

## Terms and functions

---

- **VisiblePoints** : Number of point visible from all the selected OCs when rendered from a top view.
- **VisibleInliers** : Number of VOP point that has and inlier in the point cloud.
- **UniqueVisibleInliers**: Number Visible Inliers that does not share indexes in the Point Cloud. Only if more than two OCs are colliding is .
- **InliersThreshold**: Theshold to determine what the ration between VOP and VOI needs to be for cost to increase. Used differently in GEIC than in GEICS and GEUICS.
- **PointCloudPoints**: Number of points in the pointcloud(the one captured by scape).
- **CollisionDepth**: The maximum penetration depth for a OC in a given hypothesis.
- **OCScore**: Score for a given OC, in the scape dataset this is given.
- $\sigma(x)$ : function used for discounting inliers based on collision

$$\sigma(x) = \frac{1}{1 + e^{-g*(x-c)}} \quad (1)$$

- **g**: sigmoid growth rate
- **c**: sigmoid center

- **PenalizedVisibleInliers**:

$$\text{PenalizedVisibleInliers} = \sum_{\text{SelectedOC}(SOC)} \text{VisiblePoints}_{SOC} \cdot \sigma(\text{CollisionDepth}_{SOC}) \quad (2)$$

## Genetic Evaluators(GEs)

---

### Genetic Evaluator Inlier Collision(GEIC)

$$\text{cost} = \text{VisiblePoints} - \frac{\text{PenalizedVisibleInliers}}{\text{InliersThreshold}} \quad (3)$$

### Genetic Evaluator Inlier Collision Scaled(GEICS)

$$\text{cost} = 1 - \frac{\text{VisibleInliers}}{\text{PointCloudPoints} + \max(\text{InlierThreshold} * \text{VisiblePoints} - \text{PenalizedVisibleInliers}, 0)} \quad (4)$$

### Genetic Evaluator Unique Inlier Collision Scaled(GEUICS)

$$\text{cost} = 1 - \frac{\text{UniqueVisibleInliers}}{\text{PointCloudPoints} + \max(\text{InlierThreshold} * \text{VisiblePoints} - \text{PenalizedVisibleInliers}, 0)} \quad (5)$$

## Genetic Evaluator Score Collision(GESC)

$$cost = - \sum_{SelectedOC(SOC)} OCScore_{SOC} * (1 - 2 * \sigma(CollisionDepth_{SOC})) \quad (6)$$