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Voronoi Stippling Report

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1 Summary of the two methods

In this introductory section, the methods and algorithms employed by the two stippling techniques shall be reviewed.

1.1 voronoi method

Algorithm for computing the Voronoi Diagram

Centroidal Voronoi Tessellation (CVT)

Stippling Method

Text here [1]

1.2 hedcuter method

Using an iterative approach, the hedcuter stippler uses simple rejection sampling to generate an initial distribution of points, or centroids, within the confines of a given image. The algorithm compares the grayscale value of the randomly selected location within the image and applies a gaussian scaling factor. The point is either accepted or rejected based on satisfying a predetermined threshold. Once the inital points are determined, a set of right cones are generated with apexes at the cell generator. Initially the cones have equal height. Each cone is also assigned a unique "color" to identify it later. The intersection of the cones in the z-direction will determine to which cone the pixels of the original image belong. In this way, the pixels are assigned a unique value which determines to which Voronoi Cell the pixels belong.

The weighted Centroidal Voronoi Tessellation (CVT) used by the hedcuter algorithm makes use of a density function to distribute, and realign, the centroids of the Voronoi Diagram. Darker areas (lines, edges, etc.) are assigned a higher density than lighter areas. As the algorithm iterates through the image, centroids tend to migrate towards higher density regions.

The stippling method invoked by the hedcuter places a variably sized disk, centered at the centroid of the cell. Two options exist within the code: uniformly sized disks and variably-sized disks. Various levels of gray may be obtained by uniform-sized disks at varoius spacing densities or by varying the sizes o fthe placed disks. Colored disks may also be used in conjunction to create various tones. [1]

***** uses precomputed stipple "tiles" to fill a Voronoi cell. Each pixel in the image is examined and an appropriate stipple patern applied

2 Comparison of the two methods

2.1 Multipass Results

2.2 Variations on Number of Disks

2.3 Variations on Speed with Number of Disks

2.4 Differences in image type

2.5 Differences from WSJ Hedcuts

3 Improvement of hedcuter method

References

[1] Adrian Secord. Weighted voronoi stippling. In *Proceedings of the 2nd International Symposium on Non-photorealistic Animation and Rendering*, NPAR '02, pages 37–43, New York, NY, USA, 2002. ACM. 1.1, 1.2