To address the following questions:

- Minimal (Maximal) Volume Polyhedronization
- Approximate MINVPs & MAXVPs generated
- Algorithms to find the path contained in a closed, simply-connected as well as multiply-connected contour and having shortest length was developed and implemented.
- Shortest Interior Path (SIP)

Shaped Interior Path (SIP)

Algorithms to find the path contained in a closed, simply-connected as well as multiply-connected contour and having shortest length was developed and implemented.

**Minimum enclosing hyper-sphere**

Computing the minimum enclosing circle/sphere of a point set is a classical problem in Computational Geometry. We generalized this approach to compute the minimum enclosing hyper-sphere of finite-line curves, surfaces, hyper-surfaces, as well as points, that is applicable to arbitrary dimensions.

**Configuration**

Given a finite set of points in $\mathbb{R}^d$, the problem is to find the smallest hyper-sphere that contains all the points.

**Algorithm**

1. Consider the barycenter $P$ of the point set $S$.
2. For each point $P_i \in S$, compute the distance $d_i = \|P - P_i\|$.
3. Find the point $P_j$ with the minimum $d_j$.
4. The minimum enclosing hyper-sphere is the smallest hyper-sphere containing $P$ and $P_j$.

**Applications**

- Object recognition
- Shape analysis
- Computer graphics
- Computer vision
- Medical image processing

**Results**

- Accurate and efficient implementation.
- Scalable to high dimensions.
- Robust to noise and outliers.

**Future Work**

- Implement in parallel.
- Explore applications in higher dimensions.

**Summary**

The minimum enclosing hyper-sphere is a fundamental problem in computational geometry with applications in various fields. The algorithm presented is efficient and scalable, making it suitable for high-dimensional data.

**References**


**Contributors**