

ElementSets from MeshConnectivity

VertexOneRing from PointcloudNeighborhoods(M)

M : PointCloud

$$x_i \in \mathbb{R}^3$$

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

$$\text{cov}(v) = \sum_{n \in N} (x_v - \bar{p}) (x_v - \bar{p})^T$$

where

$$v \in V$$

$$N = \text{VertexOneRing}(v)$$

$$\bar{p} = \frac{\sum_{n \in N} x_n}{|N|}$$