

Design of Experimental Procedures for Detecting 3D Syndrome

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Abstract. In this paper, we suggest a experiment procedures for detecting indicator for 3D syndrome by extracting and analyzing the changes in user's electroencephalogram of which result can be utilized for implementing the system which prevent and mitigate the syndromes which occur after watching 3D holography.

Keywords: 3D syndrome, coefficient correlation, brain wave, feature vector, detect.

1 Introduction

As the development of 3D holography, which is being utilized in various field, has been focusing only on its profitability and spread of the technology, there has not be proper technical mechanism for sorting out the physical, psychological and physiological side effects. Therefore, this study has proposed experimental procedures for analyzing the characteristics of brain wave which occurs from 3D syndromes. Further, the result of this will be utilized to suggest basic elements for eliminating the various side effects resulted from the 3D technology which has been utilized indiscreetly in various fields.

2 Related Works

Currently, the 3D technology is being utilized in various fields including TV, SW and contents but there has not been consideration on its side effects resulted from the products. There are some of ongoing studies on the 3D syndromes as the majority of users appeal eye fatigue and anxiety after watching 3D holographic image for a long time. Most of them, however, are focusing on the measurement of the level of eye fatigue rather than the danger of the eye fatigue and even there has not been standardized measurement yet.[1-2]

2.1 The Level of Eye Fatigue

The symptoms related to eye fatigue which occurs during and after watching 3D image include eye fatigue, tear, eye pressure, pain around eyes, inconvenient blinking, heated eye, difficulty in eye-focusing, blurred sight, hardened shoulders and headache. Further, the objective measurement for level of fatigue includes the subjective rating of controlling ability, sight, diameter of pupil, major synthesized frequency, eye moving speed, the level of eye fatigue and working ability.[3-6]

2.2 The Eye of Fatigue Caused By the Attribute of Stereoscopic Image

The fundamental cause of eye fatigue is that the viewer of 3D stereoscopic image makes an image synthesizing different images reflected each eye. If the different image rids itself of the range in which the two images are synthesized, the viewer experiences a double image. As a result, convergence, diffusion and accommodation of eyes do not work properly hence eye fatigue occurs. Also, the eye fatigue is caused by the rapid changes in deepness of each scene. It has been reported that balances deepness between each scene makes the viewer more comfortable.

The infinite distant of focus point can cause eye fatigue. Stereoscopic image creates broader range of depth compared to the visual environment (the size of pupil) and focusing distant in real environment and this causes fatigue of eyes. If the difference become larger, the viewer perceive distinct image at the point on which he does not focus. In daily life, this image blurs hence the viewer does not perceive it. The unwatchable image which is blurred, according to the watching-section, becomes available to watch in stereoscopic image and the broadened difference causes eye fatigue.

3 Experimental Configuration

This experiment has been carried out to extract feature vector of the brain wave signal occurred by 3D syndrome by analyzing the changes in brain wave of viewers while they watch 3D stereoscopic image. To do so, the brain wave of participants has been classified into four categories for extractions and they are as follows: before and after watching 3D image, during watching the image, when the participant feels the 3D syndrome. Further the feature vector has been extracted from each part and this is to establish a standardized indication of changes in brain wave which is occurred by 3D syndrome.

3.1 The Level of Eye Fatigue

This experiment is to analyze changes in brain wave which is to analyze the standardized indication of 3D syndrome caused by watching 3D stereoscopic image. The experiment, as the Figure 1 indicates, has been conducted in a 1person-sized experiment booth (about 320x180cm). During the experiment, external

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discouragements such as light and noise have been minimized to maximize the engagement of participants in watching the 3D image for the best reliability of result. Further, the distant between 3D TV (42inch) and participants has been set at 160cm which in which 3D stereoscopic image can be outputted.

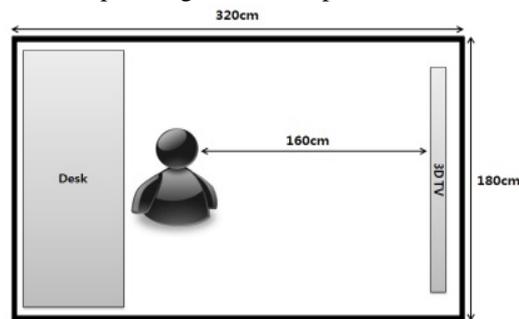


Fig. 1. Experimental Environment

4 Conclusion

In this paper we proposed experimental procedures for analyzing the characteristics of brain wave which occurs from 3D syndromes. If we conduct suitable experiment following procedures, the result of this experiment will be utilized to suggest basic elements for eliminating the various side effects resulted from the 3D technology which has been utilized indiscreetly in various fields.

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