COMP6223 : Coursework 2

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1 Introduction

This report proposes the methods to camouflage the Viola-Jones face detection algorithm. The key principles behind these techniques is to hide the key Haar features on human faces so the algorithm cannot use them for classification. There are two ways to achive this goal:

1. Minimizing pixel intensity difference between dark and white area using face-paiting colors or cosmetics.
2. Covering some parts of the face with a scarf and a reflective glasses.

The detail of each technique will be explained in Section 2 and 3 respectively.

2 Method I

The first method is to use face-painting color or cosmetics to hide the contrast on the face. The color of makeup has to be contrasted with the skin tone to minimize the difference between dark and white areas so that the algorithm is unable to detect expected Haar features on the face. The pictures below show samples of the makeup which are successfully deceive from Viola-Jones algorithm

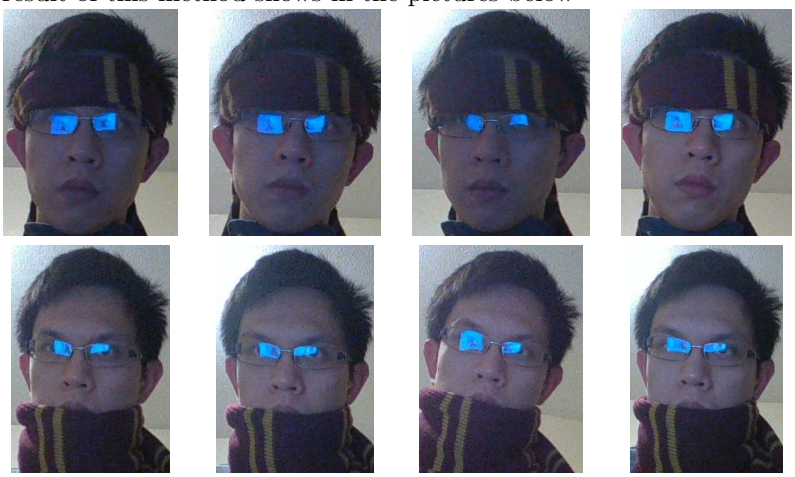
From the picture above, it can be observed that the areas under both eyes are darkened. This causes the algorithm unable to detect Haar feature of eyes as it expects the areas under the eyebrow should be bright. A same result also happens on both upper cheeks which are painted with brown.

3 Method II

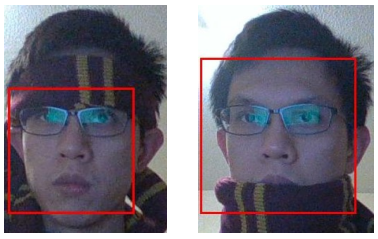
The key idea of the second method is to hide some parts of the face from the camera. For this technique, there are two things that we need: a scarf(or a napkin) and a glasses with reflective lenses. The steps of this method is as follow:

1. Cover your forehead by a scarf and tie it on the back of your head *or* Wear a scarf around you neck and pull it up to cover your lower mouth
2. Put on a glasses

The result of this method shows in the pictures below



A reflective glasses plays a key role in this method as reflective light helps cover some parts of the eyes which make the algorithm unable to detect eye features. Note that the degree of reflectiveness is crucial. A glasses with low reflectiveness is unable to deceive the face detection algorithm although forehead or lower mouth is covered by a scarf as shown in the figure below.



4 Conclusion

The two methods proposed in this report have both strengths and weaknesses. The biggest strength of the first method is consistency. By applying face-painting colors, it works under different lighting conditions. On the other hand, putting a contrast-color cosmetics on the skin makes this technique eye-catching which is unlikely to be practical for everyday use.

For the second method, as it uses ordinary tools for deceiving the algorithm, a person can apply this technique without being noticed by surrounding people. However, the technique relies on the lighting conditions significantly, so the result is not as consistent as the first method.