Anti-Aliasing Through the Use of Coordinate Transformations

Kenneth Turkowski
CADLINC, Inc.
480 California Avenue
Palo Alto, CA 94306

Abstract

The use of the point-line distance in evaluating the 2-dimensional anti-aliasing convolution is studied. We derive transformations of the point-spread function (PSF) that give the effective convolution in terms of the point-line distance when the class of object space primitives is limited to lines and polygons. Because the quality of filtering is embedded in a table indexed by the point-line distance, this approach allows one to use arbitrarily complex PSF's, only the width and not the shape of the PSF affects the amount of computation. We apply the CORDIC algorithm to point-line distance evaluation, and show its merits. Also, we show the more standard use of the CORDIC algorithm for coordinate rotation, polar-to-rectangular and rectangular-to-polar conversion, and calculating the norm of a vector. Rounded end points can be achieved by using the point-segment distance, computational methods are given, including CORDIC implementation. The CORDIC algorithms for the aforementioned geometric operations are prime candidates for VLSI implementation because of their inherent parallel/pipeline nature.

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