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AnimaFace 2D: Implementation for Mobile Devices

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Abstract
Facial animation technology is essential for the implementation of personified virtual characters capable of reproducing the style of communication that humans are accustomed to, based on verbal and non-verbal communication. Depending on the application, these virtual characters can play varied roles like instructors, assistants, avatars, presenters or sellers. Several hardware/software plataforms have been used to implement such characters including personal computers, Web, game consoles and mobile devices. The present work had as objective to study and to deepen the knowledge associated to the implementation of facial animation systems in mobile devices. In order to do so, it proposed to migrate to the mobile plataform the image-based facial animation system AnimaFace 2D developed in the Department of Computer Engineering and Industrial Automation of the Faculty of Eletrical Engeneering and Computing of UNICAMP.

Key words:
facial animation, image processing, Android programming

Introduction

The last decade experienced extraordinary growth in the number of users of devices such as mobile phones, smartphones and tablets.
In this context, our research focus on the development of interative virtual human agents in mobile devices as a promissing alternative to more intuitive, efficient and humanized interfaces and applications.
The present work explored the implementation of image-based facial animation in a mobile plataform. This technique uses photographic images of key poses, which are combined through metamorphosis techniques to generate the animation.
Image-based approach uses photographic images as animation key poses. We proposed to migrate to the mobile platform the facial animation system for Brazilian Portuguese, AnimaFace 2D [1].

Results and Discussion

The implementation of the system consisted primarily in the development of functions that perform each step of the animation synthesis process in Android environment. With emphasis on functions that perform image processing and manipulation like warping and morphing
The most complex functions implemented correspond to the functions that perform image processing and manipulation like the warping and morphing operations. Warping consists of a non-linear elastic distortion of an image. Morphing is a metamorphosis process that promotes a smooth transition between images, which is performed through successive warping operations between a base image and a target image, with synthesized intermediate frames interpolated between them.
The analysis of the system performance revealed that the memory use in Android can be a limiting factor, since long animations can result in out of memory exceptions. The individual execution time of the developed functions was small, with the warping time per image close to 120ms. The animation time as a whole depends on the number of frames to be processed, but certainly prevents its aoption by real-time applicatios.

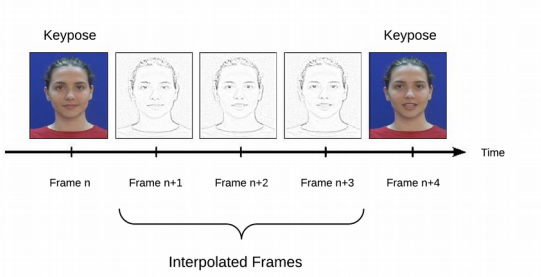

Image 1. Intermediate frames between two adjacent keyposes are obtained through the morphing process, which guarantees a natural and smooth transition.

Conclusions

It was possible to conclude that the adopted approach and the developed functions are suitable for the generation of facial animations even in conditions of limited memory and processing capability. However, alternatives must be sought to reduce the execution time, which may be too high when synthesizing long animations. Three second animations with 30 frames per second took about 7.5 seconds to be synthesized.
The next step in the project is the speech intelligibility evaluation of the synthesized animations in order to assess the level of videorealism obtained.

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