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Gaze correction with a single webcam

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Abstract:

Eye contact is a critical aspect of human communication. However, when talking over a video conferencing system, such as Skype, it is not possible for users to have eye contact when looking at the conversation partner's face displayed on the screen. This is due to the location disparity between the video conferencing window and the camera. This issue has been tackled by expensive high-end systems or hybrid depth+color cameras, but such equipment is still largely unavailable at the consumer level and on platforms such as laptops or tablets. In contrast, we propose a gaze correction method that needs just a single webcam. We apply recent shape deformation techniques to generate a 3D face model that matches the user's face. We then render a gaze-corrected version of this face model and seamlessly insert it into the original image. Experiments on real data and various platforms confirm the validity of the approach and demonstrate that the visual quality of our results is at least equivalent to those obtained by state-of-the-art methods requiring additional equipment.

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Contents

1. Introduction

With the wide availability of broadband Internet, video conferencing is becoming more and more popular both for professional and private use, and gradually replacing traditional audio calls. However when talking over a traditional video conferencing system such as Skype or Apple's FaceTime, conversation partners do not have eye contact. Concretely, when the camera is at the top of the screen, the users have the impression that the conversation partner is looking down. Beyond the pure aesthetic aspect, gaze awareness (eye contact) is a key and indispensable aspect of human communication [1], [2], [3] and thus it should be preserved when communicating over an electronic link. The problem of missing eye contact is simply due to the location disparity between the video conferencing window and the camera. Eye contact could be achieved by placing a camera right behind the video window, but this would require a transparent screen or a special mechanism involving mirrors. This has been addressed at the high-end level of teleconferencing systems using special hardware [4], [5], [6], [7] but has not yet been convincingly solved at the consumer level.

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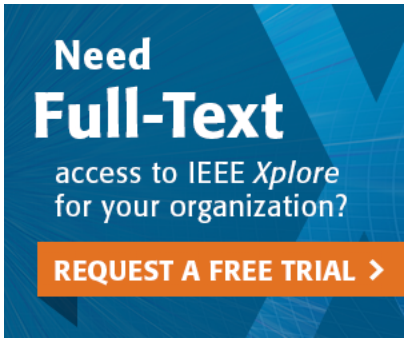

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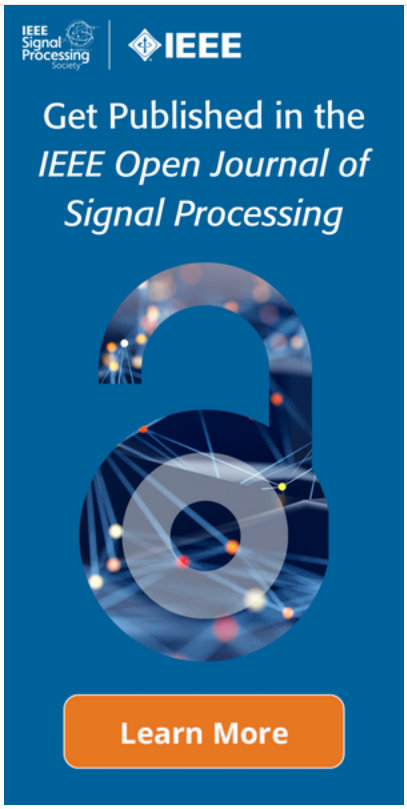

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