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A novel 3D streaming protocol supported multi-mode display

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ABSTRACT

With the development of 3D technology, many 3D commercial movies are being released widely. In addition to cinemas, some well-known commercial video websites have started to provide traditional anaglyph 3D broadcast services "red and blue color display." Owing to this trend, another multimedia revolution begins. However, there are too many choices of display technologies for users, such as anaglyph, gate-type, linear polarizer, circular polarizer and shutter, all of which typically require special monitors with different rendering methods. However, we cannot know what kinds of facilities will be adopted for the transmissions. Even with the support of different display technologies, there are still some technical problems because the same kind of rendering method cannot simultaneously support different 3D display technologies. Therefore, how to provide 3D multimedia services on the Internet becomes an important issue nowadays. This paper presents an efficient image compression strategy that provides services such as 3D, non-3D and even the free viewpoint video, and allows clients to select the compression strategies based on the types of the devices. Moreover, this paper proposes an algorithm that can optimize the packet priority for the transmission status while the videos are being transmitted on the Internet. Our experiments prove that this algorithm successfully integrates the image strategies with the packet priority and achieve "a multi-mode 3D transmission system."

1. Introduction

In the present day, the resolution of videos is becoming even more delicate. High-definition (full HD) televisions can be seen almost everywhere and the pores on a person's face also can be displayed clearly. However, in the future, to only improve the resolution of images is no longer meaningful because users are less willing to replace their equipment for better resolution. Due to this trend, many multimedia service companies began to look for the next killer application and it seemed that the success of commercial 3D films would be the most feasible alternative (Edwards et al., 2005; Goo, 2005). Nevertheless the popularization of 3D technologies might encounter many difficulties. First of all, there are too many implementation methods to achieve a 3D display, but each of them cannot support one another. In addition, there are still some problems, in which human factors are the most difficult ones to control. As for the current 3D technology including polarization, anaglyph and shutter, users inevitably have to wear the special 3D glasses, which is quite inconvenient for Asian countries with high percentage of glasses-wearers. Moreover, use of the 3D glasses might lead to dizziness in the viewer and many people thus cannot use 3D display monitors for a long time. For the time being, although many firms have proposed resolutions for 3D display, the price of 3D display equipments is still expensive (Carranza et al., 2003).

In 2009, services of high-quality video streaming were first released on the Internet. According to their environments, clients can freely choose a suitable resolution while playing videos. Along with the development of clouding technology, the Internet is bound to provide more diversified multimedia services. Besides high-definition video and audio, the popular 3D playback system is also offered. Some websites in fact have already provided 3D videos in the anaglyph playback mode and more choices, like free viewpoint videos, will be surely included in the near future.

Therefore, with the same video source, the service provider must offer all kinds of choices of playback modes and this might cause some problems in resource utilization. Different playback modes usually lead to different rendering results. To generate individual video streaming according to playback mode and resolution in advance will waste the hardisk space because the server has to save the same video streaming in different types and resolution, without including the interlace problem of polarized display. In order to solve these problems, this paper proposes a 3D video compression strategy that can support all playback modes of

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