THREE DIMENSIONAL ILLUSTRATING – 2D-3D TRANSFORM

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ABSTRACT. We present in this paper a special computer technique, which can lead us to opportunities of making three dimensional pictures from two dimensional pictures (2D-3D conversion) and we give some examples of illustrating this.

Keywords: *three dimension, photography, educational methods, iconic representations*

ZUSAMMENFASSUNG. Wir präsentieren in diesem Artikel eine spezielle Computertechnik, die uns ermöglicht, dreidimensionale Bilder von zwei dimensionalen Bildern zu machen (2.D - 3.D Konvertierung) und wir zeigen einige Beispiele um das zu illustrieren.

Stichworte: *dreidimensional, Fotografie, Bildungsmethoden, Icondarstellung*

Introduction

Different methods of three-dimensional photography and demonstrating have got abroad in the last decades (Sárosi, 2003; Ferwerda 2003). The huge technical development has brought revolutionary changes in this domain, which lead to new opportunities in education using three-dimensional illustrating. Today you can download free computer programs from the internet, which can help you put together your two-dimensional photographs into a real three-dimensional picture without investing too much energy. Three-dimensional photography earlier could be made only by artist who started using these methods with good theoretical basics and technical instincts. Yet their work of art became a treasure in exceptional cases because of the expensive and complicated three-dimensional illustrating methods. The wide-spread digital photography and computer use gave the opportunity for everyone to make three-dimensional pictures and to make them public. New opportunities with three-dimensional techniques give chance for the birth of new artistic photographs, which can be used in education.

Hereinafter we get to know a special computer technique, which can lead us to opportunities of making three dimensional pictures from two dimensional

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pictures (2D-3D conversion). Many computer programs promote this execution (realization), from which programs we get aquainted with a simply usable one, by presenting some simple examples. If interested in the results of the professional use, one can find on the http://digilander.libero.it/kems/ webpage three dimensional pictures which can be seen with red-cyan glasses, made with transforming different paintings.

Two dimensional – three dimensional conversion programs are based on the movement parallax. The point is, that if one of the two objects with the same size is closer than the other, we see the closer one in a bigger viewing angle. Hence if we move or the object moves, the shift of the closer object's is bigger than the farther one's. Generally, the shift's measurement and the distance from us, beholders, is reverse proportional. We can deduce the distance of the objects from the so-called movement parallax. In the converting program we have to import the two dimensional picture, after this we have to „bring to the softvers knowledge", which are the closer and the farther objects on the picture. For this, there are different methods, which can vary within the same program.

Methods

In a previous article we present in detail the biological roots of three-dimensional visualization, the phenomena of movement parallax, which can be used efficiently in making three-dimensional graphics, the Zöllner- and Corridor-illusion. We described the visual elements, which contribute to define a plane two-dimensional image in three-dimension: coherent lines, the covering, the measurement changes, the relative altitude state, the abatement of detail profusion, the shadings and the perspective effects of colors (Szállassy et al., 2009).

To look 3D pictures we need 3D glasses, which can be active or passive. Modern active glasses can be controlled by microprocessors, and accordingly synchronized with the projected image either the left or the right lens are covered. In this way the image in our brain becomes a 3D image with deep-stridency. Toward the active glasses the synchronized signs are assured from the transmitter of the projector or from a little unit. The question is when will this technology used in everyday education.

The most appropiate method has to be chosen by the user on the bases of the picture's type. The Bas-relief 1.25 program requests the spatial information as a depth map, where the closer elements of the picture are marked with clearer nuance, the farther ones are with darker nuance.

The Bas-relief 1.25 program (figure 1.) can be downloaded from the http://www.3dphotopro.com/software.html web address. For the 3D Gugle program (http://www.magia.it/Alfa23/3DGugle/NewGugHlp.htm) we can give the information about the space, by coloring one after the other in different strata the farther and the closer picture elements. This program is used especially for paintings to be transformed into three dimensional pictures, for after all two dimensional pieces of art's can not be illustrated into three dimension pictures by other ways.
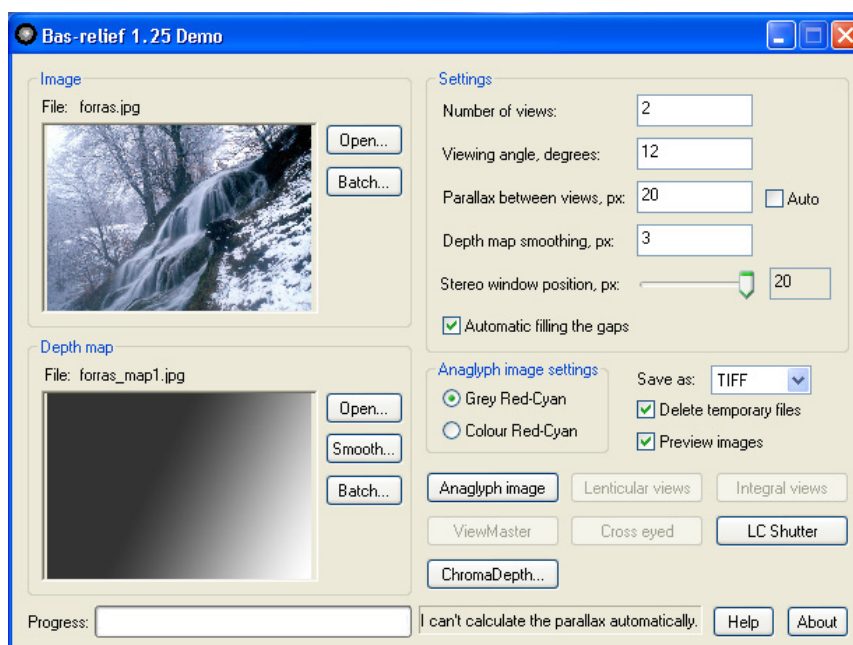
Fig. 1. The Bas–relief 1.25 Demo program operational system for 2D-3D transform

Results

The most computer drawing programs already dispose color transition for the fill of lineal drawings, which use, in many times can be create depth map with just few clicks. In what follows, we will see some examples for this.

On the picture above the distance between the objects grow from the right bottom corner untill the left top corner, therefore it is simple to visualize the depth map. It is subservient to concentrate the rattling three dimensional effect on the waterfall situated in the centre of the image. This way we have to realise a depth-map which concentrates the light-dark colour transition.

In the case of Hortobágy white alkali lake, first we transform the coloured picture into a black-white picture, then we establish on the water surface a grey-nuanced gradient wich is getting darker upwards (figure 2.). Next, we color black the far situated reedy, and on the sky we put another grey-nuanced gradient wich is getting darker upwords, which we make it transparent in 80% (figure 3.). This way we make not just the sky look three dimensional, but some clouds too. After we imported the original picture and the grey-nuanced depth-map by clicking on the "Anaglyph image" the "Bas-relief" program creates the tree dimensional picture which can be viewed with red-cyan glasses (www.freeweb.hu/kriskagy/3d1.htm).

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Fig. 2. The first steps of a depth-map making on an Hortobágy white alkali lake

Fig. 3. The final steps of creating depth-map from a Hortobágy white alkali lake

In some cases some of the objects appear in different distance. In making the depth-map from the picture's closer objects we have to mark them (circle them) and we have to make the grey-nuanced gradient. On the undermentioned pictures this method can be examined in the case of Tisa riverride greenwood (figure 4.).

We can use successful 2D-3D transforming in macrophotos too. In making depth-map of pictures illuminated by flashlight, it is enough if we transform the picture into grey-nuanced (figure 5.), after all the closer parts are better illuminated by the flashlight, this way those will appear lighter than the farther ones. In the case of darker, closer objects a correction might be needed because of the pattern, in this case, making lighter the originally, complite dark eye. In the case of photos made with light-microscope, near the forementioned method it can lead to a succesful result if we make a black-white negative picture (figure 5.). During some manipulation we have to pursuit to visualize true to life, wether the pictures from the final result reflect the true anatomical relations.
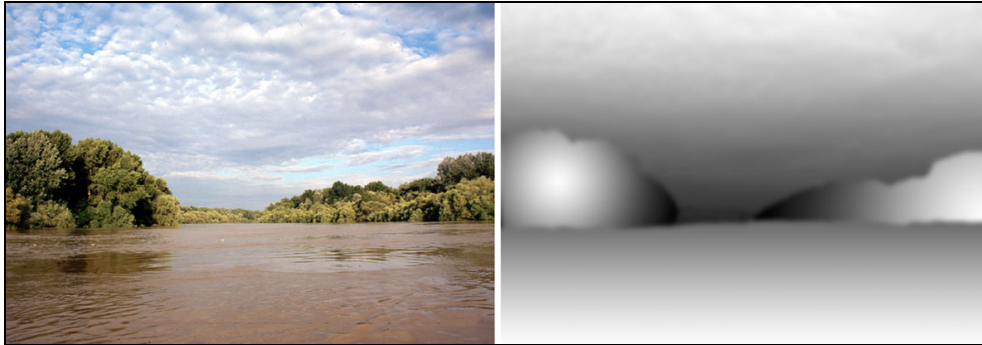
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Fig. 4. The grey-nuanced depth-map of the Tisa and the two dimensional picture

Fig. 5. Grey-nuanced depth-maps, black and whitw positive and negative picture: common dragonfly transfiguration – macro photo, young fish – microscopical photo

Conclusion

With 3D technology, teachers get a new opportunity to involve pupil in education and learning courses. 3D technology is an opportunity which certainly will capture the attention of pupil and will make curious the laziest child too. It isn't hard to imagine how spectacular and easy could be the understanding-learning process be at an anatomy lesson, geography, history or biology topic using 3D technology. After a class like this, it wouldn't be hard to imagine that the pupil would run home excited and tell about the days biology class. Which else, if this isn't the aim of education? Today the 3D projection techniques are available for everyone and more and more curriculae appear on the market which can be studied specifically in 3D surroundings. It is certain that the opportunity of 3D projection could be the next step of the understanding-learning evolution. It is an acknowledged

fact that we don't learn in a similar way, some learn visually, others learn after sounds and there are some who can learn better with touchable experience. Anyhow, 3D projection and learning helps very much. There are studies which demonstrate that students who use 3D technology in studying get much higher grades and in class tests and during exams. Thus the results are better, the activity and the interest can't be compared with the experiences in traditional education.

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