Graphisme, animation et nouveaux médias Partition of unity parametrics for texture synthesis

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Abstract

Graphics, Animation and New Media

Partition of unity parametrics (PUPs) are a recent framework designed for geometric modeling. We propose employing PUPs for procedural texture synthesis. Using PUPs to interpolate among data values distributed through the plane, the problem of texture synthesis can be approached from the perspective of point placement and attribute assignment.

[1] P ERLIN K.: An image synthesizer. SIGGRAPH Comput. Graph. 19, 3 (July 1985), 287-296. [2] RUNIONS A., S AMAVATI F. F.: Partition of unity parametrics: a framework for meta-modeling. The Visual Computer 27, 6-8 (2011), 495-505.

[3] W ORLEY S.: A cellular texture basis function. In Proceedings of the 23rd annual conference on Computer graphics and interactive techniques (New York, NY, USA, 1996), SIGGRAPH '96, ACM, pp. 291-294.

Summary

PUPs-based textures properties:

- Arbitrary topology of control net
- Local support
- Control the weight with orientation (figures on the right)
- High-continuity interpolation - Texture synthesis tasks is a point distribution tasks
- Creation of both stationary and non-stationary textures

Algorithm:

- Distribute points through the plane
- Each point has an associated value (color, intensity)
- PUPs interpolates the values over the plane to produce the texture







Progressive textures

Results







Iterative process





Color assignment according to location



Spot textures



Cellular textures













Noises with cells





Color interpolation