeup dataset (YMU) division for the training and testing was 70% and 30%, respectively, Makeup in the wild (MIW) dataset and Virtual makeup dataset (VMU) used for testing only[1].
- YMU dataset contains 604 images.
- For this research from YMU dataset 422 images were used for training and 182 images were used for testing.
- MIW dataset contains 154 images, VMU contains 102 images, and both images were used for testing.
- Classifier: Linear OVA-SVMs

6. Discussion

- If we consider about overall accuracy, higher value was obtained for VMU because YMU and MIW dataset have images with light makeup whereas VMU has heavy makeup images.
- The features obtained through each subsystem were finally given to a classifier in order to categorize them.
- In this study, 860 images (YMU, MIW, VMU) were used in the SVM classifier.
- The overall accuracy obtained is 74.06% for YMU, 75.49% for MIW, and 90.76% for VMU.

7. Conclusion

- Overall accuracy was obtained by combining all methods (HSV, Tessellate, watershed transform, Canny edge detector, LBP histogram) and then fed to Support Vector Machine (SVM) classifier.
- The proposed method can be further improved by considering Eye shadow detection, Lipstick detection, and Liquid foundation detection.

8. References

1. Dantcheva, C. Chen, and A. Ross. Can facial cosmetics affect the matching accuracy of face recognition systems? In BTAS, 2012.
2. C. Chen, A. Dantcheva, A. Ross, "Automatic Facial Makeup Detection with Application in Face Recognition," in Proceeding of 6th IAPR International Conference on Biometrics (ICB), (Madrid, Spain), pages 1-12, June 2013.
3. T. Ahonen, A. Hadid, and M. Pietik¨ainen. Face description with local binary patterns: Application to face recognition. *IEEE Trans.on PAMI*, 28(12):2037–2041, 2006.
4. S. Varshovi. Facial makeup detection using HSV color space and texture analysis. Master's thesis, Concordia University, Canada, 2012.