

IMAGE PROCESSING AND RECOGNITION OF FACE PHOTOGRAPHS FROM MISSING CHILDREN AND TEENAGERS

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ABSTRACT

Owing to the recent academic, technological and industrial advances, biometric information such as face images can be used successfully to select and possibly identify some children and teenagers that have been missing, by screening automatically some databases maintained by the Brazilian Civil Policy or some public data resources available on the Internet. However, when the missing cases exceed years, some photos may either become useless, because of the several natural biometric changes that tend to occur particularly on children and teenagers faces, or may have significant reduction on their signal to noise ratio, making the person identification even harder. Moreover, face images of the same subject may vary depending on the illumination, profile position, changes in facial expression and other artefacts. This work proposes and implements a step-by-step image processing tool to spatially normalize and recognize frontal face images captured under distinct acquisition protocols. Using statistical techniques, the computational framework reduces the original dimensionality of the face images, improving the computational time of the recognition process, and selects given a set of pre-normalized face images the most similar ones based on probabilistic pixel maps and minimum Euclidean distances. Our preliminary experimental results show that our approach might provide a suitable computational framework for normalizing and recognizing face images of missing kids in practice, highlighting the main facial discriminant features used in the recognition process while reducing significantly the inherent artefacts of face photographs captured especially in non-controlled environments.

1. INTRODUCTION

Face recognition is a trivial task for humans with significant relevance in our interpersonal relationships [1]. However, this pattern recognition problem is a complex task to automatic digital systems in general and, therefore, has attracted the attention of several research groups around the world due to its importance and scope. In this work, we implement a step-by-step automatic face recognition tool and investigate its applicability on identifying missing children and adults by using frontal face images acquired under distinct acquisition protocols.

2. METHODOLOGY

The methodology consists essentially of 4 main processes: acquisition, pre-processing, classification and post-processing, as shown on Figure 1. Figure 2 illustrates in detail the normalization step, inherent to the pre-processing process, when using controlled and non-controlled face samples [2].

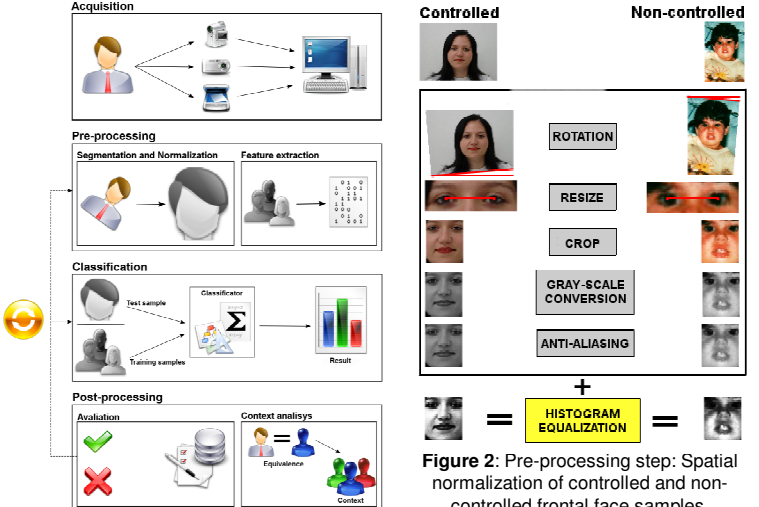


Figure 1: A basic face recognition system.

3. EXPERIMENTS

We have carried out a number of experiments using frontal face images acquired under distinct acquisition protocols. All the controlled samples are from the FEI face database and the non-controlled ones are from missing children and teenagers available on the Internet.

4. RESULTS

Figure 3 shows the mean images of all the non-controlled samples of missing children and teenagers used before and after our spatial normalization algorithm. We can see clearly

the effectiveness of this pre-processing task for further recognition. In Figure 4, we illustrate our recognition process based on the probabilistic pixel maps of the most similar controlled frontal face images stored in the FEI face database.

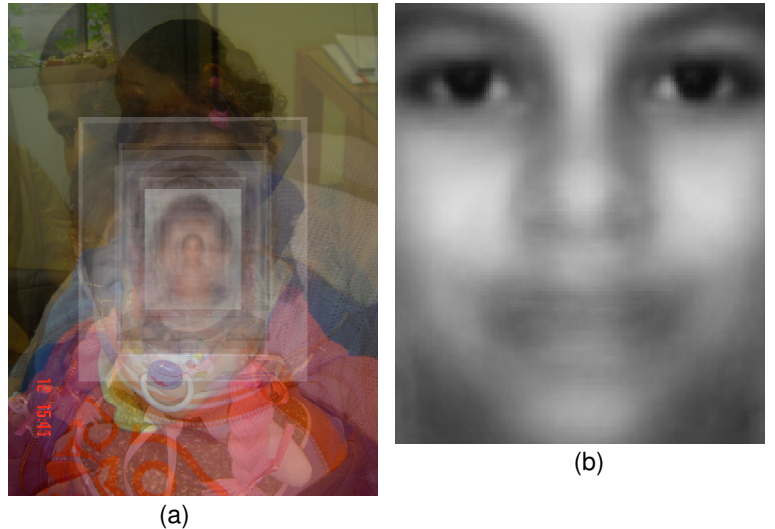


Figure 3: Mean images of non-controlled face images: (a) before and (b) after our spatial normalization algorithm.

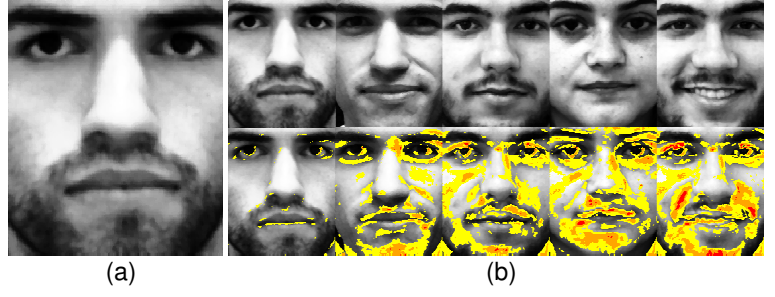


Figure 4: Recognition process of a test sample (a) based on the 5 most similar frontal face images (b, top) and the corresponding probabilistic pixel maps (b, bottom).

5. CONCLUSION

Our experiments are preliminary but show promising results of our pattern recognition approach on normalizing and recognizing frontal face images of missing kids in practice, especially because these images have often been acquired under non-controlled environments.

ACKNOWLEDGMENTS



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