Who do you want to be? Real-time Face Swap

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***Abstract*— This demonstration paper presents a face swap application where two people's faces are automatically exchanged in real-time without any calibration or training. This is performed using the Active Appearance Models technique. A realistic visualization is achieved using an adaptive texture sampling technique. The face swap is performed irrespective of the sex, age or ethnicity of the subject in front of the camera. This application is intended for gaming, shopping, educational or entertainment purposes and will be presented in a real-time setup during the demo session.**

I. Introduction

Changing one's facial appearance into someone has been always a nice dream. With digital manipulations and post-processing techniques such illustrations have been widely popular for both fun and professional purposes. In this demonstration we present "FaceSwap"; a software tool to digitally swap faces real-time irrespective of sex, age or ethnicity of the subject. This will allow the person in the video or in front of the camera to change facial appearance.

We believe such an application could be useful for an immersive gaming experience, where one could better personalize with the identity of the character. Other applications like virtual dressing room or interactive billboards could be useful for commercial and entertainment purposes.

II. Method

FaceSwap principally uses Active Appearance Model (AAM) to model the face in 3D using over 500 landmarks on the face. This method has been initially presented over a decade ago [1] and has been further improved in [2] where real-time processing with robustness against lighting and head pose is achieved.

In the proposed demonstration, the selected source and target images are analyzed to produce the appearance vectors and a swap is performed using the rotation, translation and scale parameters between the source and the target.

In the FaceSwap pipeline, the shape, texture and the corresponding alignment parameters; pose and normalization of the AAM model are utilized. Pose parameters are required to fit the model parameters into the dimensions of the image, the normalization parameters are used to transform the texture into the appropriate color space of the image.

III. Applications

Gaming: Stronger identification with the game character can increase the level of enjoyment during the game [3]. Replacing the face of the game character with the face of the player increases the identification of the player and therefore creates a stronger engagement in the game itself as presented in Figure 1. It can as a further step be possible to integrate vital signs from the player to adapt the game difficulty [4].



Fig. 1: The face of the game player (Source) is swapped on the face of Cristiano Ronaldo (Target). The facial expression of the source face is merged with the texture of the target

Virtual dressing room: In a virtual dressing room, instead of changing the clothes, the face on the model can be changed. This way one can stay seated and shop without even having to leave the house and still know what he/she would look like in a dress.

What does it feel like: Assume the identity of someone you know. This can either be done in a therapeutic setting (e.g. swapping identity of the bully and the bullied) or in an entertainment setting (e.g. become your parent, biggest idol.)

IV. Demonstration

The proposed automatic face swap application presents a complete framework for changing the faces of two people in a real-time setting using an off-the-shelf web camera. The setup for presenting the real-time demonstration is provided and people are welcome to play around and enjoy this fun application.

References

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