ElementSets from MeshConnectivity

VertexOneRing, Faces from Neighborhoods(M)

$$M: \text{ TriangleMesh}$$
$$x_i \in \mathbb{R}^3$$

$$V, E, F = \mathit{ElementSets}(M)$$

$$\mathit{UpdateStep}(i, j, k, d) = \begin{cases} p & \text{if } s_{1,1} < 0 \text{ and } s_{2,1} < 0 \\ \min\left(d_j + \|x_j - x_i\|, d_k + \|x_k - x_i\|\right) & \text{otherwise} \end{cases}$$

where

$$i, j, k \in V$$
$$d_i \in \mathbb{R}$$
$$X = \begin{bmatrix} x_j - x_i & x_k - x_i \end{bmatrix}$$
$$t = \begin{bmatrix} d_j & d_k \end{bmatrix}^T$$
$$Q = \left(X^T \ X\right)^{-1}$$
$$1 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$
$$p = \frac{1^T \ Q \ t + \sqrt{\left(1^T \ Q \ t\right)^2 - 1^T \ Q \ 1 \cdot \left(t^T \ Q \ t - 1\right)}}{1^T \ Q \ 1}$$
$$n = X \ Q \ (t - p \cdot 1)$$
$$s = Q \ X^T \ n$$

$$\mathit{GetNextLevel}(U) = v - s$$

where

$$U_i \subset V$$
$$s = \bigcup_i U_i$$
$$v = \mathit{VertexOneRing}(s)$$

$$\mathit{GetRangeLevel}(U, a, b) = \bigcup_{i=a}^{b} U_i \text{ where } U_j \subset V, a, b \in \mathbb{Z}, \text{ index}$$

$$\mathit{GetLevelSequence}(U) = \begin{cases} \mathit{sequence}(U, n) & \text{if } |n| \neq 0 \\ U & \text{otherwise} \end{cases}$$

where

$$U_i \subset V$$
$$n = \mathit{GetNextLevel}(U)$$