

# Variants of the Marching Cubes algorithm

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## Abstract

Creation and manipulation of images contribute toward the understanding of complex structures, such as in applications concerned with medical studies, mainly based on X-ray computed tomography and magnetic resonance images. One of the most used algorithms in this domain for 3D modeling and enhanced visualization is the Marching Cubes. Marching cubes algorithm extracts polygonal mesh of an isosurface from a 3D field, and is known for its low computational cost and high robustness. Here, we discuss variants of this algorithm developed to generate polygonal meshes with superior quality; however, these new algorithms present higher computational costs than the original one. Two variants are faster than the Marching Cubes original algorithm and generate polygonal meshes with similar quality. Besides, other two variants are faster and generate polygonal meshes with poorer quality. In addition, one variant was developed to generate polygonal meshes with less aliasing than the Marching Cubes. In general, the authors of these variants compared their algorithm only with the original Marching Cubes algorithm. This is a work in progress about 14 variants of the Marching Cubes algorithm. Concerning the nine variants that generate polygonal meshes with better quality, we intend to compare their quality and performance. Regarding the two variants that generate polygonal meshes with similar quality, we intend to compare which one is faster. Finally, we will study the computational cost of the two variants that generate polygonal meshes with worse quality.

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