Real-Time Facial Character Animation

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Abstract— This demonstration paper presents a real-time facial character animation application where the facial expressions of a person are simultaneously synthesized on a virtual avatar. The proposed method does not require any training or calibration for the person interacting with the system. An Active Appearance Model based technique is used to track more than 500 points on the face to create the animated expression of the virtual avatar. The sex, age or ethnicity of the subject in front of the camera can also be automatically analyzed and hence the visualization of the avatar could be adapted accordingly. This application requires a standard web cam and is intended for gaming, entertainment or video conference purposes and will be presented in a real-time setup during the demo session.

I. Introduction

Capturing one's face and transferring it on a virtual avatar or a character can be useful for many purposes. Being able to control your avatar's facial expressions is a way to enhance the engagement in a video game and lets one personalize with the identity of the character. It can also be used to keep the anonymity of a person in a video call. Such anonymity has been previously used to spot child abuse and has obtained a great success [1].

In this demonstration, we present a real-time character animation tool where the facial expressions of a person in front of a camera are simultaneously synthesized on a virtual avatar. For this technique no training or calibration is required. In contrast with the conventional methods that require 3D cameras, our system uses a standard web-cam.

II. Method

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

The virtual avatar is able to adapt itself depending on the person in front of the camera. It could be a male or a female avatar, could wear glasses or have a beard. Such demographic information is automatically acquired from the person interacting with the avatar and could be incorporated to the avatar's look for an enhanced engagement.

The realistic 3D avatar (male, female or fictional character) can move its eyes and head according to the user's movements and perform facial movements to give the appearance of speaking using the framework described in [3]. A facial analysis framework can detect the face and classify the demographics (gender, age) and emotions of the user, as well as determine the gaze direction of the user.

Fig. 1: The face of the person is captured and the facial expression is synthesized on a virtual avatar to keep anonymity

III. Applications

Gaming: A facial mimicking avatar enables players of a game to interact face to face with their emotional expressions over the anonymous avatar. With the real-time application of such a facial tracking functionality, stronger identification can be possible to increase the level of enjoyment during the game. As a further step it can be possible to integrate vital signs from the player to adapt the game difficulty [4].

Video Conference: Keeping the anonymity of one's self can be of vital importance. Figure 1 shows a video conference scenario where one prefers to keep her face anonymous but still wants to be able to engage a rich visual communication using facial expressions. Our proposed technique can obtain such an engagement without an extra hardware.

IV. Demonstration

The proposed application presents a complete framework for generating a virtual avatar. The user in front of the camera interacts with the avatar and observes the presented expression. We will provide the setup for presenting the real-time demonstration and will let people play around and enjoy this fun application.

The tool does not record or store captured video. Analyses are performed locally on the computer used in the setup. Only meta-data (user demographics, emotions experienced) is stored and the privacy of participants is respected.

References

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