IMAGE & VIDEO SYSTEMS Lab.

S3D Quality Analyzer
S3D Quality Enhancer

KAIST

KAIST Image and Video sYstems Lab.

IMAGE & VIDEO SYSTEMS Lab.

Overview of the technique

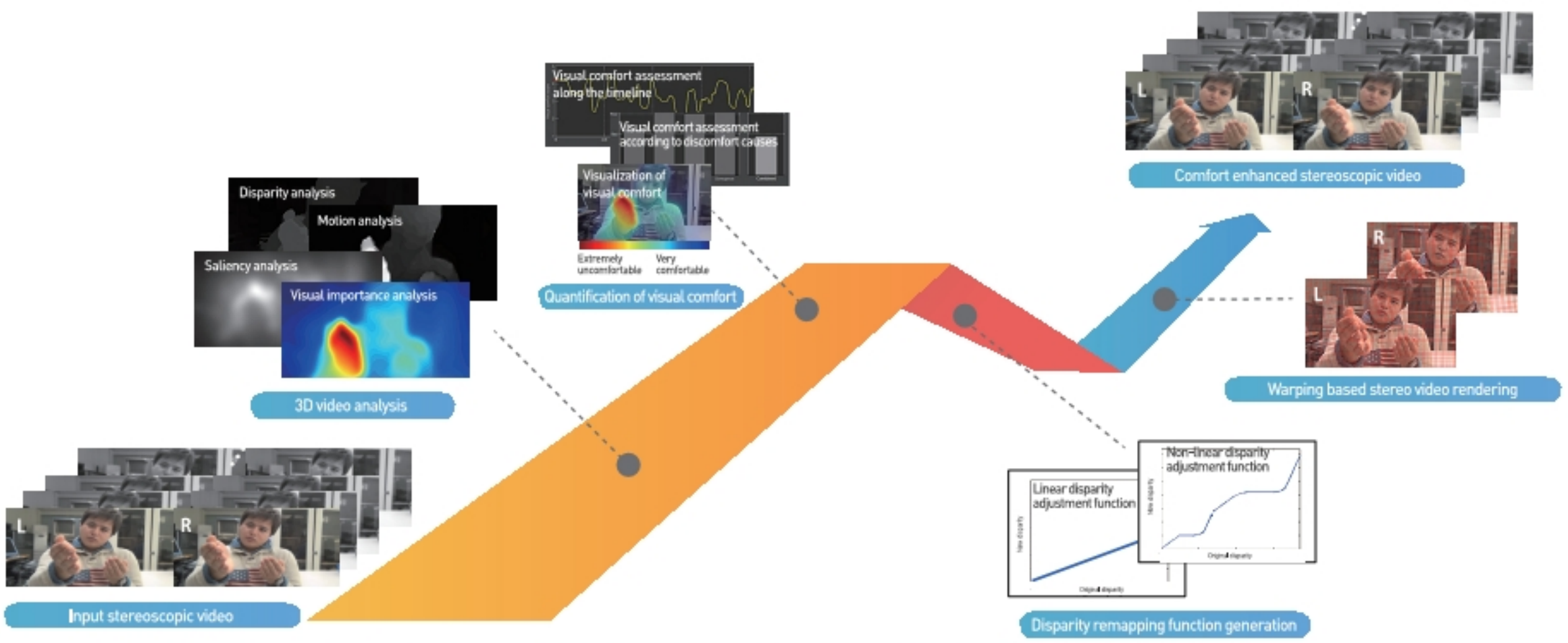
- Interest in 3D content service is high as ever, and stereoscopic 3D (S3D) TV has been widely disseminated. The lack of high quality 3D content (especially, ones without visual discomfort) is still a persistent obstacle preventing proliferation of stereoscopic 3D services into the mass market.
- Techniques that analyze and ameliorate visual discomfort of S3D contents are necessary to create and disseminate high quality 3D contents.
- Two techniques have been developed: **"S3D quality analyzer"** and **"S3D quality enhancer."** S3D quality analyzer automatically analyzes S3D video quality. S3D quality enhancer enhances the visual comfort by automatic elimination of discomfort causes.

Status of the technique

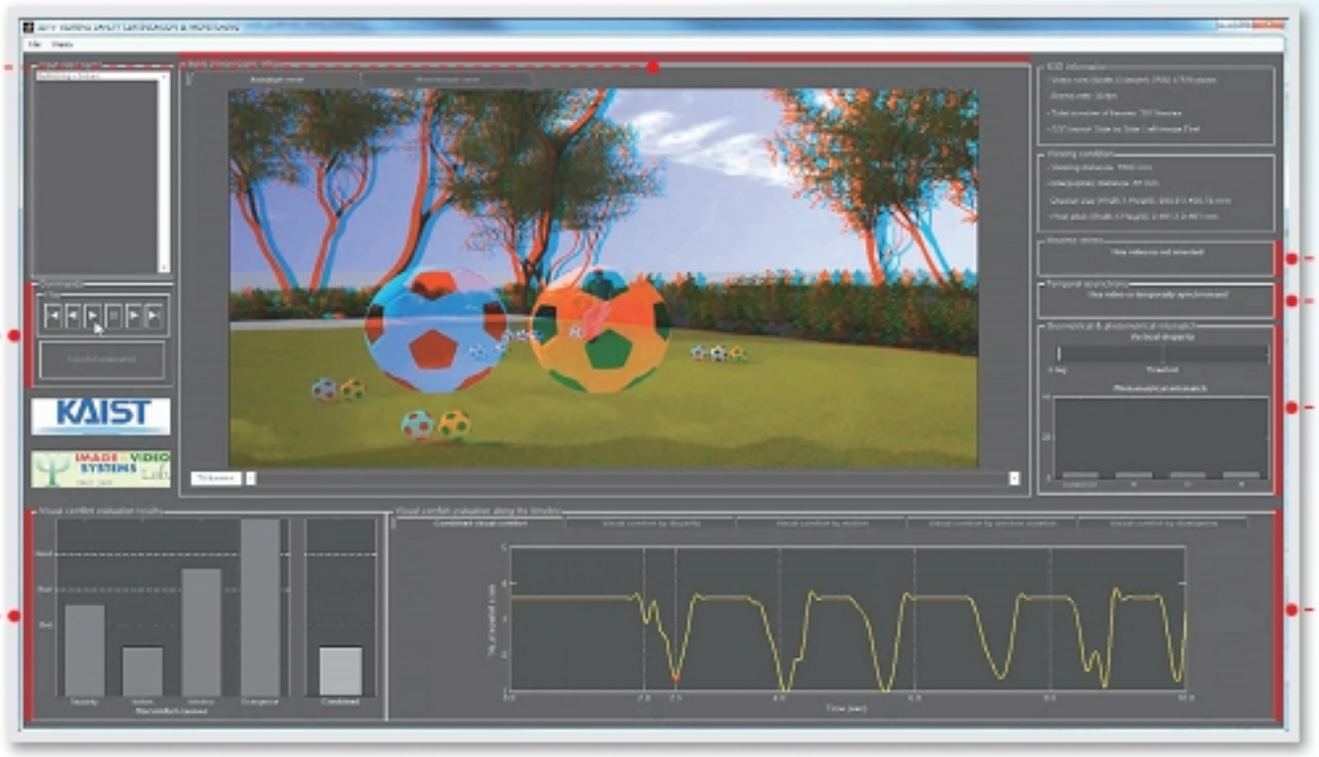
- Most 3D quality analysis techniques are based on 2D quality analysis techniques and it is difficult to automatically obtain detailed analysis results that indicate the problematic discomfort causes. For these reasons, production cost for 3D content increases.
- Most conventional techniques for improving visual comfort use global linear disparity adjustment, which could lead to side effects such as reduced depth impression and depth distortion due to excessive disparity adjustment.
- The developed S3D quality analyzer can provide comfort analysis results with respect to various causes of discomfort. Based on the comfort analysis, the developed 3D quality enhancer adaptively adjusts the disparity of S3D video.

Feature of the technique

- **"S3D Quality Analyzer"** can provide comfort analysis results with respect to various discomfort causes, and can quantify the overall 3D quality.
- **"S3D Quality Enhancer"** can enhance visual comfort using adaptive (linear/non-linear) disparity adjustment of S3D video according to discomfort causes based on the comfort analysis results.



[Overview of quality analyzer and enhancer for S3D video]



[Prototype of "3D Quality Analyzer"]

[Prototype of "S3D Quality Enhancer"]

Uncomfortable stereoscopic image (anaglyph 3D)

Linear disparity adjustment for reducing global discomfort cause

Non-linear disparity adjustment for reducing local discomfort cause
(dashed square indicates the local problematic region)

[Example of "S3D Quality Enhancer"]

Market trend and forecast

- Estimations of 3D TV sales in relation to 3D broadcasting and content services

(unit: million-dollar)

Type	2010년	2014년	2017년
World market	2,129	9,136	15,423
Reference	DisplaySearch(2010.1), "3D Display Technology and Market Forecast Report"		

IMAGE & VIDEO SYSTEMS Lab.

– Applications

- Smart stereo image analyzer to guide the production of high quality (i.e., comfortable) S3D movie and broadcasting contents.
- Best Comfort S3D camera to automatically control the capturing of comfortable stereo images
- Best Comfort S3D display to automatically assess and ameliorate visual discomfort
- Comfortable S3D contents search/recommendation services based on the automatic comfort classification

– Status of intellectual property right & technology transfer

- Status of intellectual property right

Type	Title	Application number (Date of filing)	Patent number (Date of publication)
Patent	Apparatus and method for visualizing visual discomfort of stereoscopic image and video		10-1356427 (2014-01-22)
Patent	Method and apparatus for visual discomfort metric of stereoscopic video, recordable medium which program for executing method is recorded		10-1220223 (2013-01-03)
Patent	Method for reducing crosstalk based on crosstalk visibility	10-2014-0024866 (2014.03.03)	
Patent	Method for controlling disparity of stereoscopic 3d display	10-2014-0003749 (2014-01-13)	
Patent	Stereoscopic imaging method and system for visually comfortable 3D images	10-2013-0071520 (2013-06-21)	
Patent	Apparatus for visualizing visual fatigue in stereoscopic image	PCT-KR2011-009932 (2011-12-21)	
Software	Visual comfort analyzer for stereoscopic 3D video		C-2014-010201 (2014-05-08)
Software	Visual comfort enhancer for stereoscopic 3D video		C-2014-010202 (2014-05-08)

- Technology transfer

Technology	Items	Form
3D Quality Analyzer	Software, proto-system	Executable file (.exe) or source
3D Quality Enhancer	Software, proto-system	Executable file (.exe) or source

Contact person : Prof. Yong Man Ro | Dept. of EE in KAIST
Tel. +82-42-350-3494 | Fax. +82-42-350-7619 | E-mail. ymro@ee.kaist.ac.kr