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A New 3D Shape Descriptor Based on Multi-Resolution and Multi-Block CS-LBP

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Abstract : In content-based 3D shape retrieval system, achieving high search performance has become an important research problem. A challenging aspect of this problem is to find an effective shape descriptor which can discriminate similar shapes adequately. To address this problem, we propose a new shape descriptor for 3D shape models by combining multi-resolution with multi-block center-symmetric local binary pattern operator. Given an arbitrary 3D shape, we first apply pose normalization, and generate a set of multi-viewed 2D rendered images. Second, we apply Gaussian multi-resolution filter to generate several levels of images from each of 2D rendered image. Then, overlapped sub-images are computed for each image level of a multi-resolution image. Our unique multi-block CS-LBP comes next. It allows the center to be composed of m-by-n rectangular pixels, instead of a single pixel. This process is repeated for all the 2D rendered images, derived from both 'depth-buffer' and 'silhouette' rendering. Finally, we concatenate all the features vectors into one dimensional histogram as our proposed 3D shape descriptor. Through several experiments, we demonstrate that our proposed 3D shape descriptor outperform the previous methods by using a benchmark dataset.

Keywords : 3D shape retrieval, 3D shape descriptor, CS-LBP, overlapped sub-images
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