**Algorithm pipeline**

|  |  |
| --- | --- |
| **Input:** | I: A gray-scale image of cellular solid;  T: The error threshold to terminate the loop  e: initial error |
| **Output:** | D: A power diagram that fits the image of cellular solid |
| **1:** | Define bounding domain S from image I |
| **2:** | Extraction of two skeletal point set from the void and the solid and denote them Q and P, respectively |
| **3:** | Initialize a point set X from Q |
| **4:** | Two-step Optimization Loop,  repeat if e < T |
| **4-1:** | D <-- PowerDiagramGenerator(X, Domain) |
| **4-2:** | D <-- Reconstructor(P, D) |
| **4-3:** | X+ <-- MeshOptimizer(D, X) |
| **4-4:** | e <-- norm(X+-X) |

**Three key components:**

* PowerDiagramGenerator: generate from X a clipped power diagram, D, bounded in S
* Reconstructor: update D such that D is a good reconstruction of P
* MeshOptimizer: optimize X to generate D

**Challenges:**

**Q1: Initialization of X and how many X we need?**

A1: This can refer to the very beginning report of mine, which states a method that decomposes the domain into quads using Voronoi decomposition.

An asymmetric issue occurs and cannot be handled by my previous proposal because the previous method desired to delineate the material interface by Voronoi decomposition computed by the two sets of skeletal points.

This time, I use only one set of the skeletal points, and assume the materials to be cellular solid which presents more regularity in its shape.

**Q2: How many sites in X should we initialize?**

A2: This shouldn’t be a problem since what we rely on is the power diagram that can make useless sites hidden by adjusting their weights. What we need to do is to ensure that the MeshOptimizer can reliably adjust the weights of sites.

**Q3: A1 gives a very good initialization for generating the diagram. If we do not have a very good initialization in some extreme cases, can we solve the problem as good as possible?**

A3: In what situation we may end up with a poor initialization? In situations where the maxima of the gray-scale scalar field are cluttered or where the gray-scale image is in 3D.