Higher order multiview wavelets

Vladimir Saveljev[1,2]
[1]**Dept. of Inform. Display Engineering, Hanyang University, Seoul 133-791, Korea**
[2]**Imaging Media Research Center, KIST, Seoul 136-791, Korea**
Tel.:82-2-958-5794, E-mail: saveljev.vv@gmail.com

The synthesis and analysis of the multiview images in real time is one of important problems of 3D imaging and 3D image processing in autostereoscopic multiview and integral displays.

Previously we proposed the multiview wavelets [1], [2] based on the Haar function, which itself defines a family of wavelets. However, since the Haar function can be alternatively considered as the B-spline of 0th order [3], [4], then along with the Haar-based multiview wavelets, it is possible to build multiview wavelets of the higher orders based on the B-splines.

In this paper, we present the wavelets and the analysis of a multiview image using such multiview wavelets. A distinctive feature of B-splines is the compact support. Examples of two-dimensional (2D) wavelets based on the B-splines of 0^{th}, 1^{st} and 2^{nd} order are shown in Fig. 1. The analysis of a multiview testing image of a tetrahedron is shown in Fig. 2.

Fig. 1. ***2D multiview wavelets of 0th, 1st and 2nd order (left to right)***

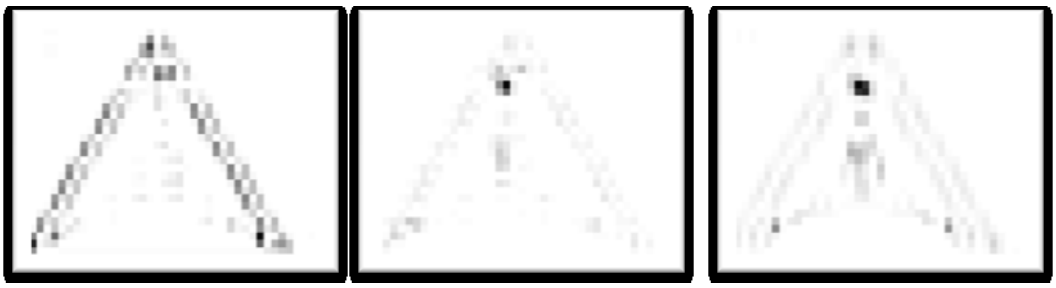

Fig. 2. ***Image analysis using wavelets Fig. 1.***

Figure 2 confirms, for instance, that the point near the upper apex of the testing object lies in the 3^{rd} depth plane; its recognized position corresponds to the spatial structure of the testing object. Relatively to the 0^{th} order Haar-based wavelets, the multiview wavelets of the higher (1^{st} and 2^{nd}) orders show a higher selectivity; compare, for example, the wide-spread transform of 0^{th} order (Fig. 2, left) with the clearly concentrated transforms of the higher orders (Fig. 2, middle and right).

The wavelet analysis using the proposed multiview wavelets of higher orders shows a good recognition of the locations of particular points.

References

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