2020 3D Media
Spatial Sound and Vision

D5.1 Initial set of test material of 2D-3D image conversion, set of geometric test patterns for testing the correctness of 2D-3D conversion.

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Abstract	In this deliverable we describe the test data provided to the consortium in order to explain the various difficulties included that have to be solved in order to respond to the potential demand of the market. 2D-3D conversion process starts by an automatic or semiautomatic segmentation. This task is the most complex since there is no information available regarding the 3D of the filmed scenes.
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Table of contents

1. Public Executive Summary

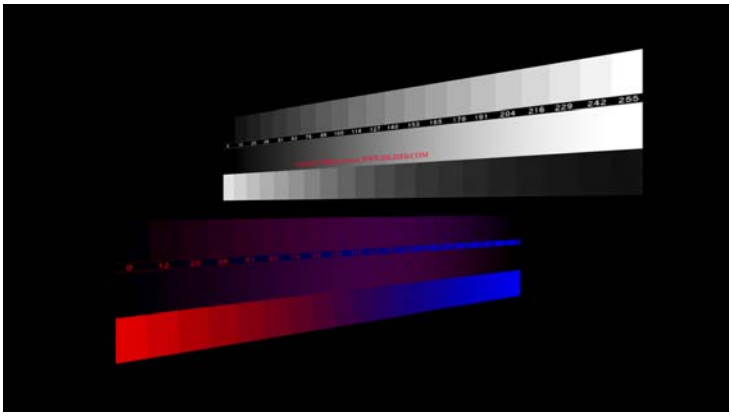
2D-3D conversion process starts by an automatic or semi-automatic segmentation. This task is the most complex since there is no information available regarding the 3D of the filmed scenes. In a regular workflow of conversion, the input is given as a digital 2K movie that we will consider as one dimensional movie for which we need to retrieve the third dimension. The quality of the conversion will be directly proportional to the quality of segmentation. To be able to evaluate the quality of the reconstructed 3D effect, we will use some sequences that we shot using stereoscopic cameras. Various geometric patterns were created in order to test the efficiencies of the future automatic algorithm. We also created 3D sequences using a stereoscopic camera. The evaluation of the 2D-3D conversion quality will be made by comparing the reconstructed 3D effect after (applying 2D-3D conversion to one eye of the test material) to the ground truth coming from the stereoscopic camera. In order to be compatible with the type of sequence that the market will ask us to 2D-3D convert, we provided 3 type of content including various scientific complexities.

2. Introduction

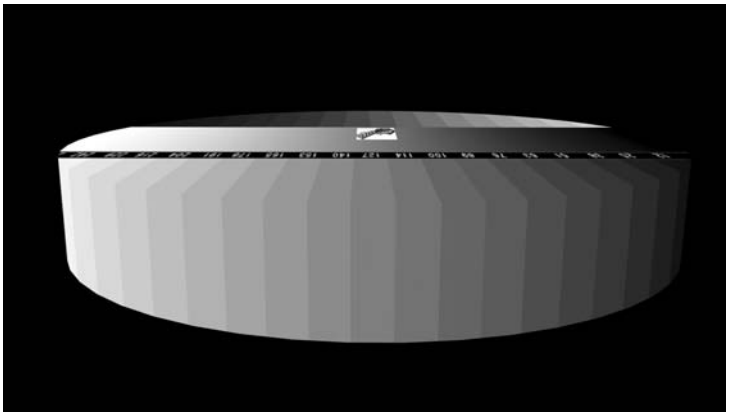
In this deliverable we describe the test data provided to the consortium in order to explain the various difficulties included that have to be solved in order to respond to the potential demand of the market.

3. Description of the provided content and 2D-3D conversion complexities

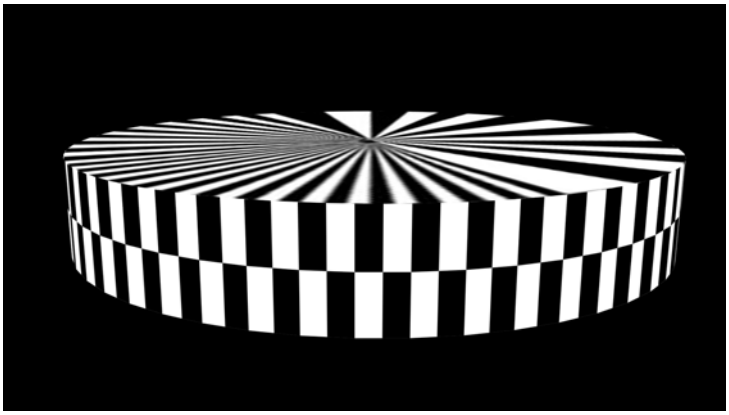
We first created 3D patterns whose geometry is known in order to better evaluate the various future algorithm developed within the project. This sequence is made of 3 patterns that have a large range of depth and various speed of rotation in order to measure the limit of the algorithm to various criteria: “colour information”, “speed and large motion”, “colour gradient”, “continue depth variation”.



First pattern made of 2 rotating planes textured with black and white gradient and discontinuities, and with a colour blending gradient and discontinuities.



Second test is made of a rotative wheel textured with a discontinued black and white pattern.



The last pattern will be very useful to measure the effect of pattern redundancies on tracking algorithms.

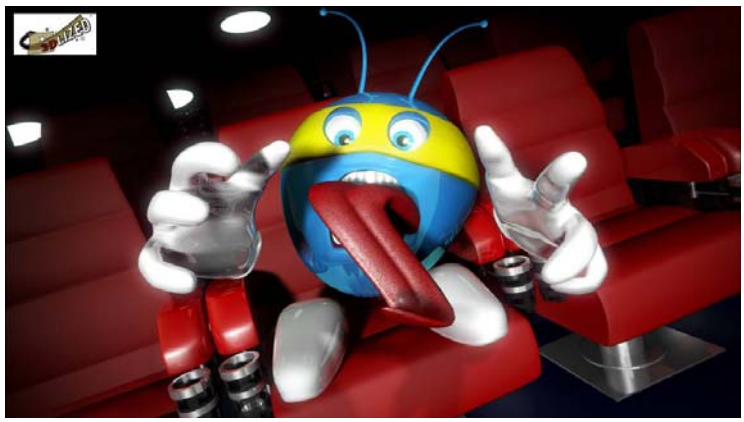
These 3 patterns (wheels and planes) are located half behind the screen and half in front of the screen to compare the future results of tracking on the two types of 3D effects.

Doremi has also provided 3 types of data to the consortium in order to improve and adapt segmentation algorithms (first step in 2D-3D conversion methods) on real sequences:

1. The movie clip called Glam's has been shot outdoor and indoor using a stereoscopic camera. The texture is quite rich and segmentation will be tested widely. This movie is about 3 minutes long and includes some particularly complex images to process for 2D-3D conversion: light reflections and refractions on windshields of cars, light reflections on painting of cars, fast moving and deformable objects such as dresses of women submitted to wind, forest and highly detailed background, variation of lighting conditions such as in a cave of champagne at Pommery (some sequences are even lighted by candle lights). This test is representative of real conditions of future films we will have to convert. This sequence will be used to test the results of our project comparing the 3D made by the stereoscopic camera and the 2D->3D conversion applied to the film on one eye.

2. A movie clip "Kaleidoscope", that relates horse races in 3D, includes 1'30" of 2D images that have been converted by DOREMI/3DLIZED. This movie includes the 3 ways of making 3D effects: Computer Graphic Images for titles, Stereoscopic shooting for the first 5 minutes of film and 2D-3D conversion. The sequence provided to the consortium is the 2D-3D converted one. This sequence is one of the most complex that we could have to process because the horses are running really fast, all legs are of the same colour and none of our algorithm worked event partially. This sequence is provided in order to see if some algorithm could improve the 2D-3D conversion workflow. We don't expect to get full automatic conversion on that sequence, but the new algorithm may help computer graphists to do less manual work.

3. A third movie has been provided to the consortium: this clip is called “Fitou”, it’s a computer graphic movie that includes a very strong “out of screen” effects. The textures and character are easier to detect, but the 3D effect is very strong, we will use this sequence to find the limitations of strength of 3D effects by 2D-3D conversion, when we will take one eye in order to make the conversion. Since the movie is in 3D, we will be able to compare the 2D-3D conversion applied to one eye and the original 3D movie. This movie has been provided to others European consortium, such as 3DPhone, in order to collaborate with other research teams that deal with other kind of displays (Phone, PDA, 3D TV,).



4. Conclusion

This first set of sequences has been used by several partners of 2020 3D Media in order to qualify their in-house algorithms and their improvements. It was important to face real difficulties as a first approach in order to define several sequences that will address particular scientific issues. These sequences will be also a useful material in order to test the algorithms that compute density maps.
We are currently shooting new sequences that will be available for the consortium by the end of January 2009. These new sequences are less complex and will allow the partners to isolate scientific problems in order to solve them independently, in a first step. The 3D parameters were better controlled at the shooting time and the filmed scene is simple enough to be entirely reconstructed in 3D. These materials will give the opportunity to evaluate with a higher precision the comparison between 2D-3D conversion results and the ground truth. These sequences will be also evaluated for 3D comfort on audiences; the best sequences will also represent a “good” (in term of perception) ground truth to the consortium. The 3D pattern developed in this workpackage will also be very usefull to evaluate the quality of perception of the 3D displays. This work will provide a reference to measure the quality of displays (measure of ghosting, colour posterisation effects due to 3D glasses, influence of the speed of rotation onto perception comfort…)