Context-Patch based Face Hallucination

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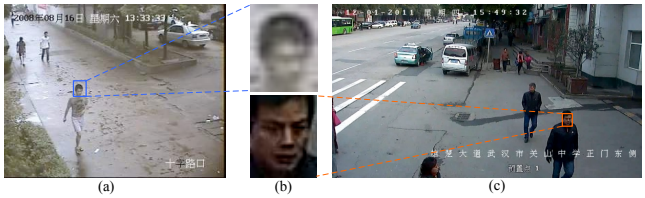
Introduction



(a) (b) (c)

Fig.1. Typical frame from a surveillance video. (a) and (c) are the images from a camera with CIF size (352×288) and a camera with 720P size (1280×720) respectively; (b) are the two interested faces extracted from (a) and (c).

Surveillance cameras have been used for a large range such as security and protection systems. They can provide very important clues about objects for solving a case, such as criminals.

However, the resolution of a video camera is very limited due to cost and technical reasons. In addition, the object is so far away from the camera even if the video is clear that the resolution of the interested face in the picture is too low to provide helpful information.

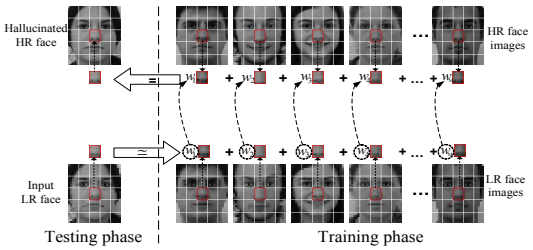


Fig.2. Flow diagram of the position-patch based face hallucination framework. To obtain the optimal weight vector is the key issue.

Inspired by the results of face analysis that human face is a class of highly structured object and consequently position plays an increasingly important role in its reconstruction, some position-patch based face hallucination methods have been proposed. The key issue of those methods is how to represent the input image patch and obtain the optimal weight vector

Motivation and Our Method

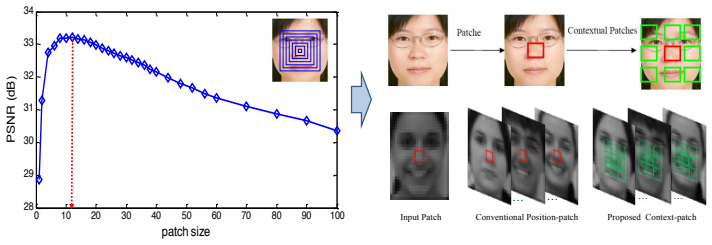


Fig. 3. Simply enlarging the patch size does not always bring performance improvement. in this paper, we propose to simultaneously consider all the patches in a large window around the observation patch and develop a context-patch based face hallucination framework.

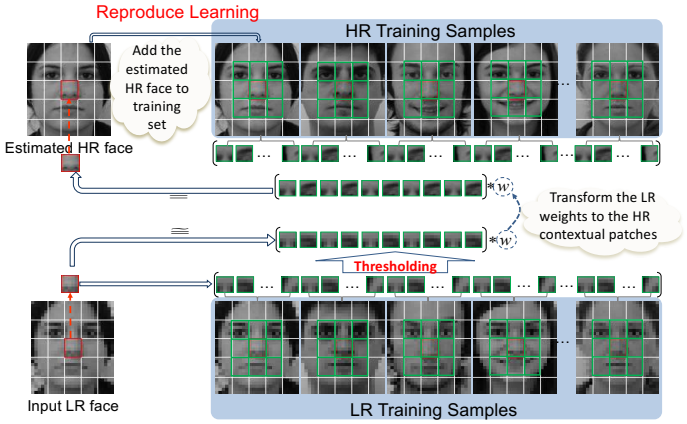


Fig. 4. Flow diagram of the proposed context-patch face hallucination framework.

We propose the context-patch based face hallucination framework, and develop a novel patch representation method based on Thresholding Locality-constrained Representation. Additionally, we introduce a reproducing learning to iteratively enhance the estimated result by adding the estimated HR face to the training set.

Experimental Results

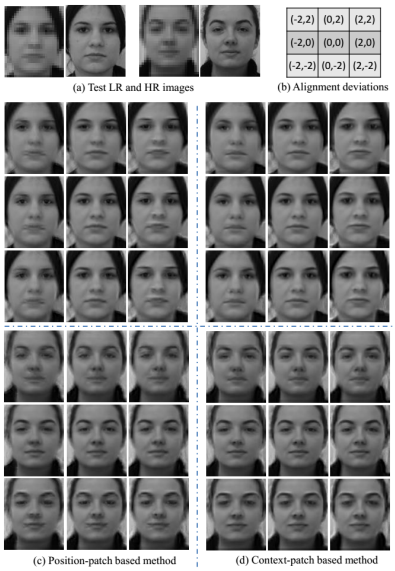


Fig. 5. Robust to misalignment.

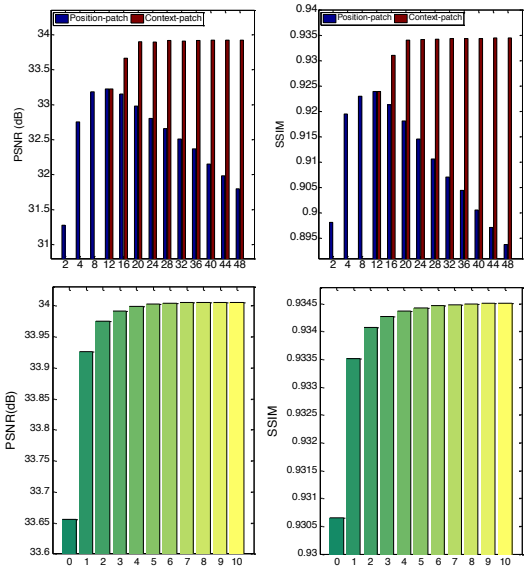


Fig. 6. Effectiveness of contextual information and reproducing learning.

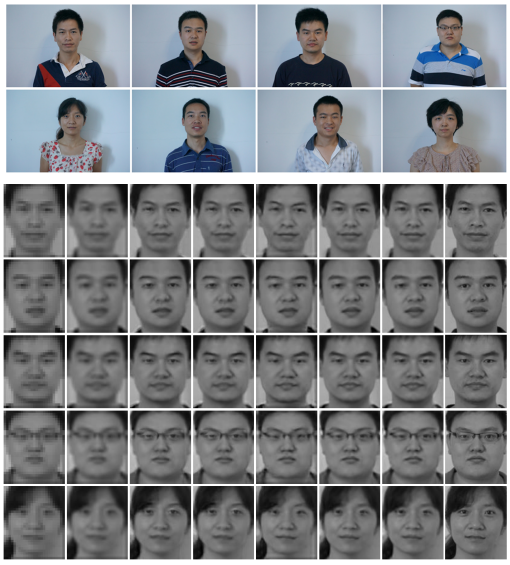


Fig. 7. Visual face hallucination results of the four real-world images.

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