Paper: Facial Expression Recognition System Using Machine Learning

Summary

In this paper, the authors propose a facial expression recognition system using machine learning which constructs multi-layer classifiers based on the data set with 7 people. The system consists of two main processes: face detection and facial expression recognition (FER). The facial detection process uses haar-like features and histogram of oriented gradients (HOG) features are extracted from each facial region. Then, the support vector machine (SVM) is used to recognize the facial expression of a certain person based on these extracted features.

In the face detection part, a rectangular facial region is selected and reset based on haar-like features. The region is then resized to 32 by 32 pixels to extract HOG features. The reason is to consider the changeable appearance of each person. Another reason is to minimize the background to improve the classification rate.

The facial expression recognition part has two classifiers: person classifier and facial expression classifier. The person classifier is constructed by a 1:3 ratio of facial image data set to non-facial image data set. The existence of faces in an input image is recognized at the person classifier. The facial expression classifier is then trained by HOG features of only personalized face images without a non-facial image based on SVM.

From their experiments, they found out that the conventional system has a total F1 score of 0.8443 whereas their proposed system had the F1 score of 0.8756.

Strengths

- The points that the paper is making is pretty easy to track down.

Weaknesses

- The paper could have done a bit better job with visualization and captions.
- The paper seemed too short. Even though the paper is not particularly complicated, having some background work and explanation of their network architecture would have been helpful to the readers.
- Is the F1 score as metric enough? I think including other metrics too will strengthen their argument.

Confusions

- Why exactly are they using two classifiers in their Facial expression recognition?
- Any reason for using SVM for classification purposes?

Discussions

- I would want to learn more about haar-like features and HOG mentioned in the paper?
- The paper mentions that FER requires an individually optimized system, how can testing the system on a different person affect the performance? Are there systems out there today which is a more general-purpose?
- What are some other applications this can be used in? For example, has such a system been used in Casinos, where a lot can be told from someone's facial expression?