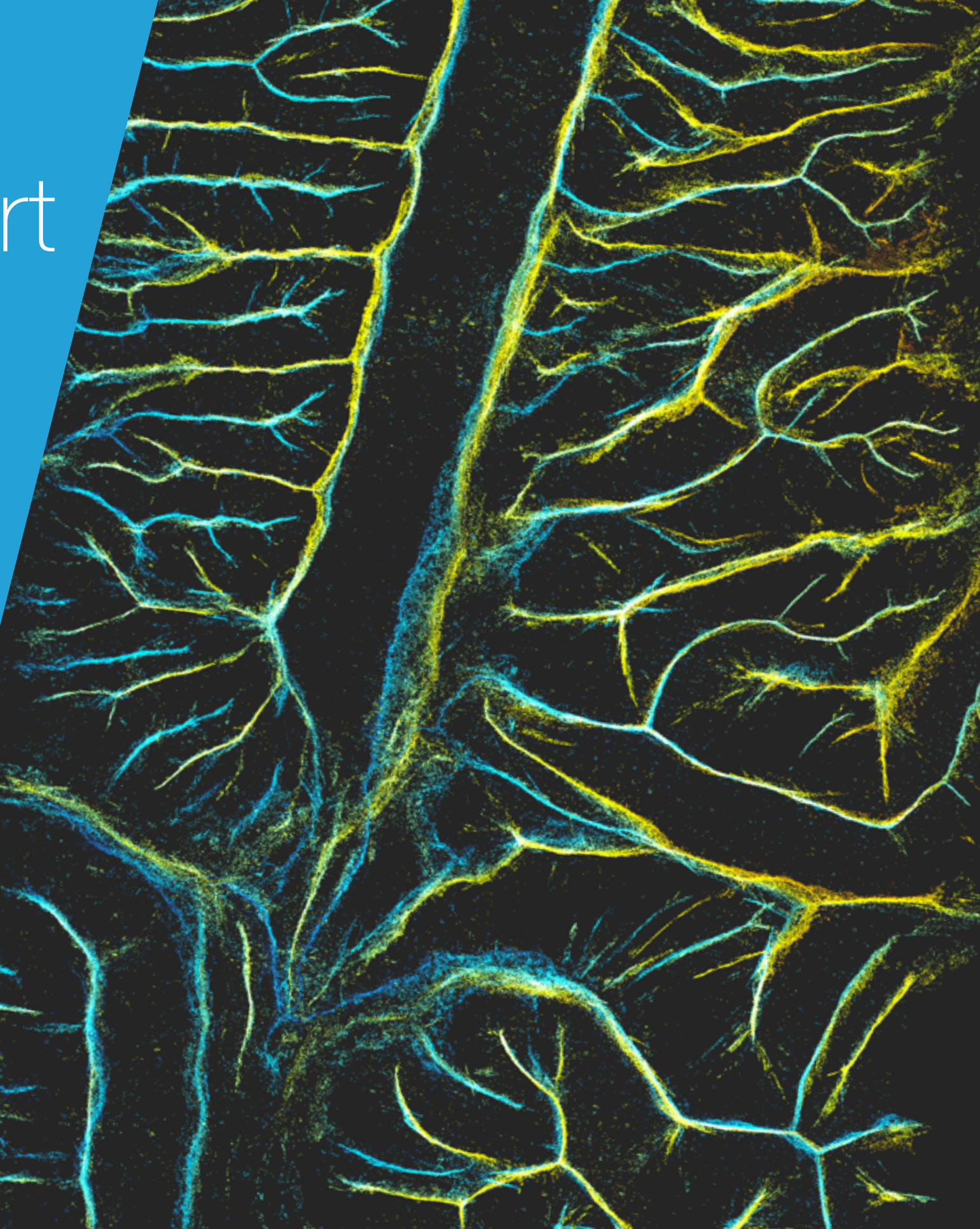
3DSM
Progress report

4th User Committee meeting
Zwolle, 19 january 2016

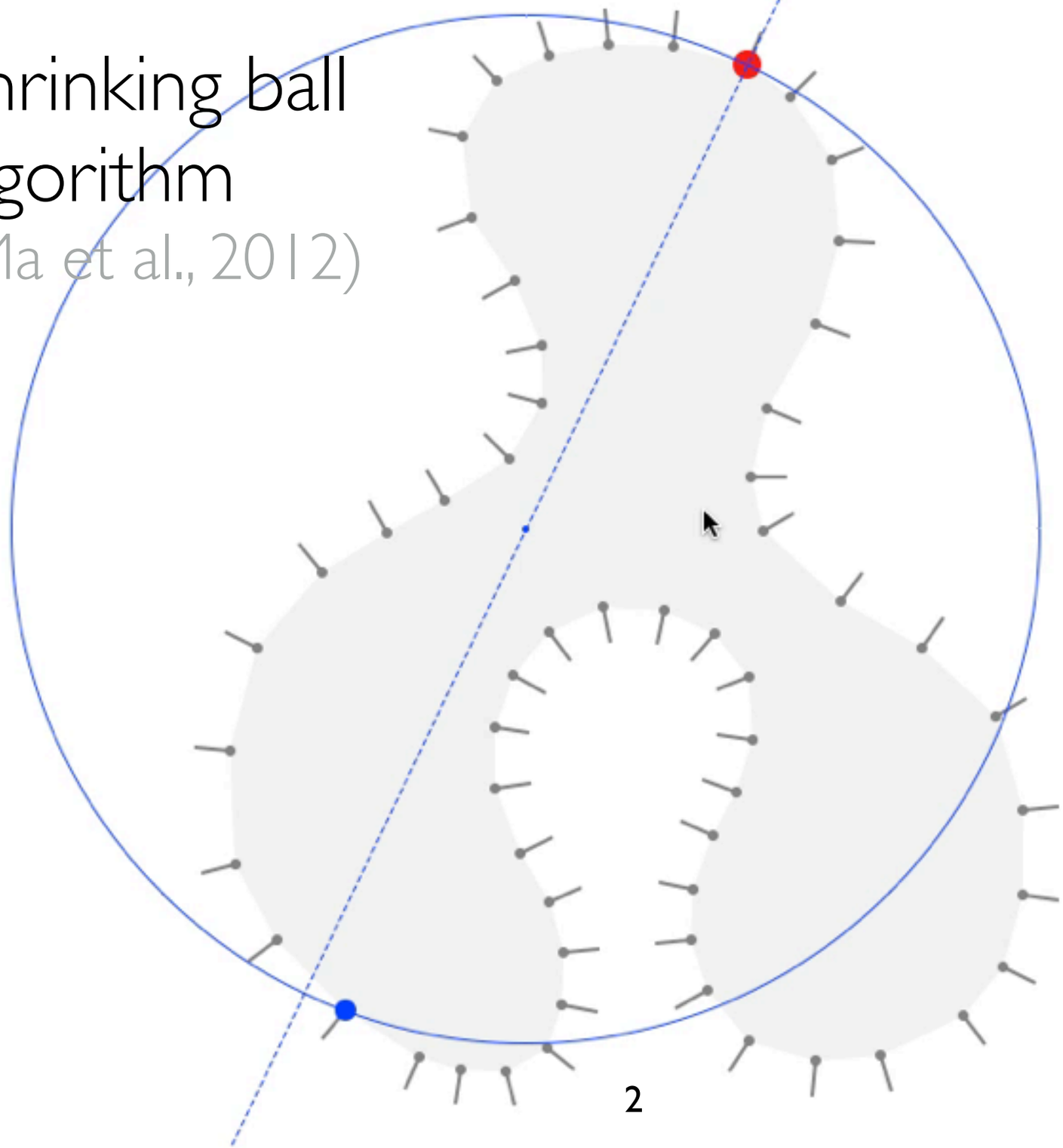
Ravi Peters
Hugo Ledoux
Jantien Stoter

TU Delft
3Dgeoinfo



MAT approximation

Shrinking ball algorithm
(Ma et al., 2012)



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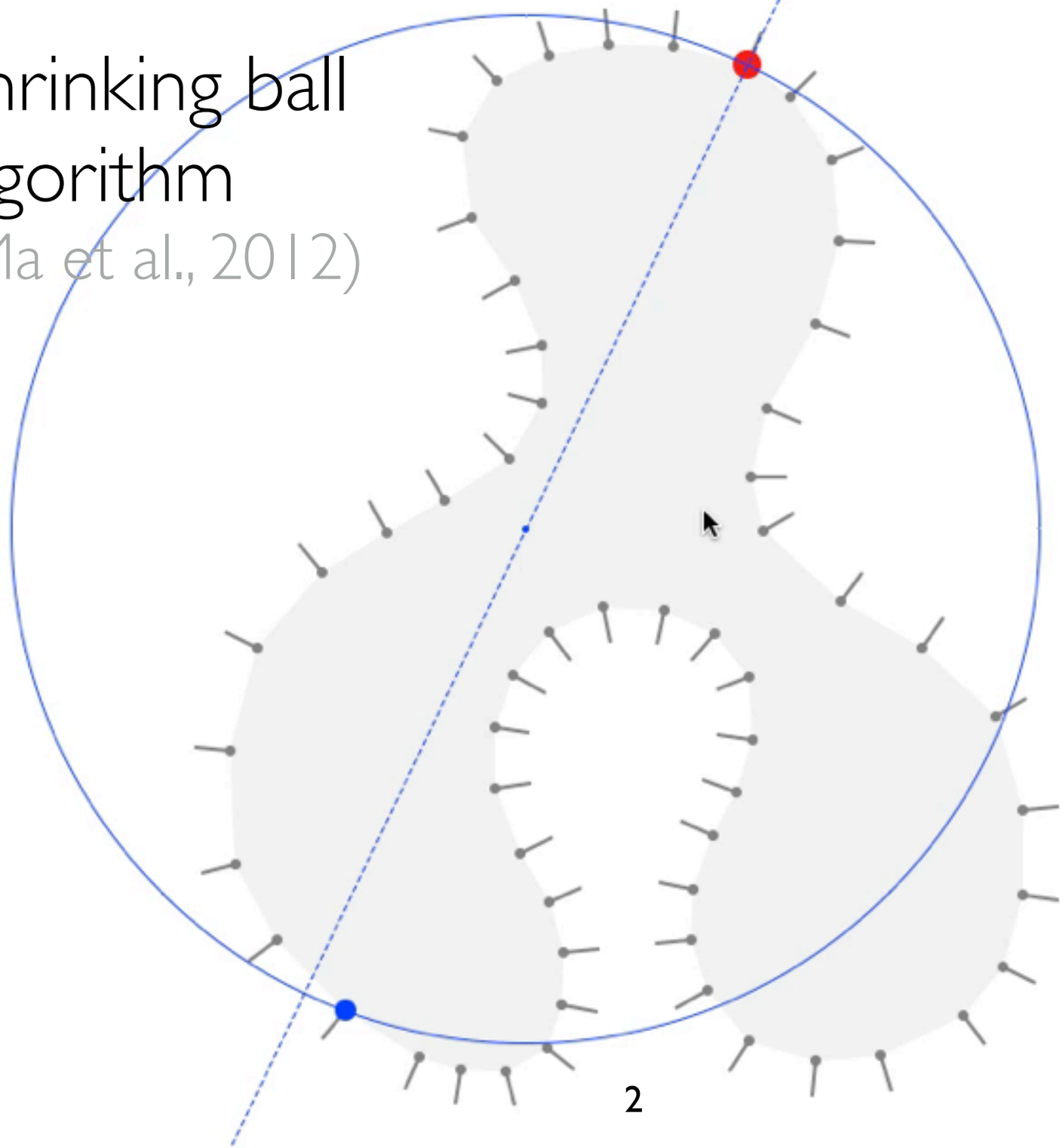
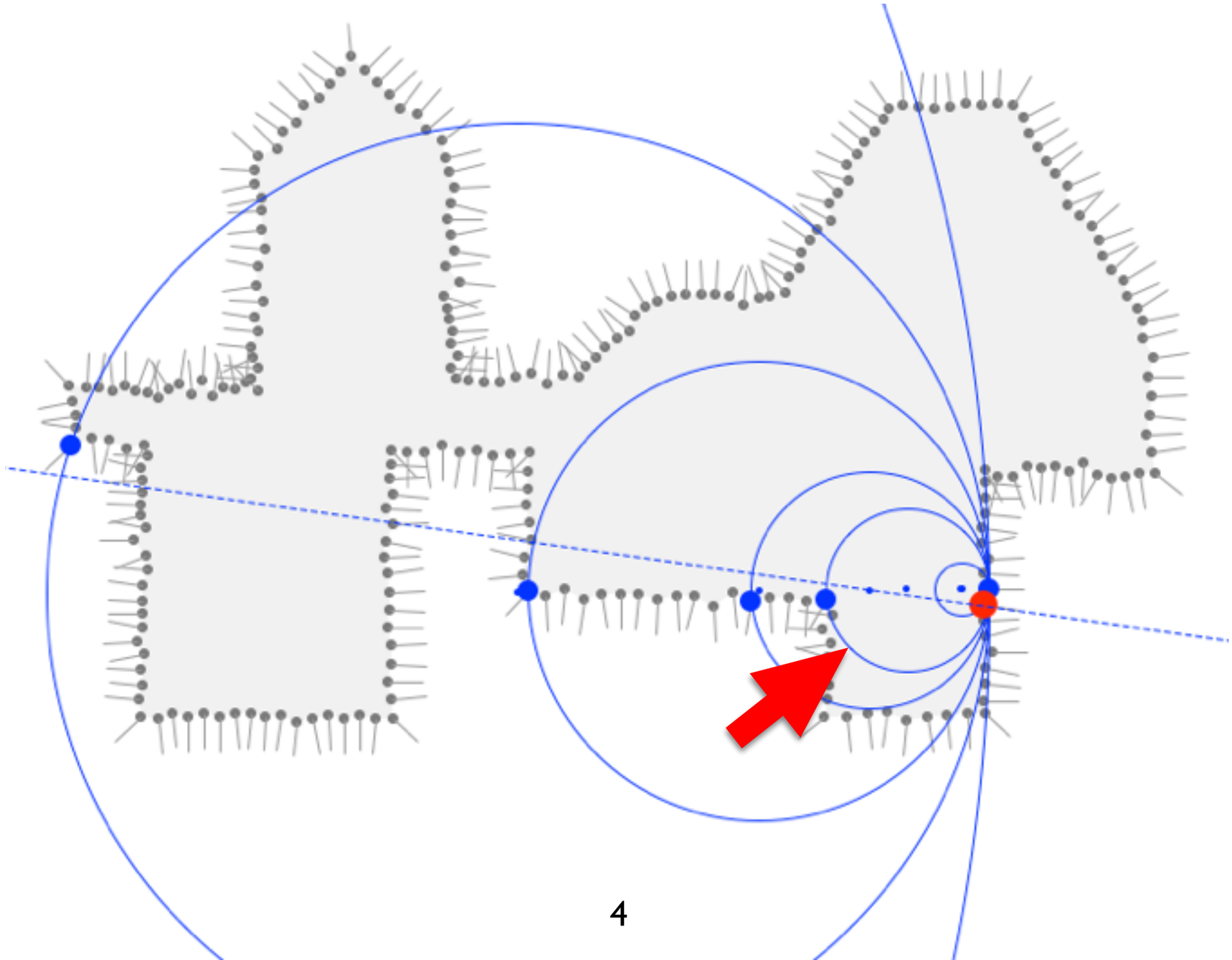


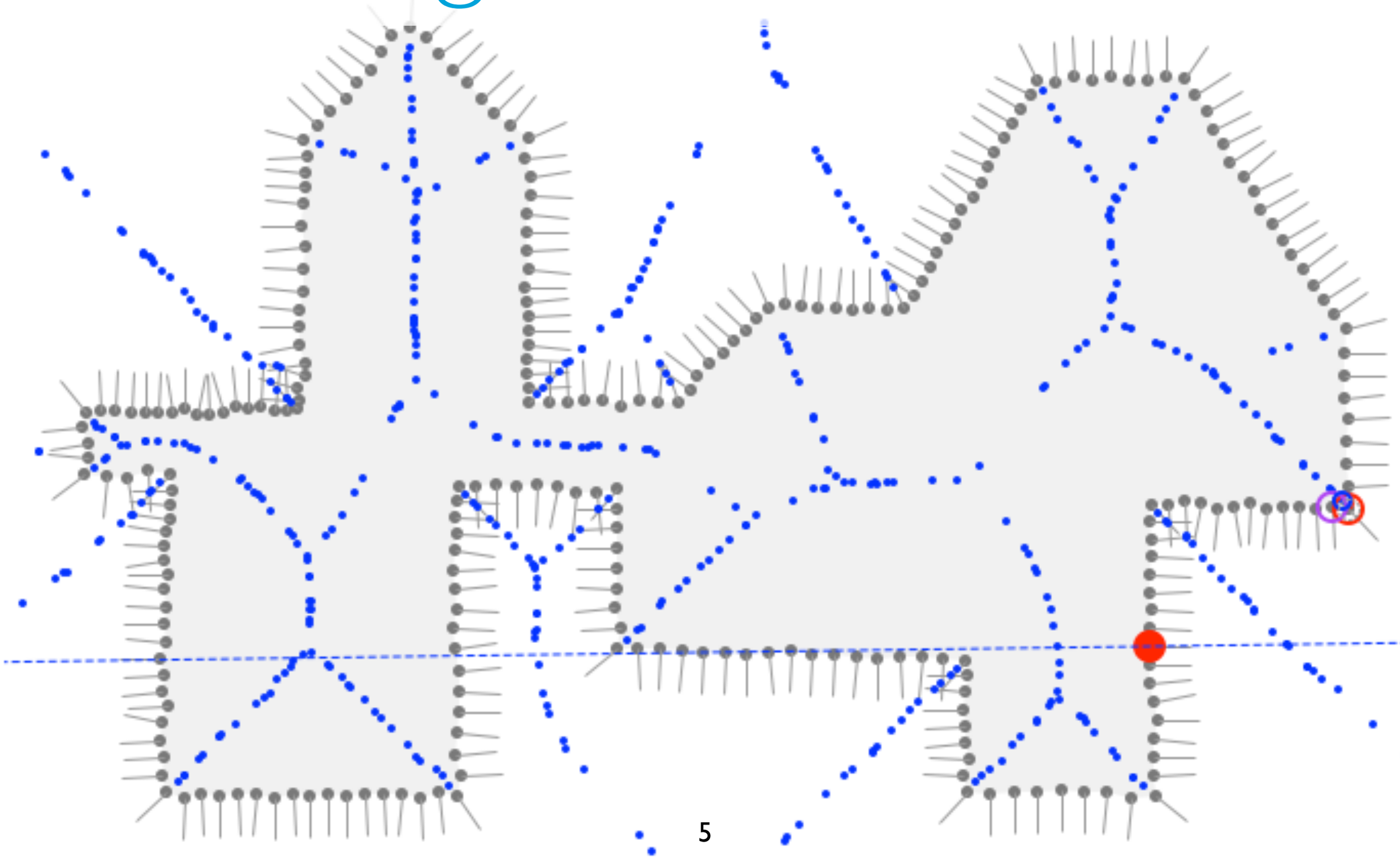
Dealing with noise

Dealing with noise

Even for noisy points, 'good' ball is computed



Dealing with noise

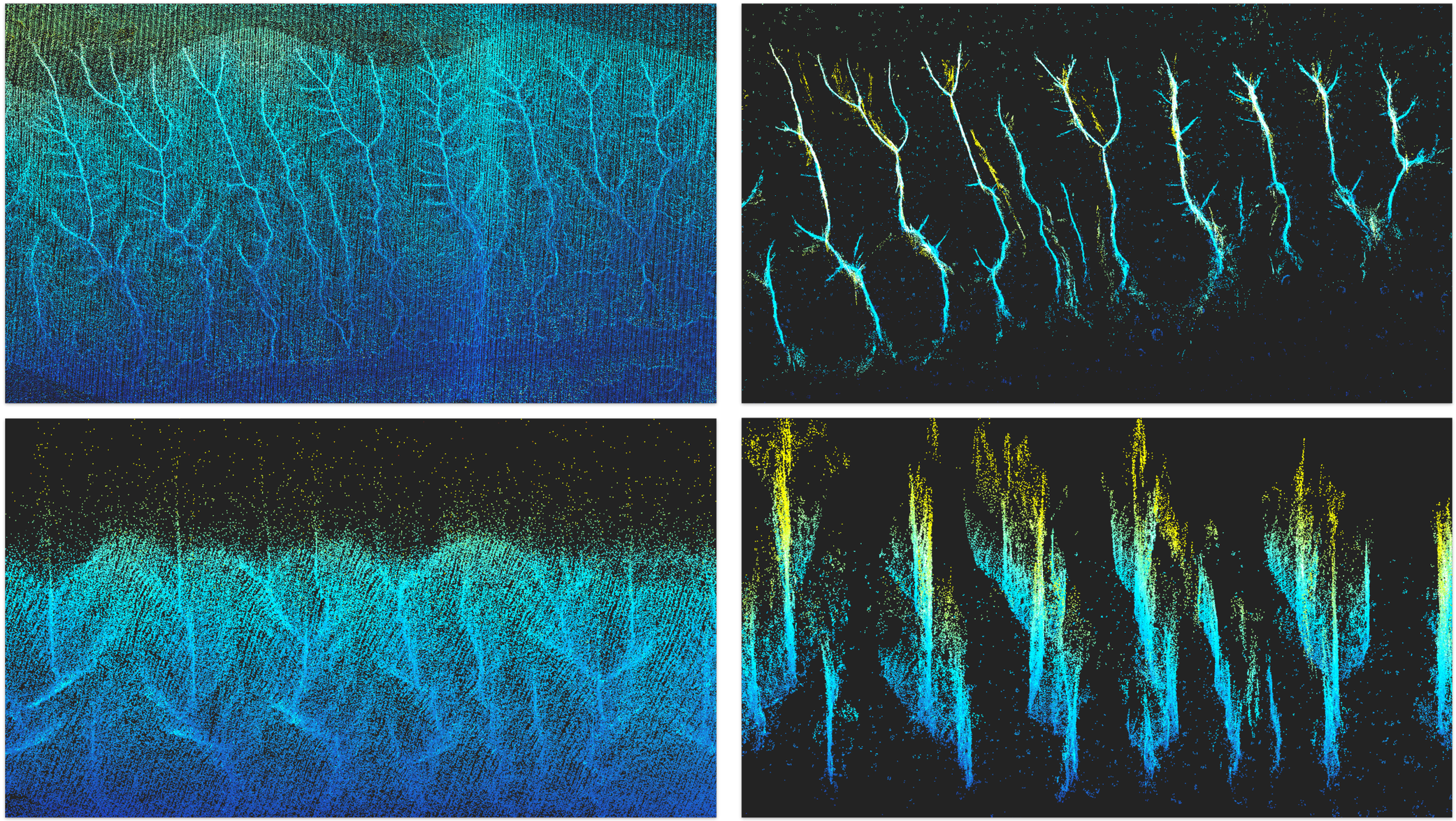


Dealing with noise

Without denoising

With denoising

Top-view

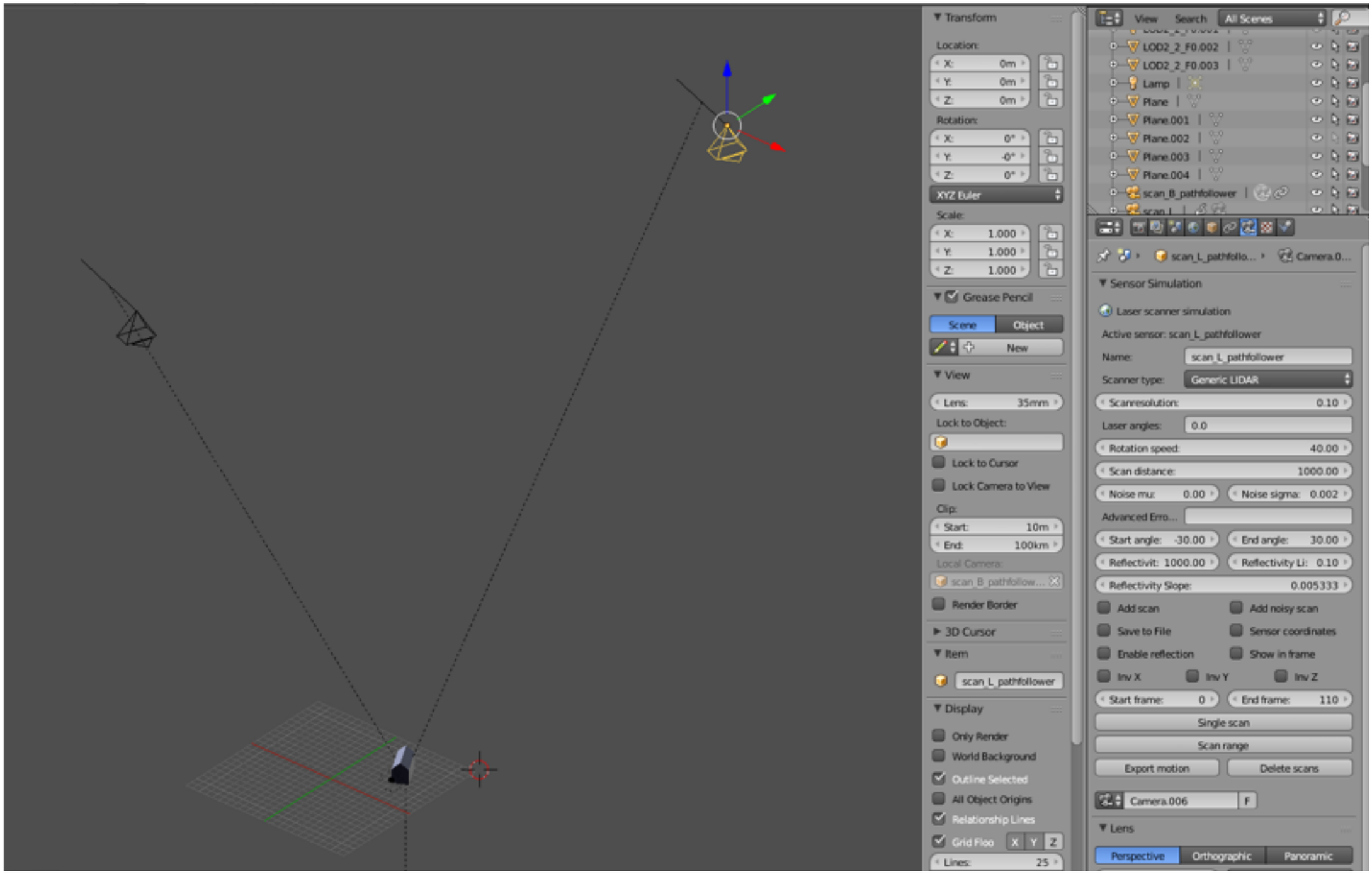


Front-view

Robust MAT approximation

Robust MAT approximation

Simulated point clouds



Simulated point clouds

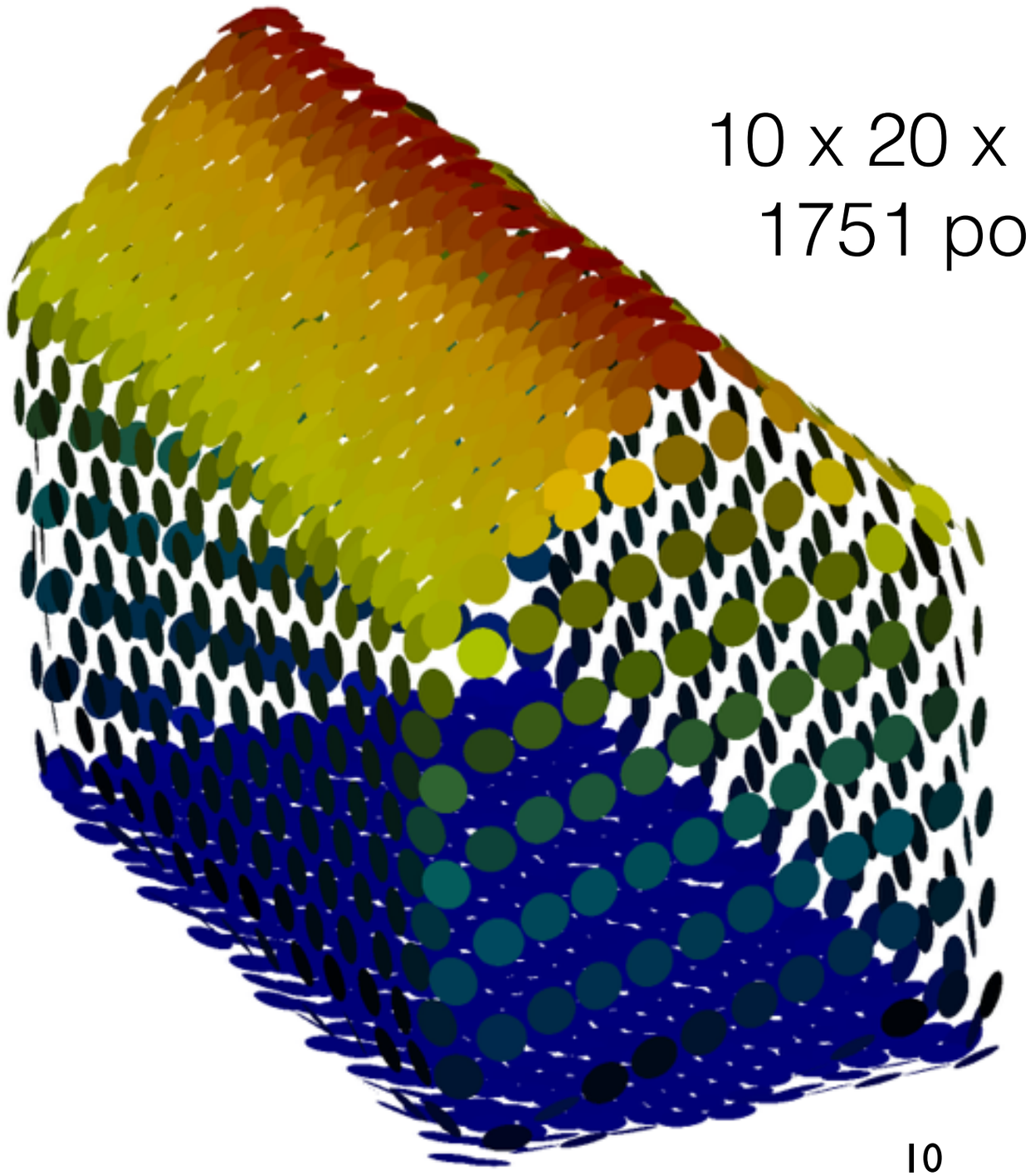
Scanning geometry

Flying height	Corridor width laser	Flight line distance
450m	520m	398m

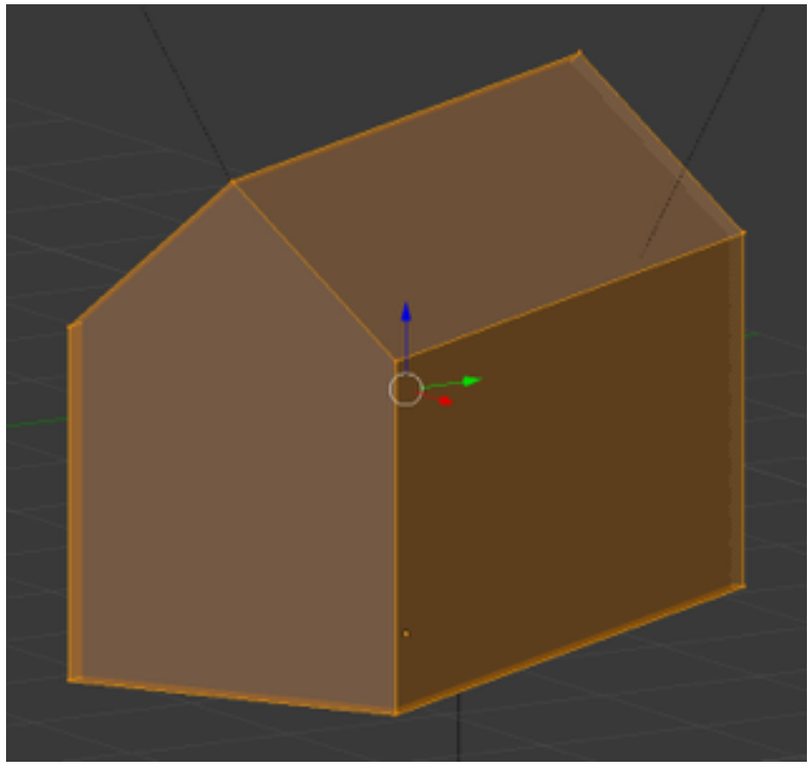
Noise (std deviation, normal distribution)

Along laser beam	Scanner position
2 cm	2 cm

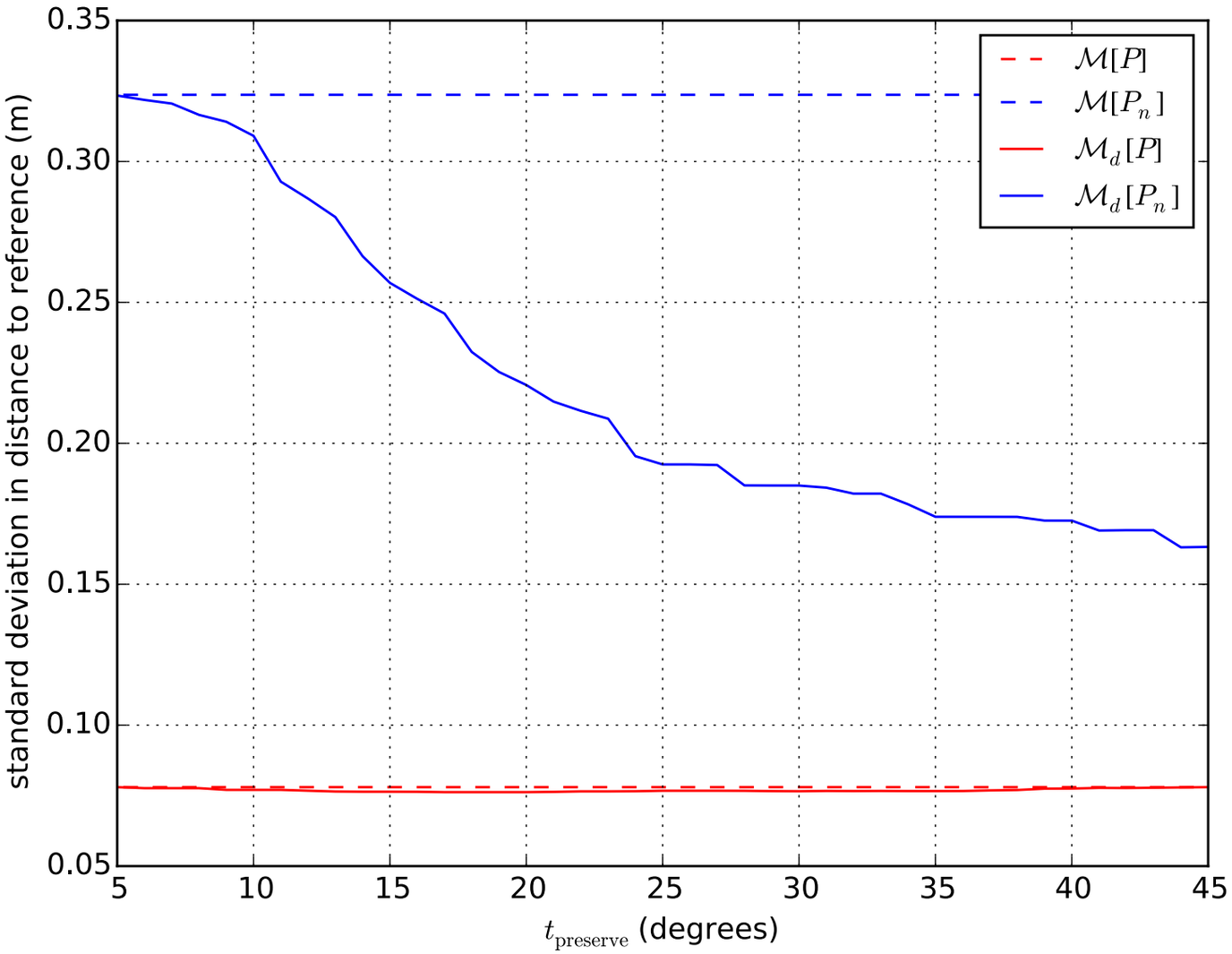
Simulated point clouds

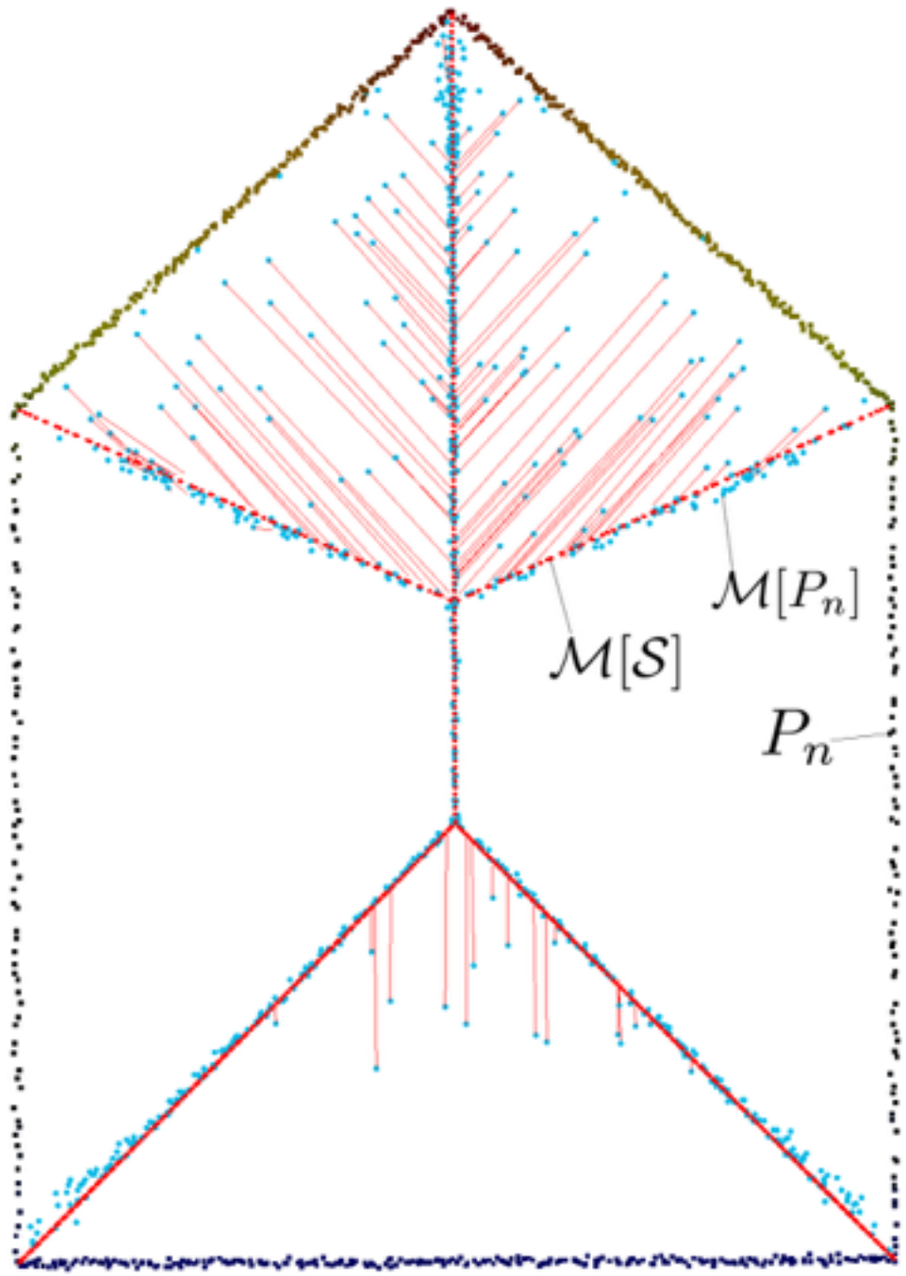


10 x 20 x 15 m
1751 points



Simulated point clouds





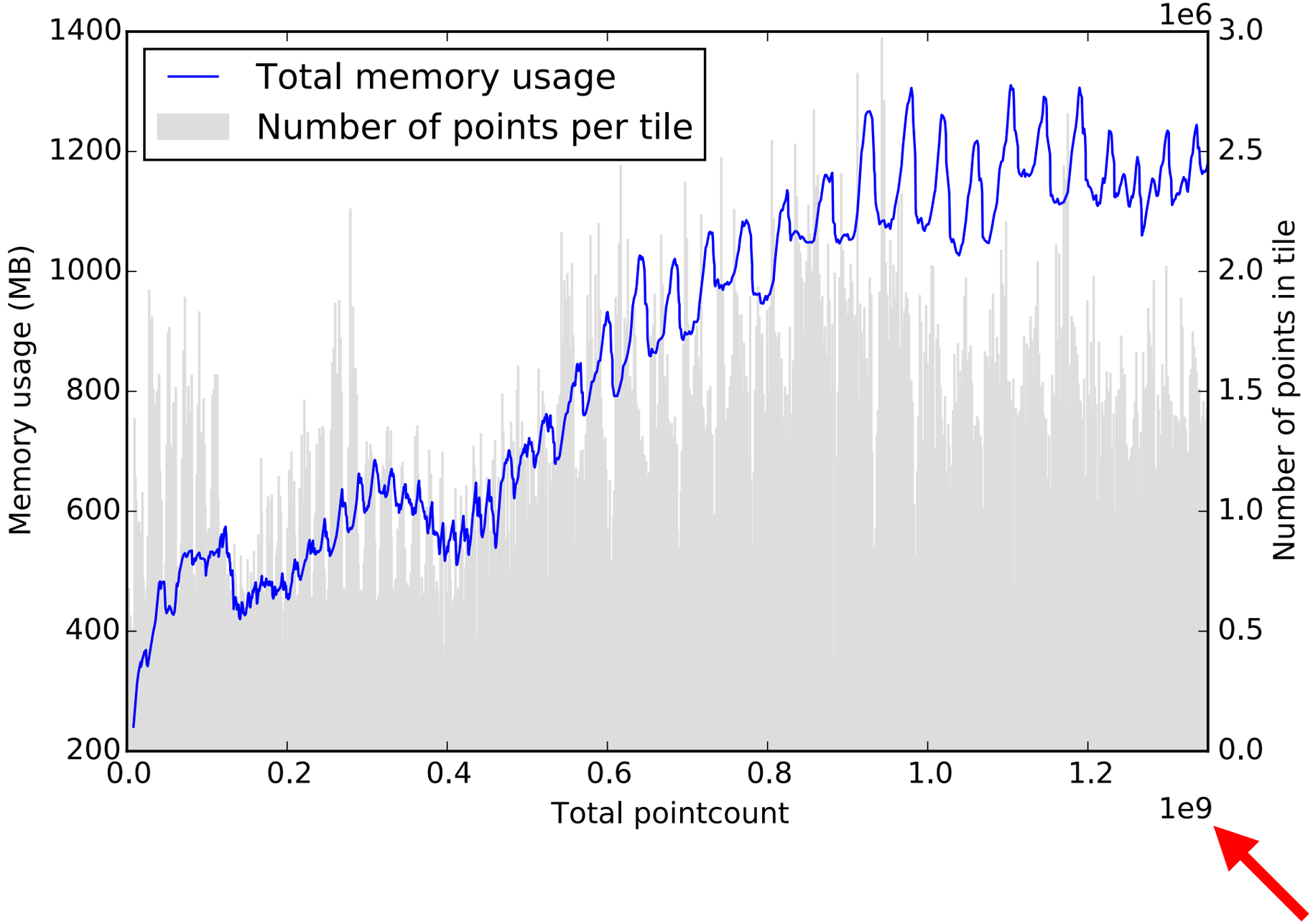
Scalability

1. of computation (multiple cpu cores)

2. in size of dataset (using tiling)

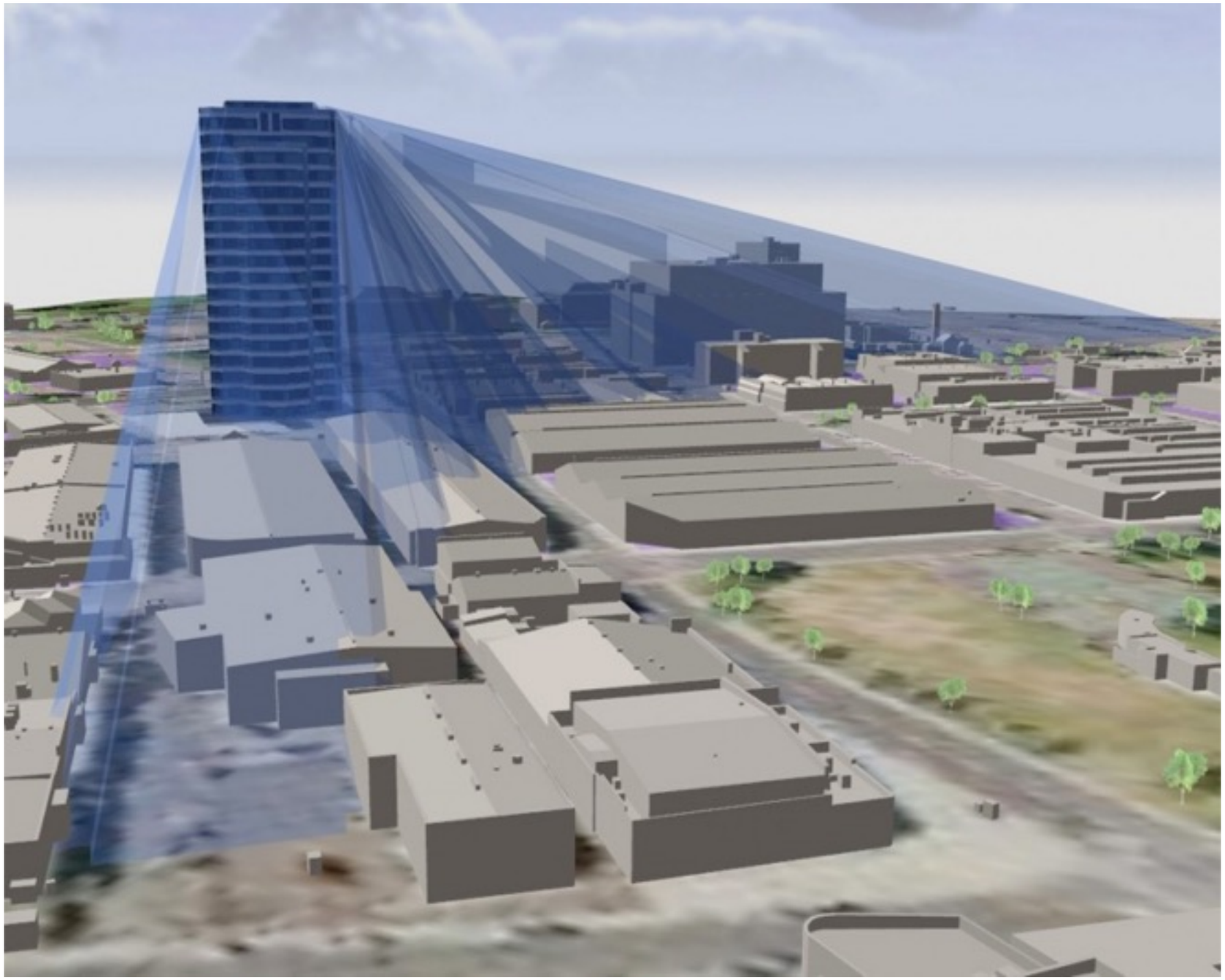
Marco Lam
(MSc student)

Scalability



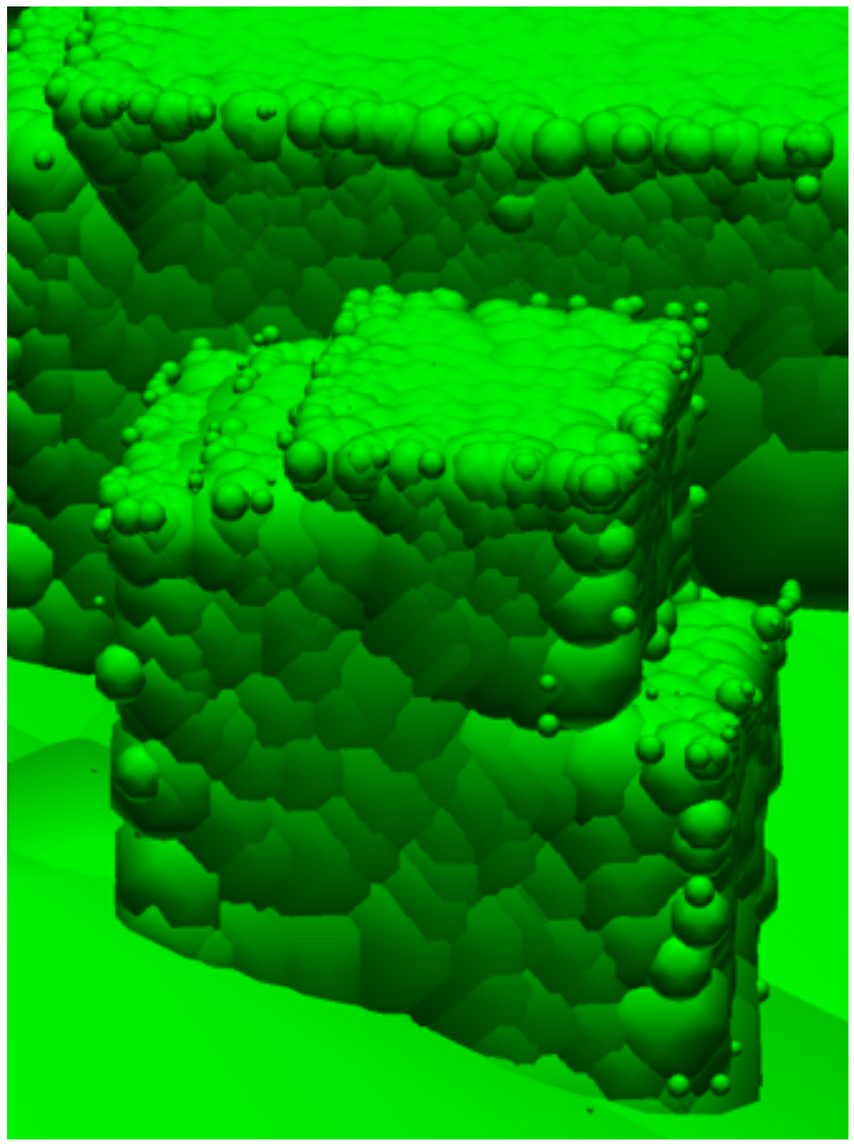
Visibility

Line-of-sight/shadow analysis

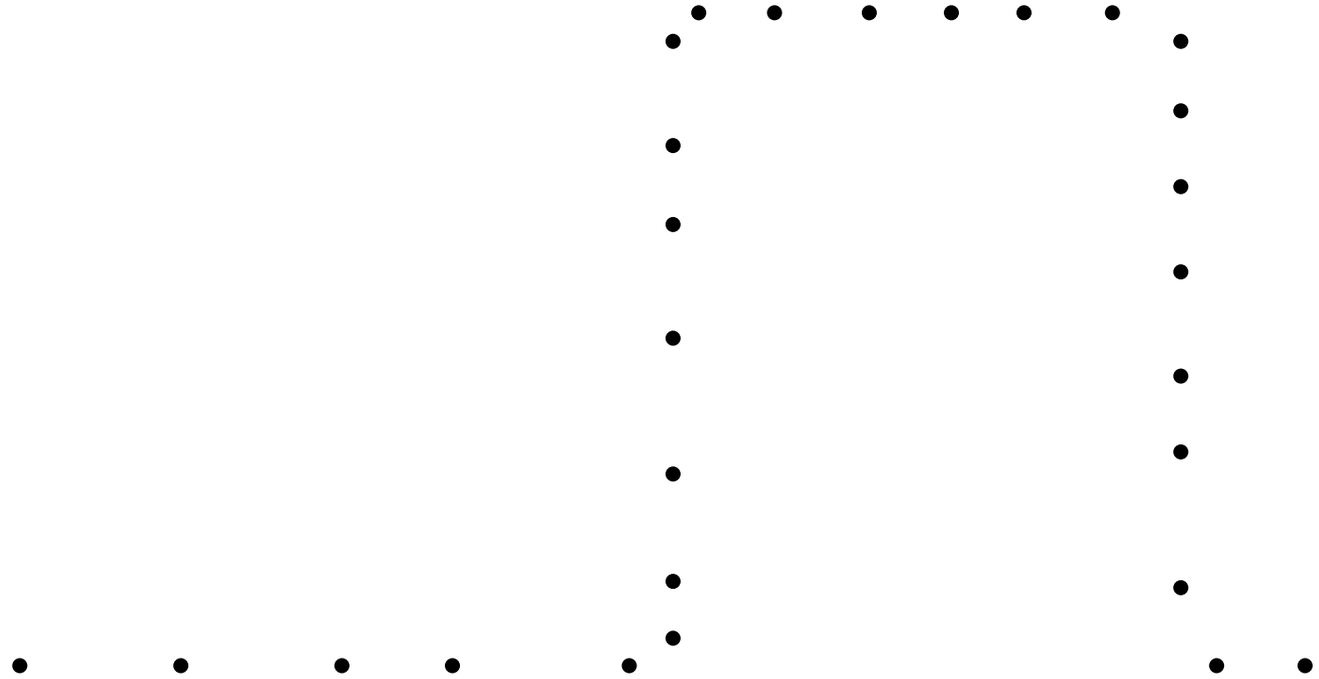


Building volume

By union of medial balls



Workflow



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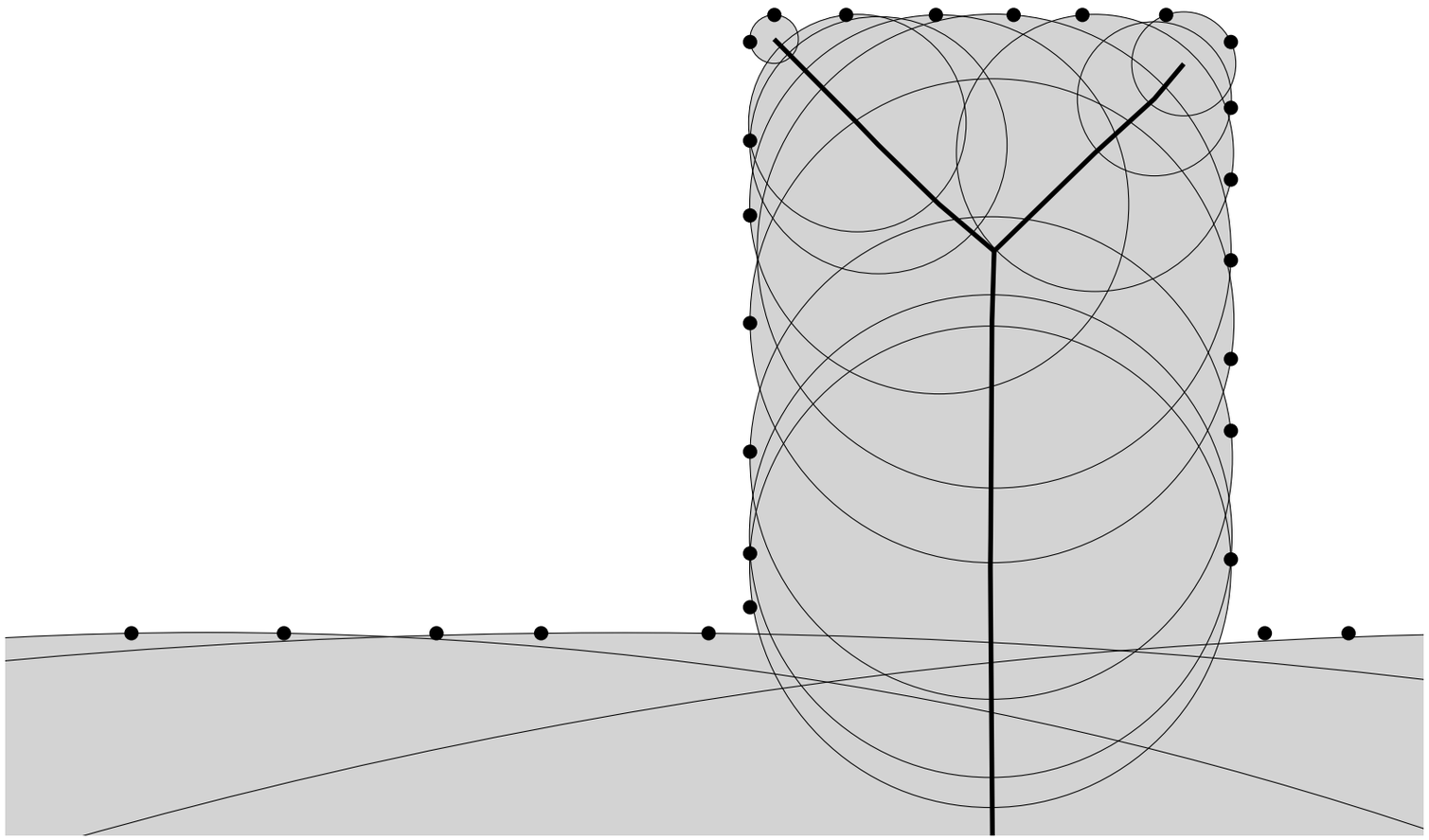

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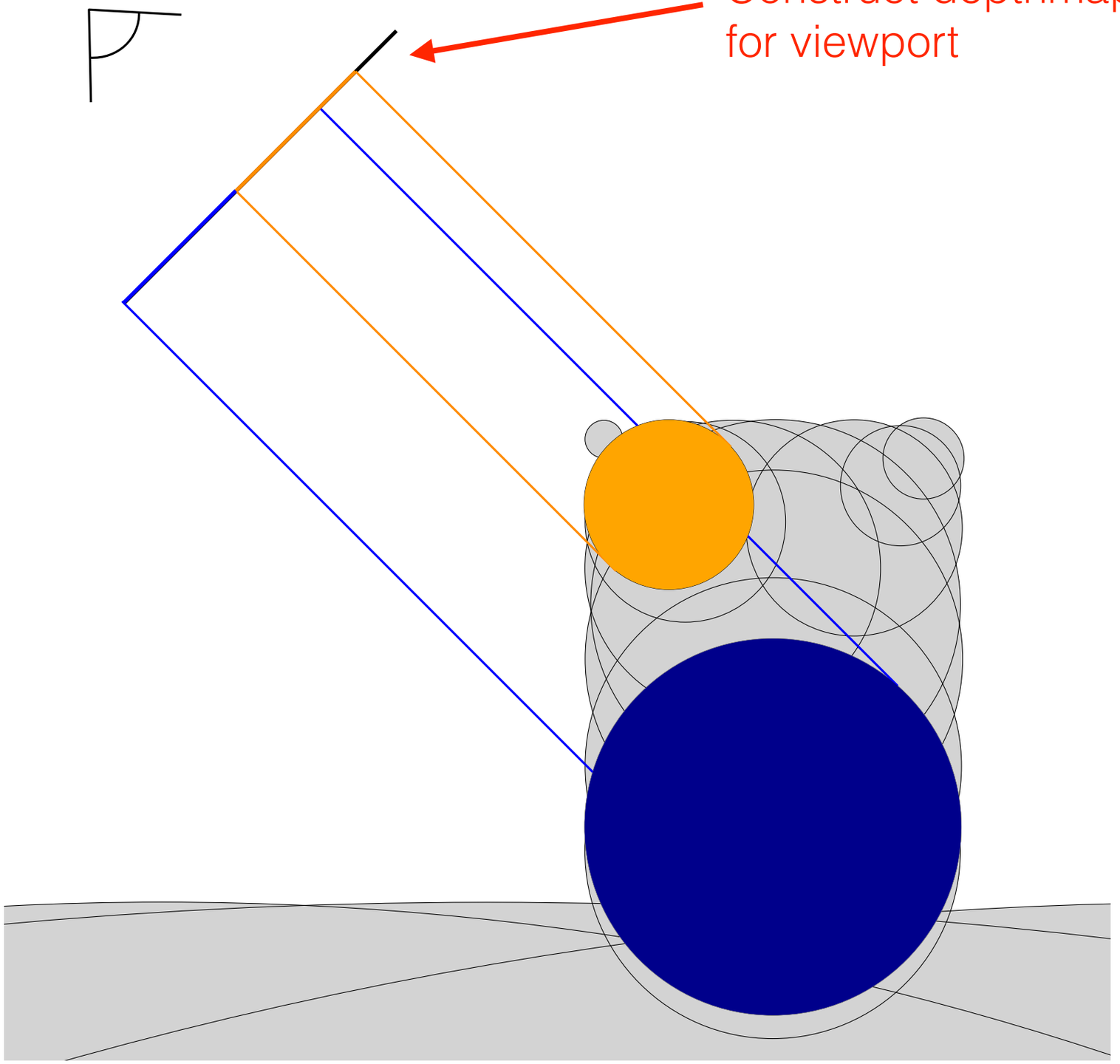

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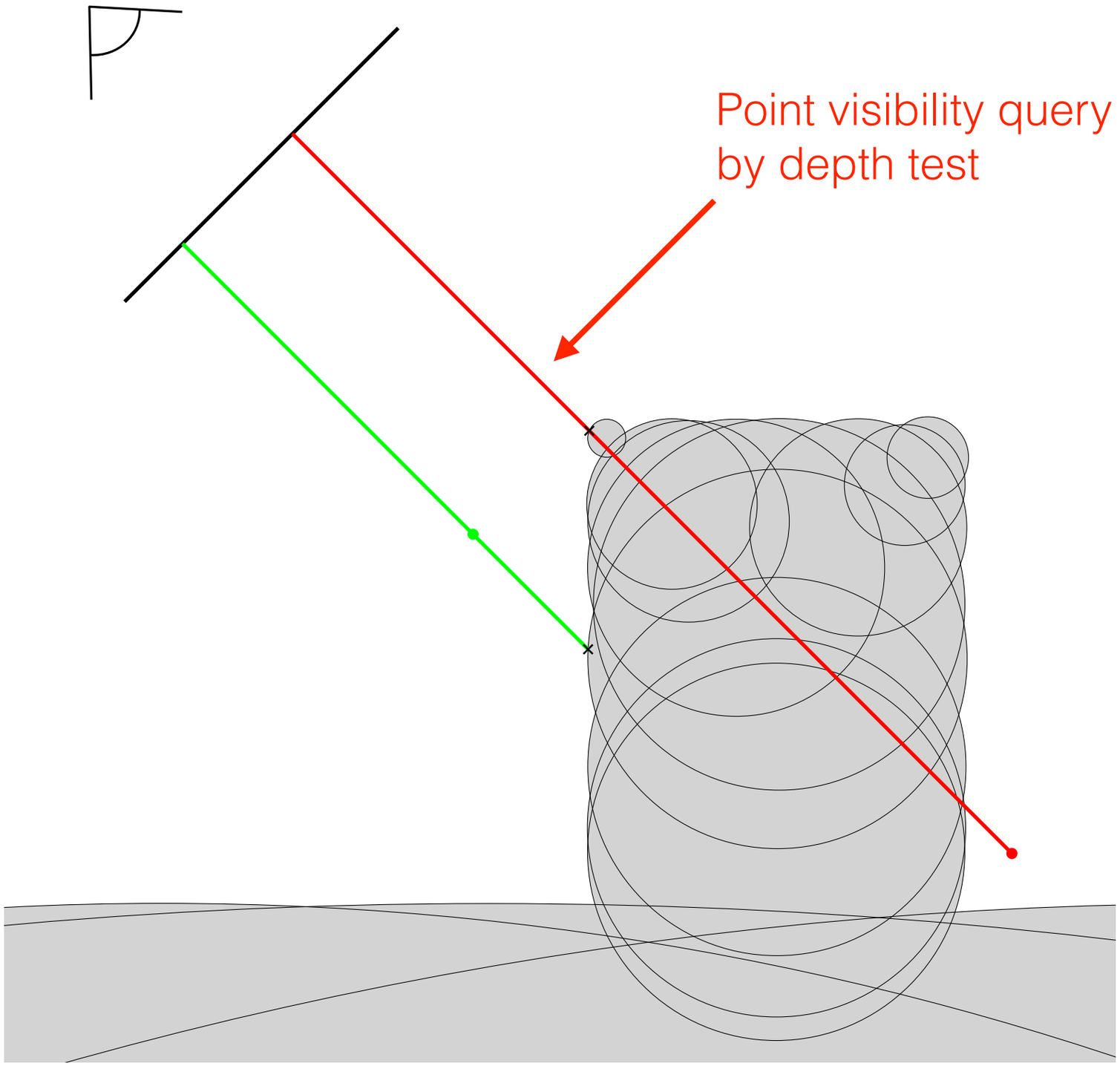

Figure 1

PointVis

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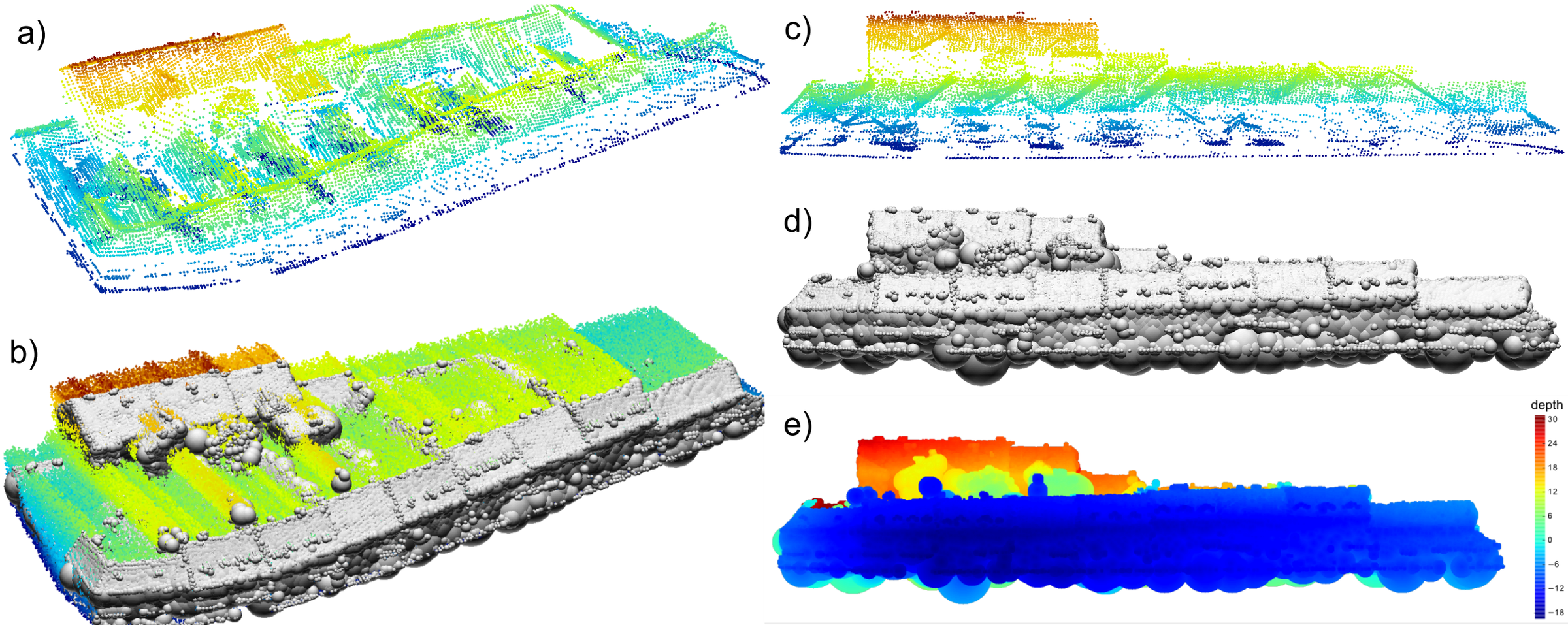
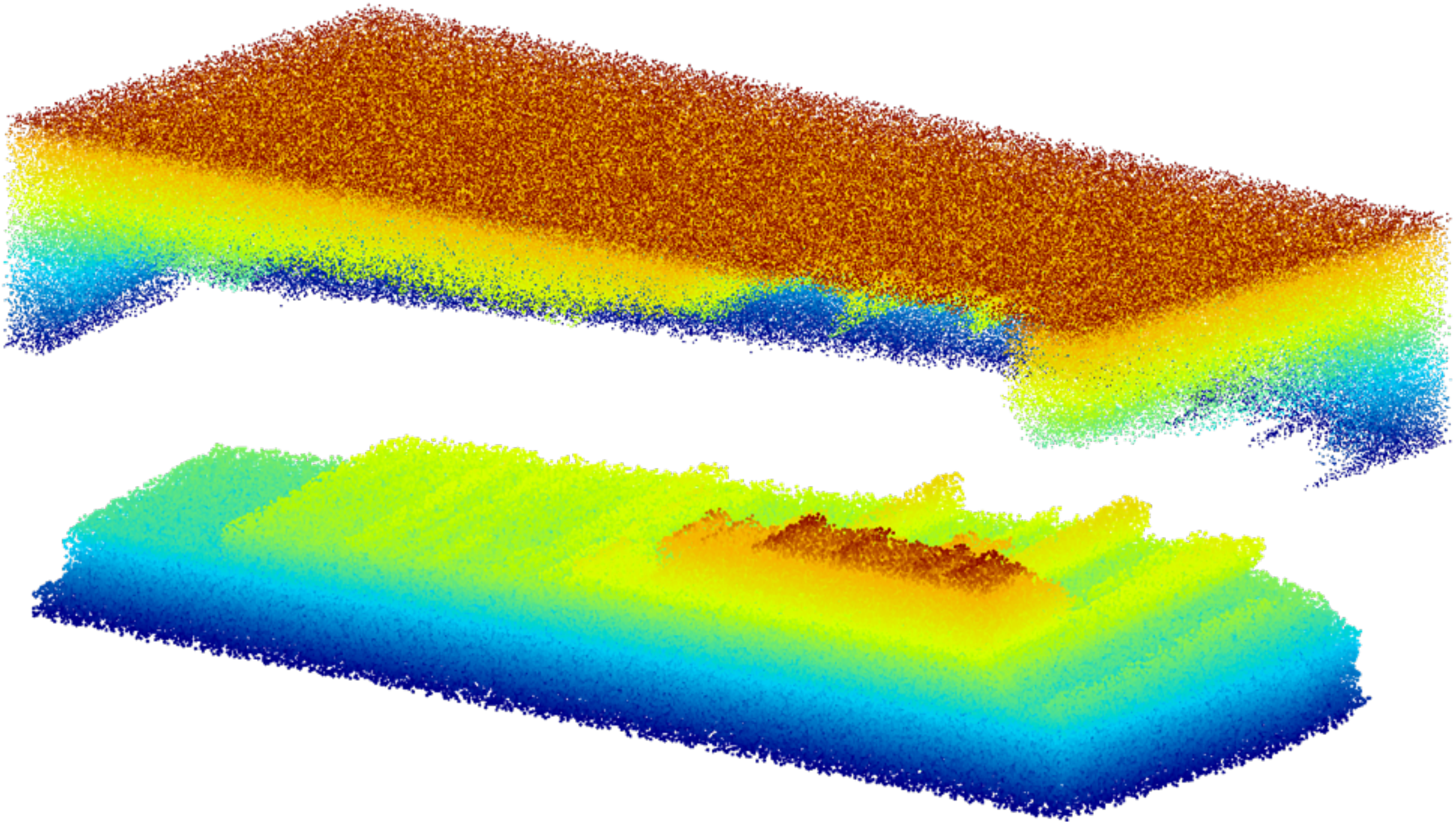
PointVis

LiDAR point cloud



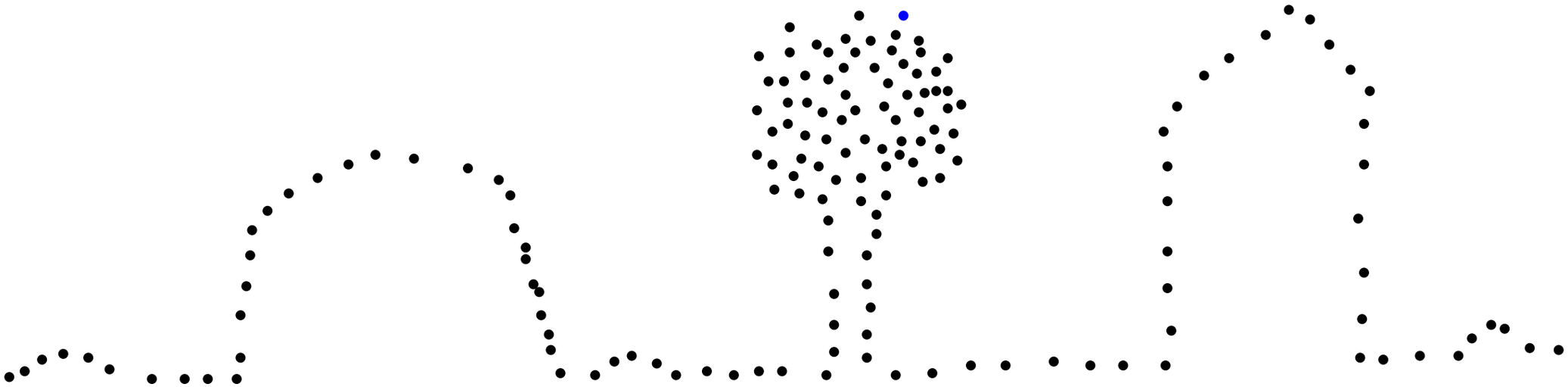
LiDAR point cloud



Visibility Analysis in a Point Cloud Based on the Medial Axis Transform. Ravi Peters, Hugo Ledoux and Filip Biljecki. In *Eurographics Workshop on Urban Data Modelling and Visualisation 2015*, Delft, Netherlands, November 2015, pp. 7–12.

Current work

Obtaining MAT hierarchy



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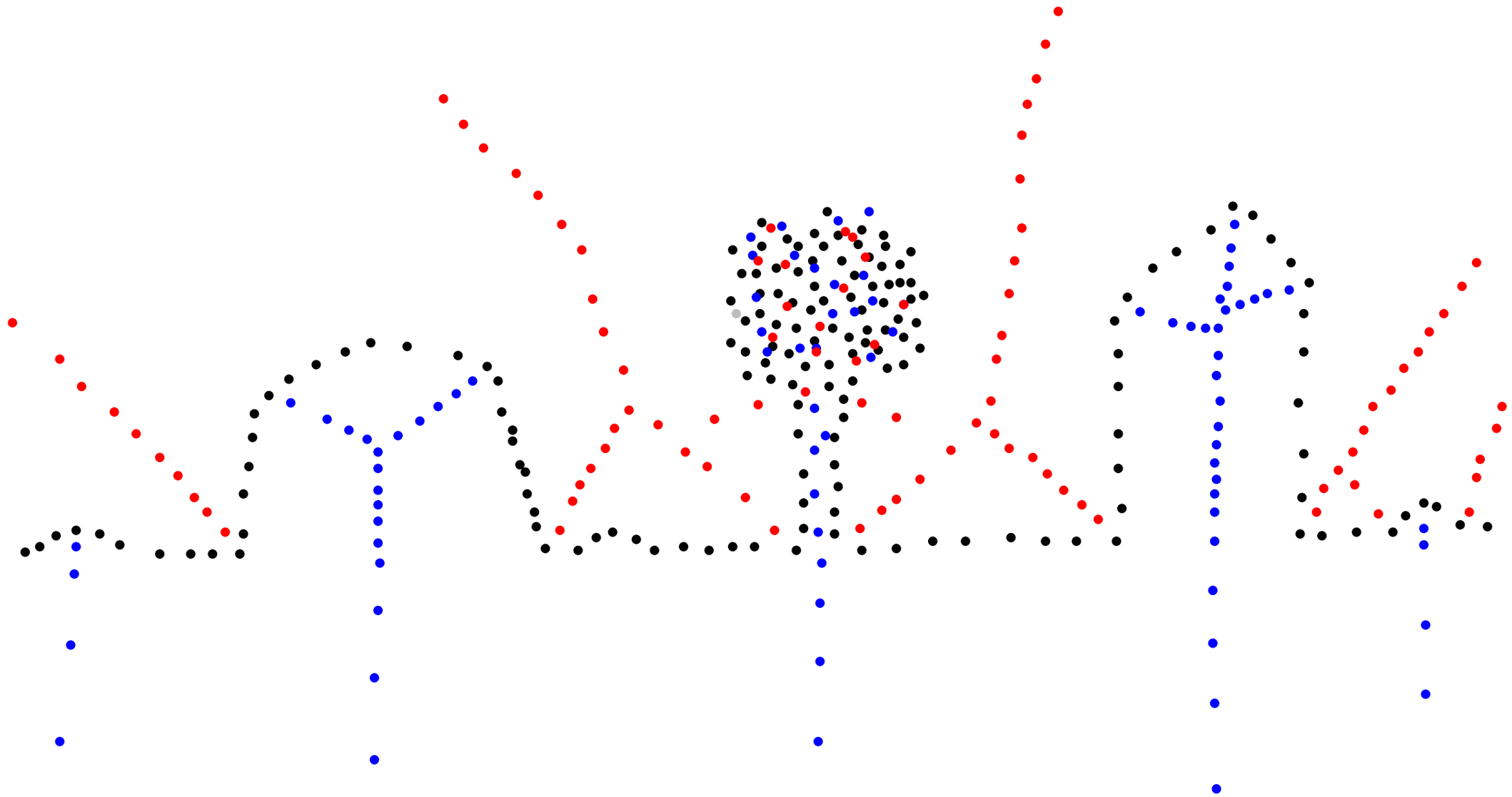

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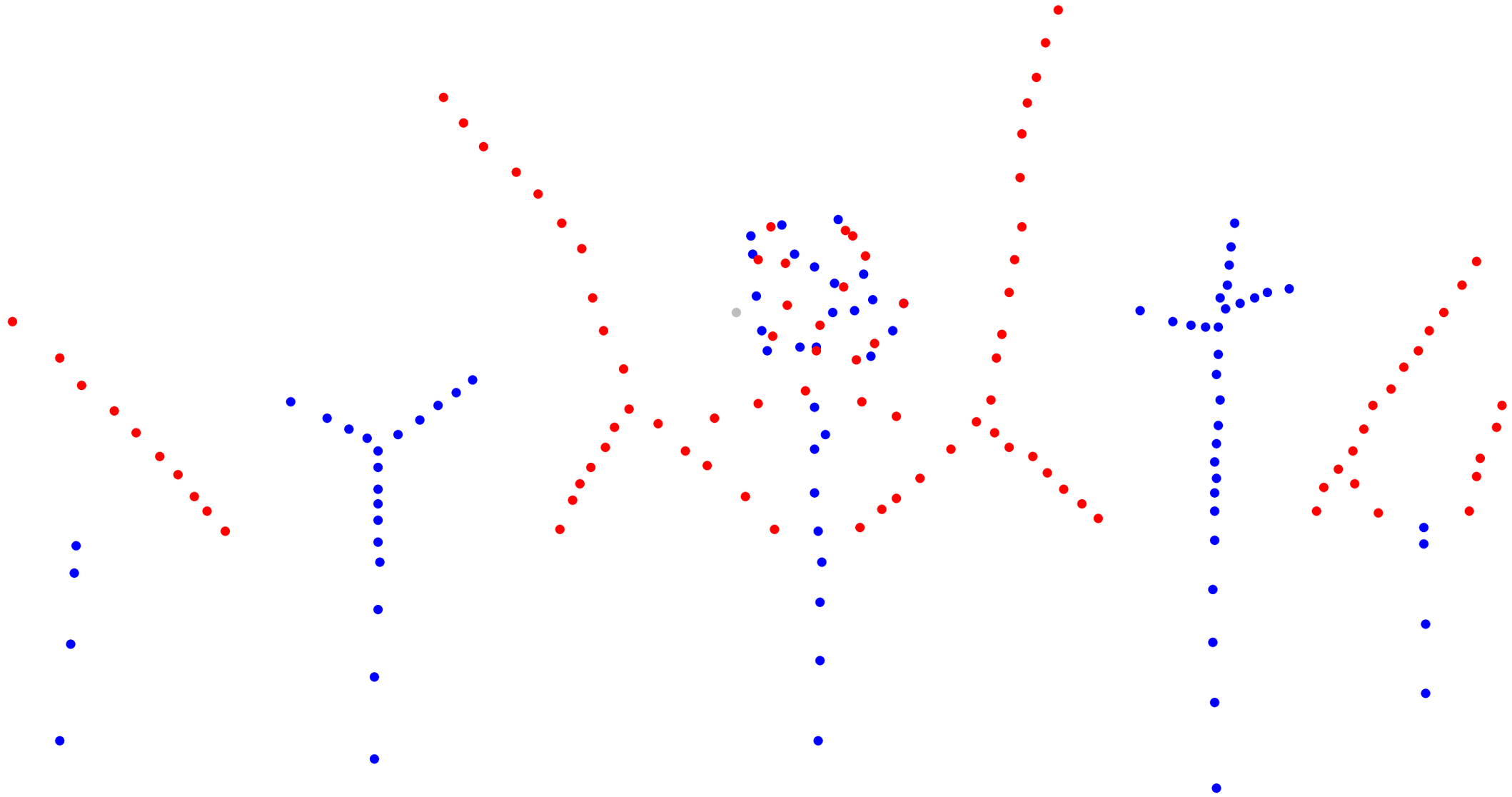

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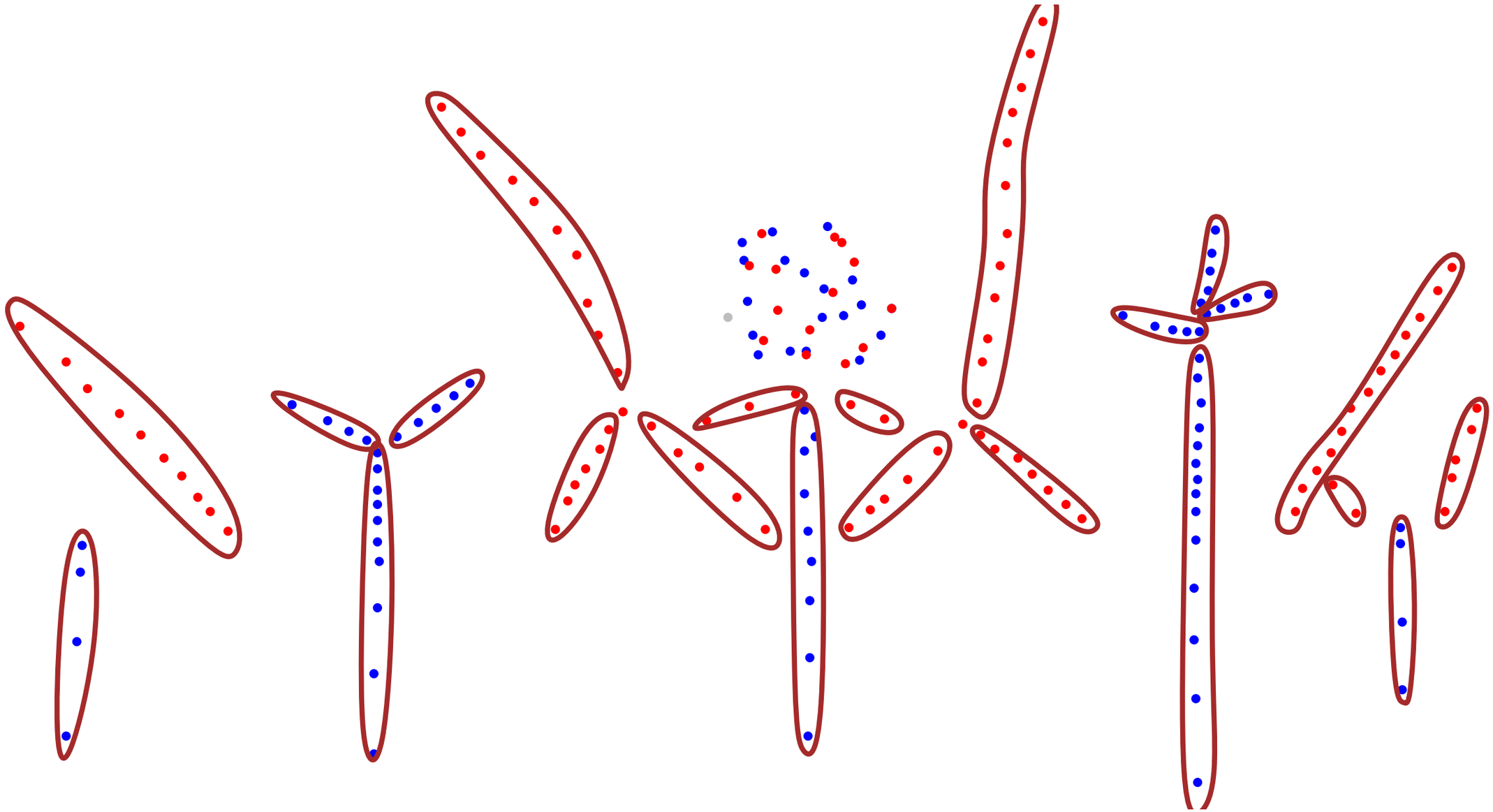

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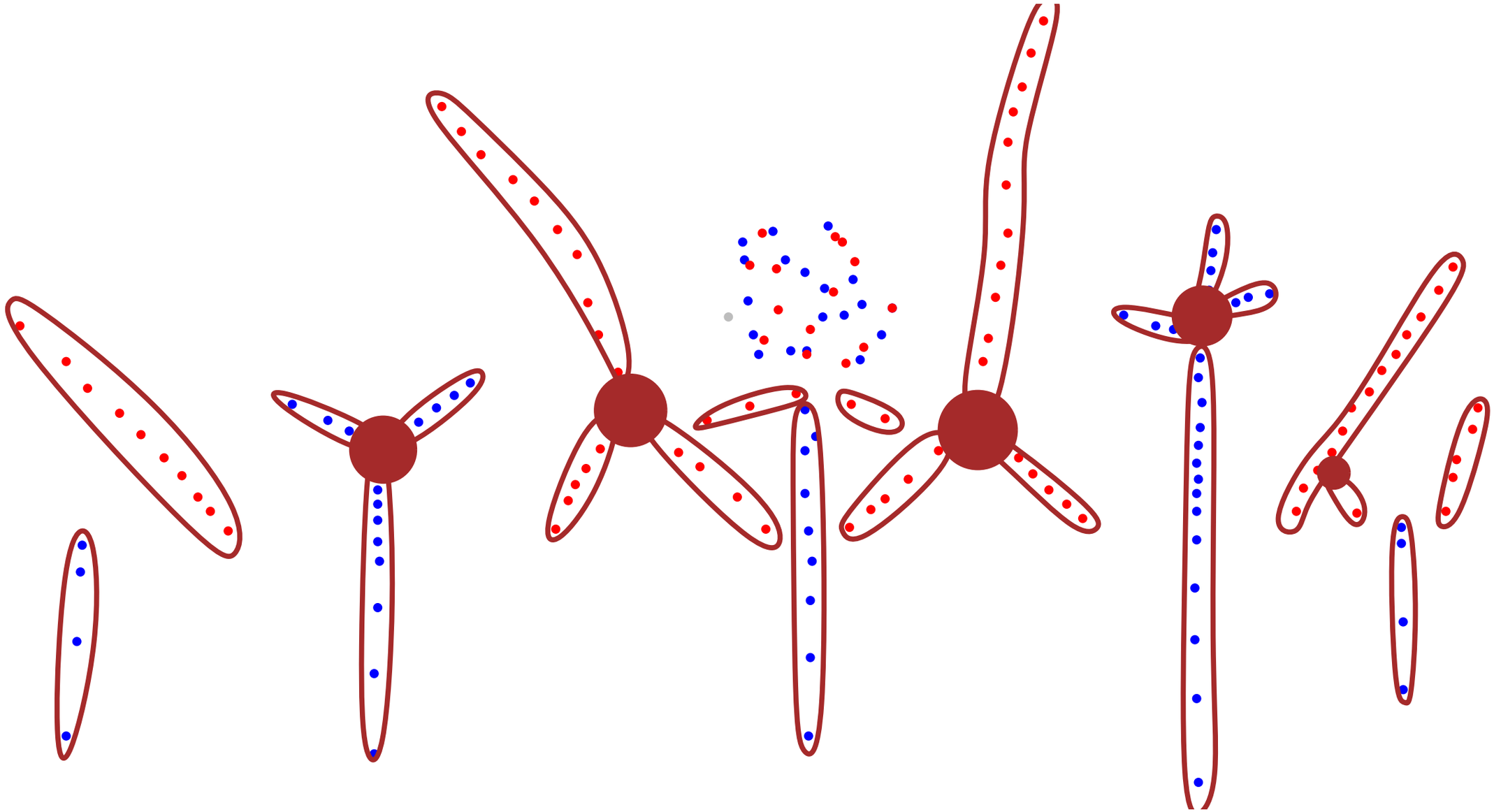
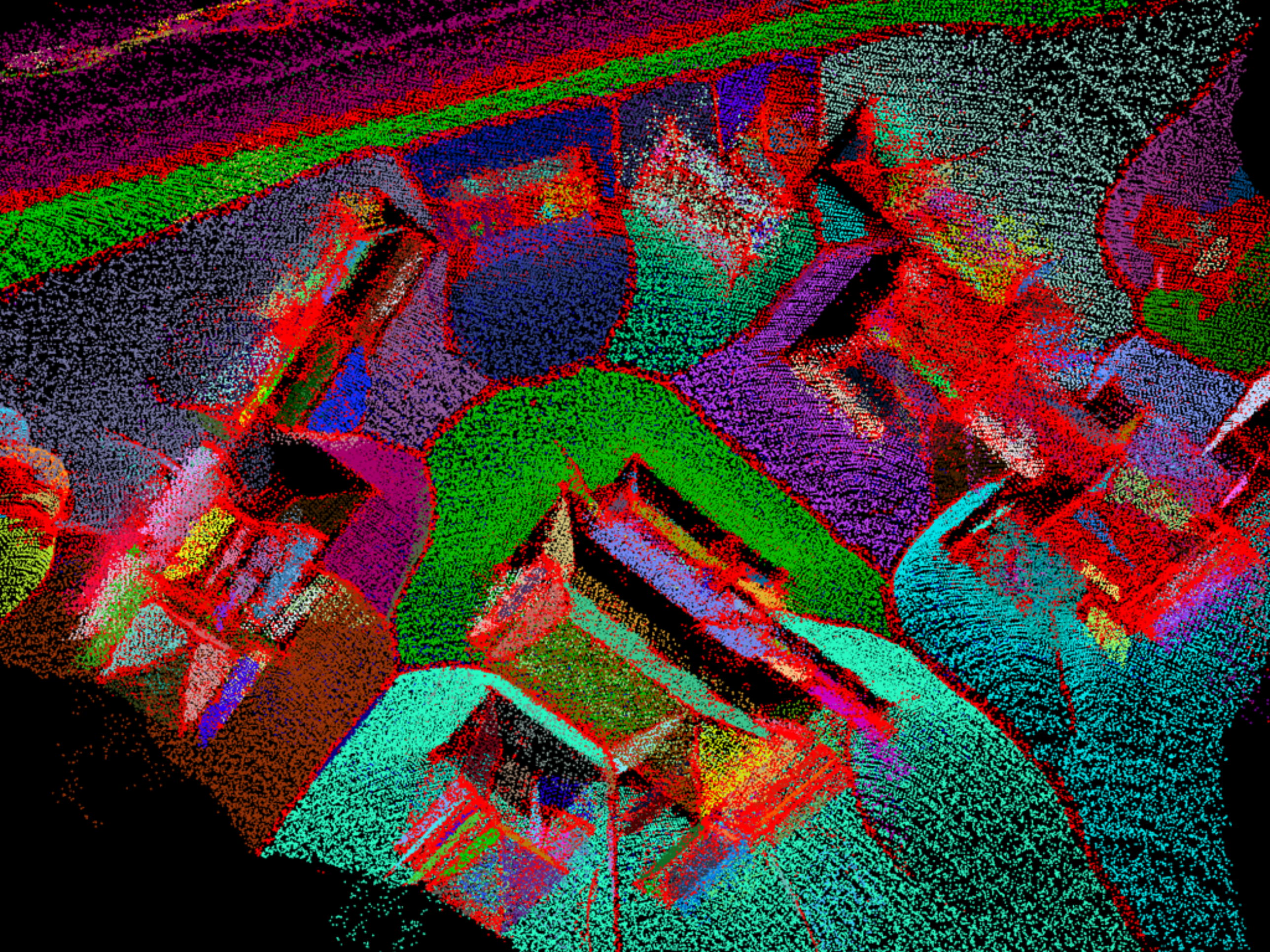
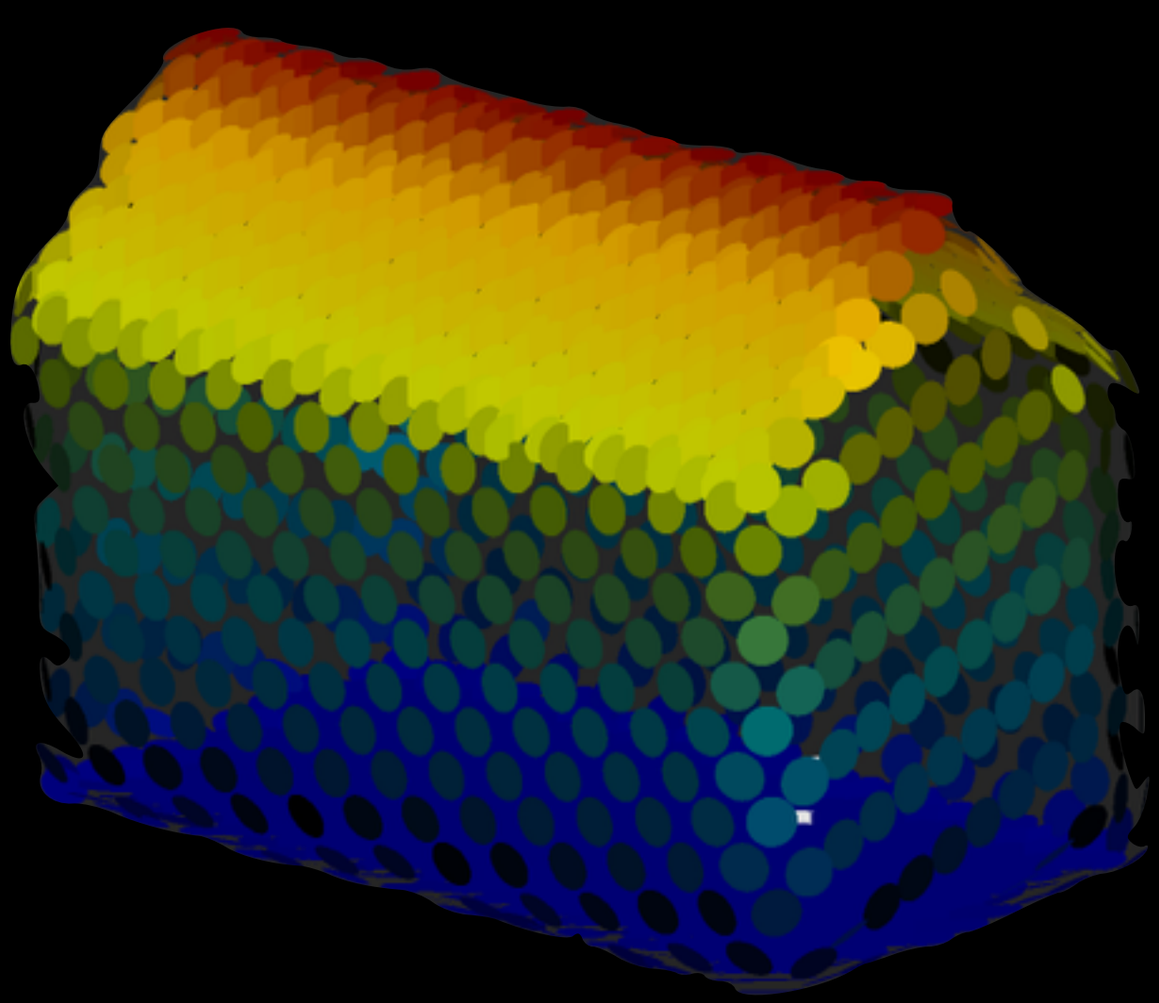
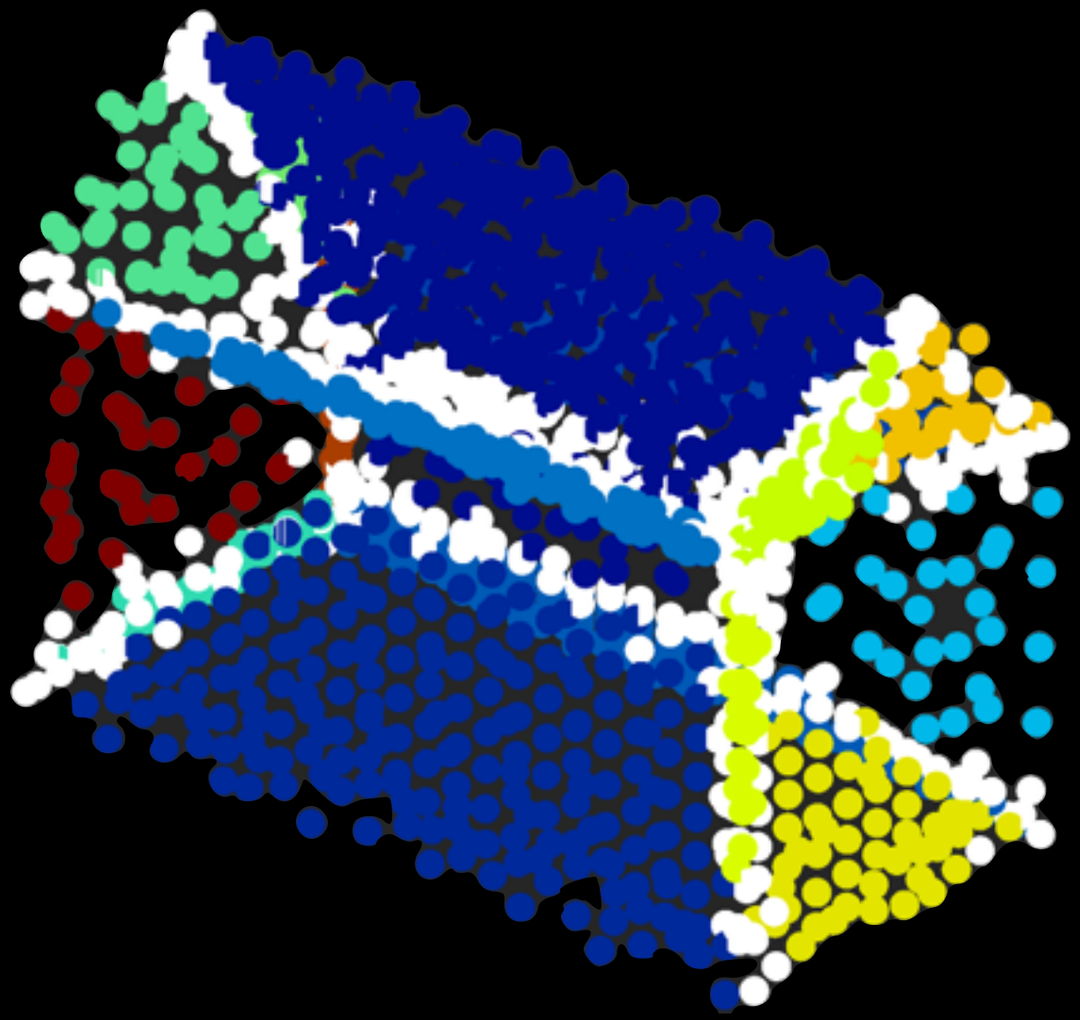




MAT segmentation

Using difference of normals (as used in e.g. PCL)





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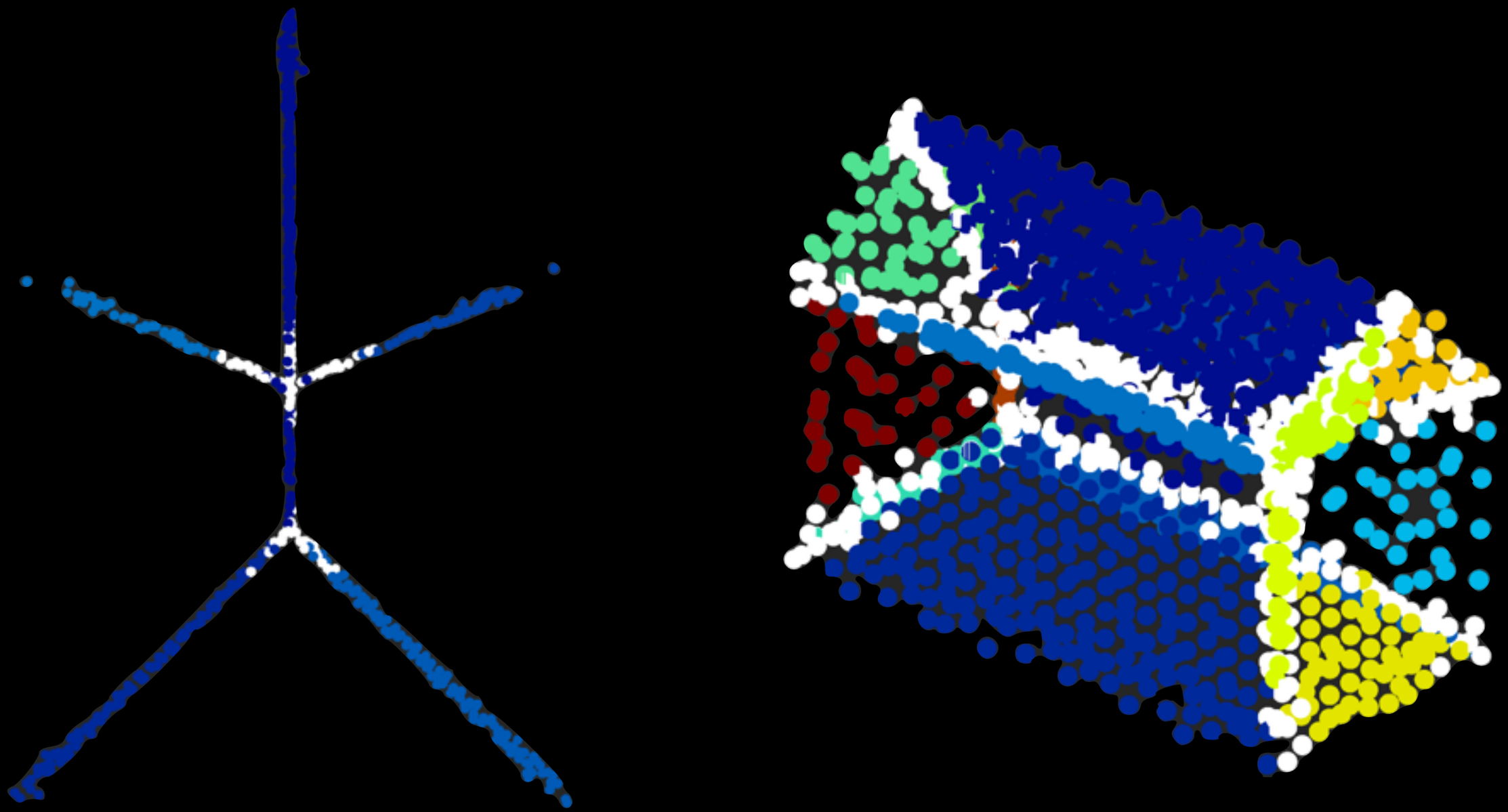

MAT segmentation

difference
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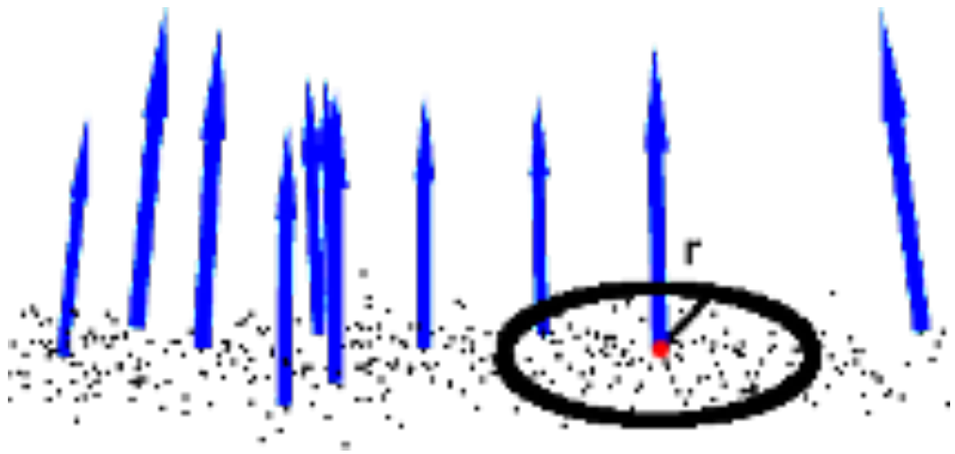

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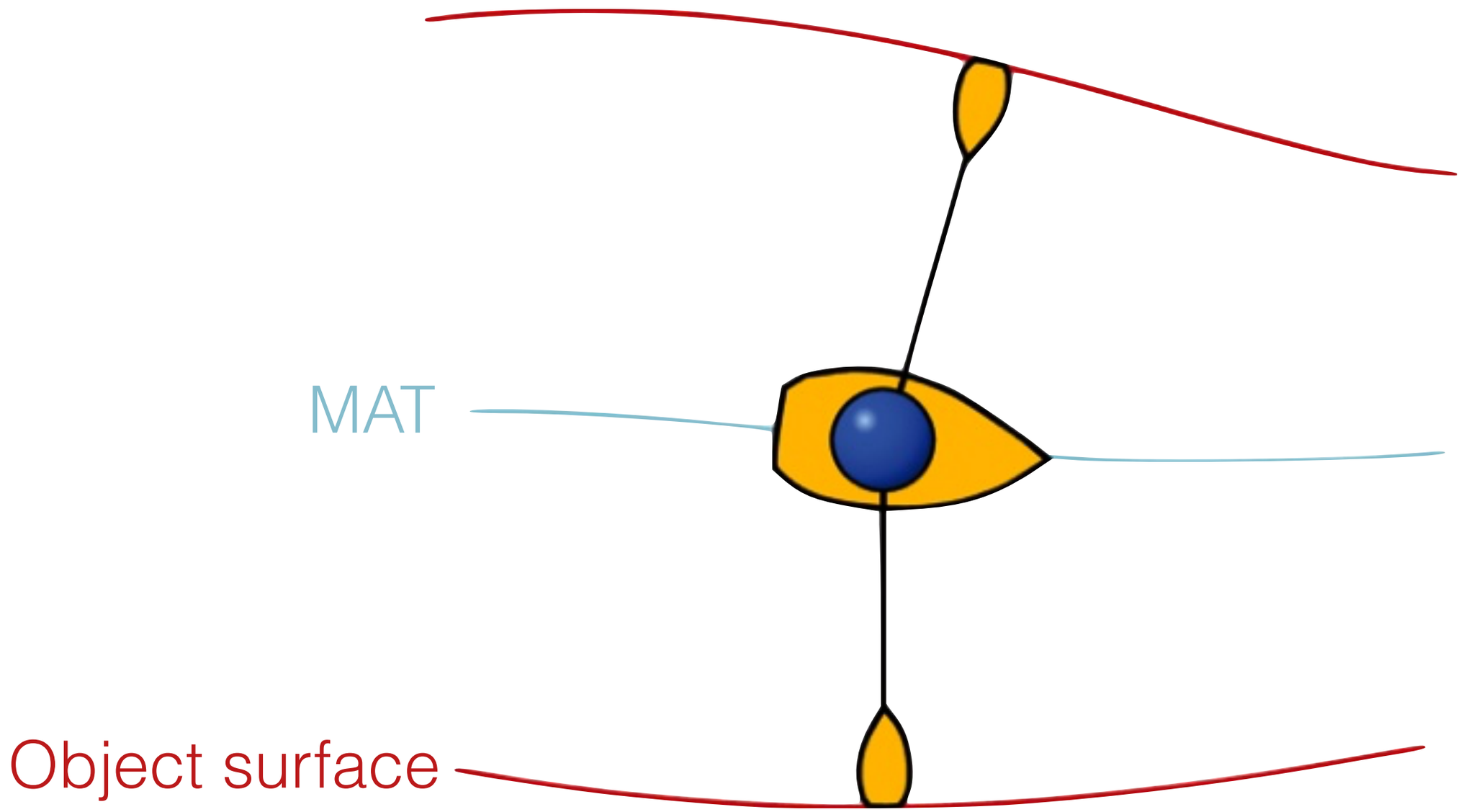

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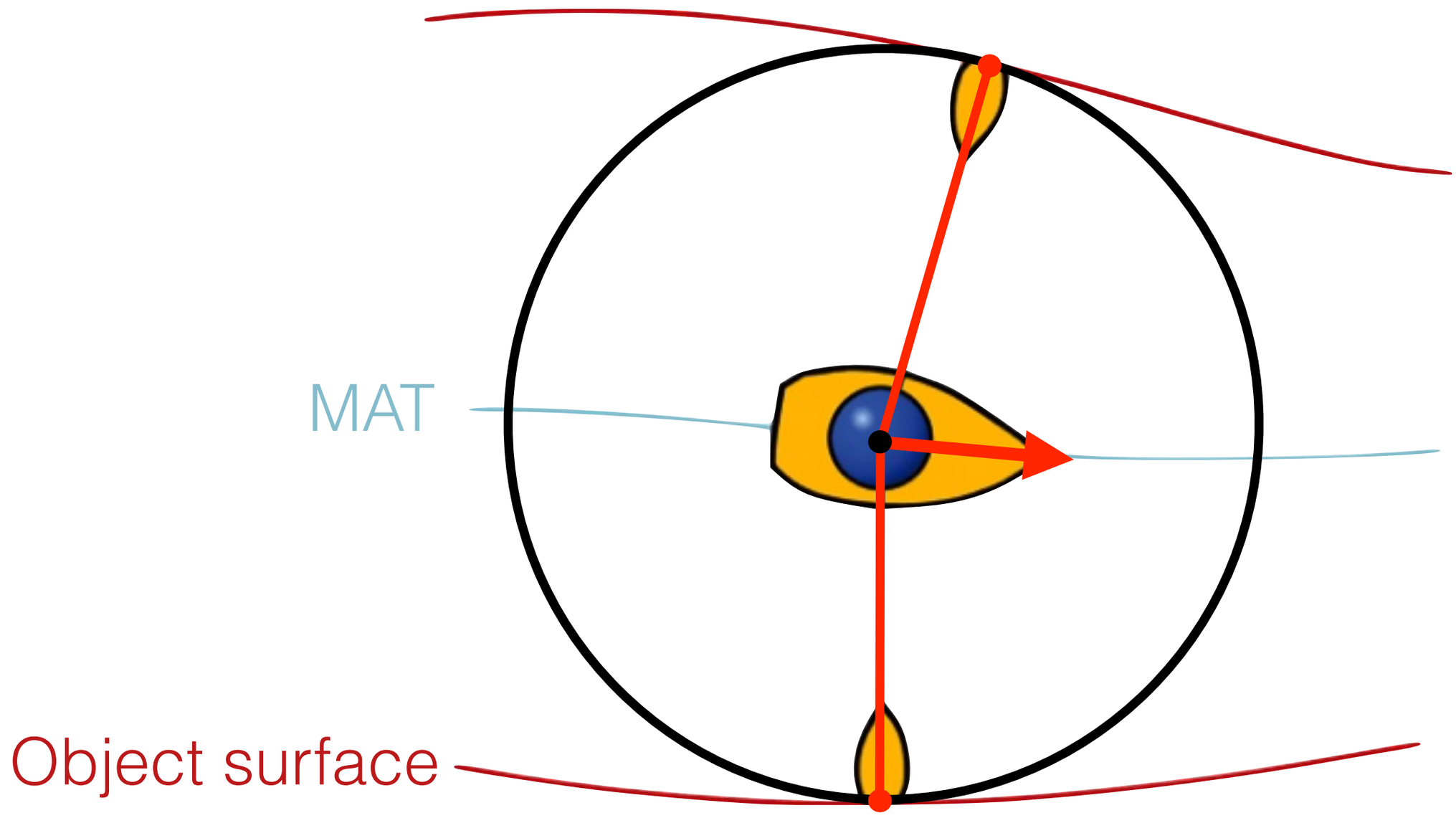

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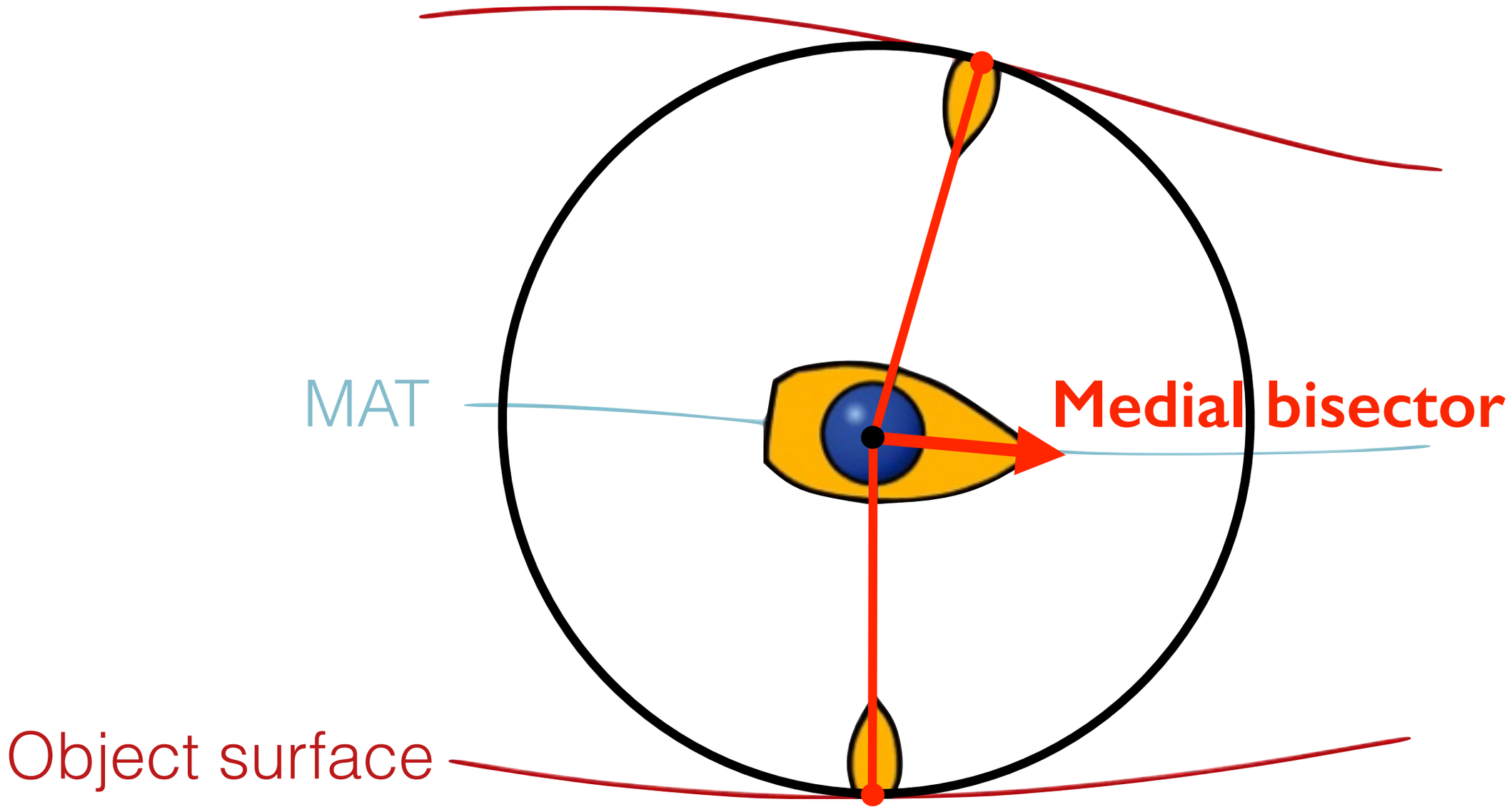

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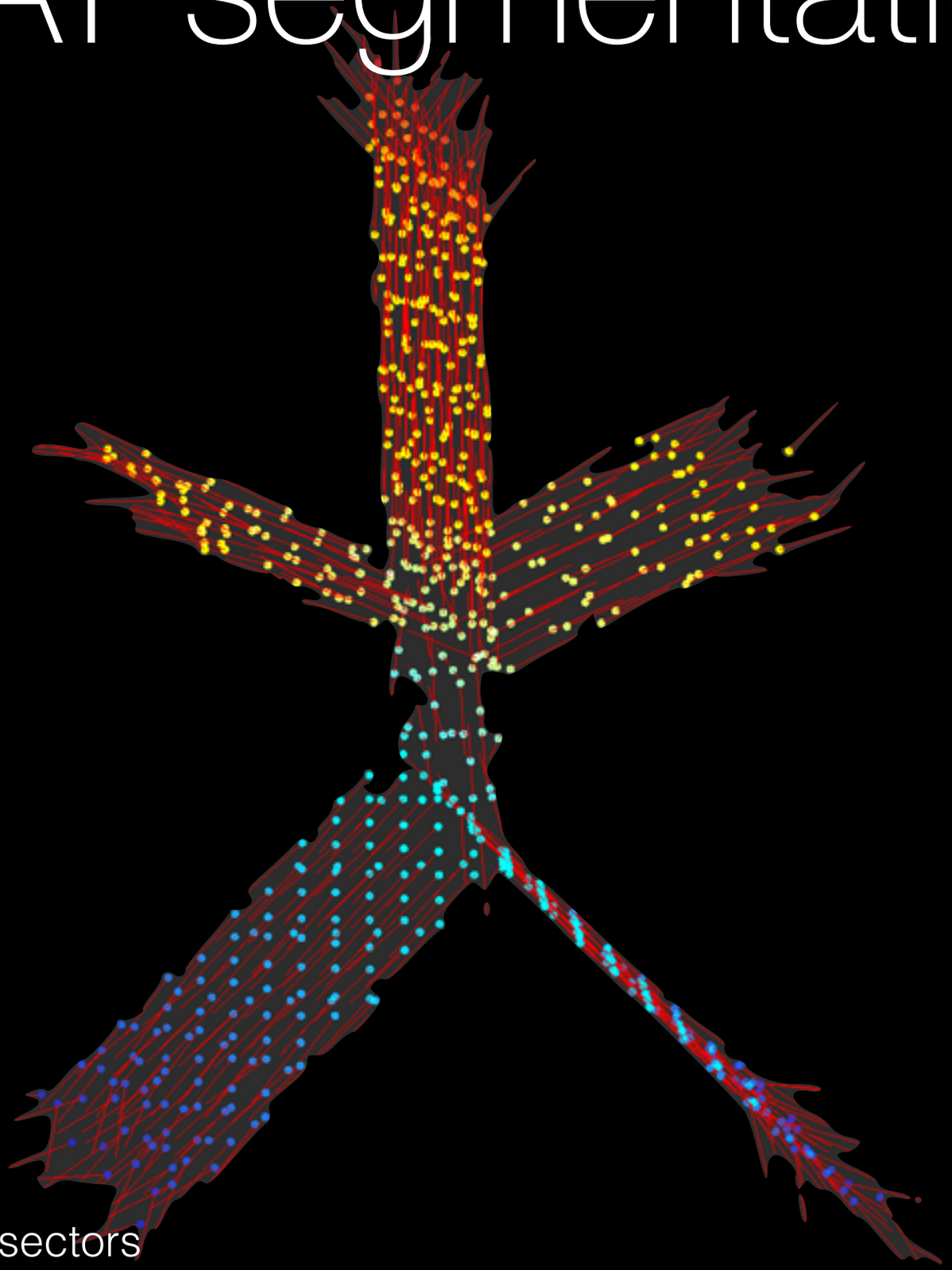
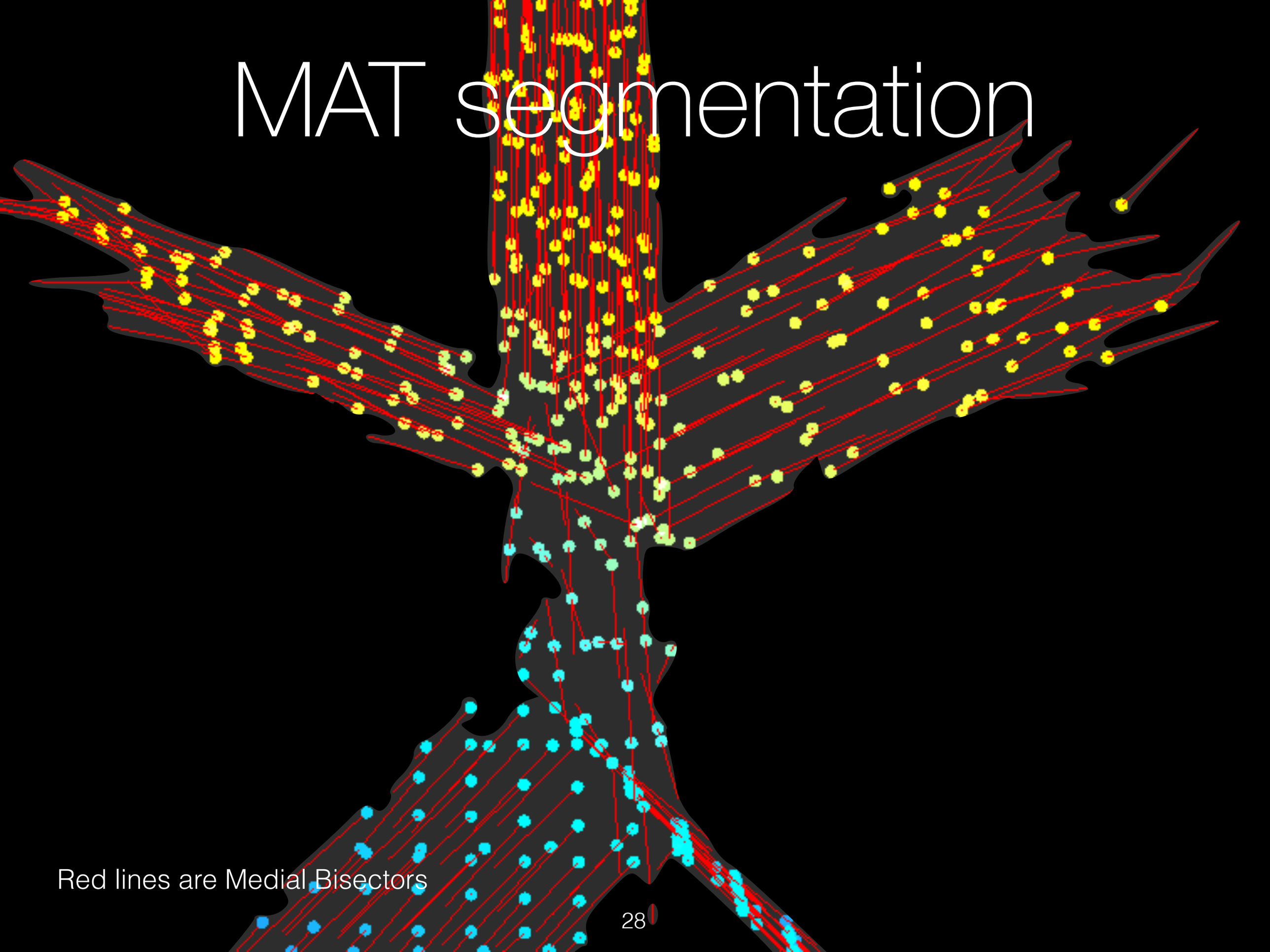


Red lines are Medial Bisectors

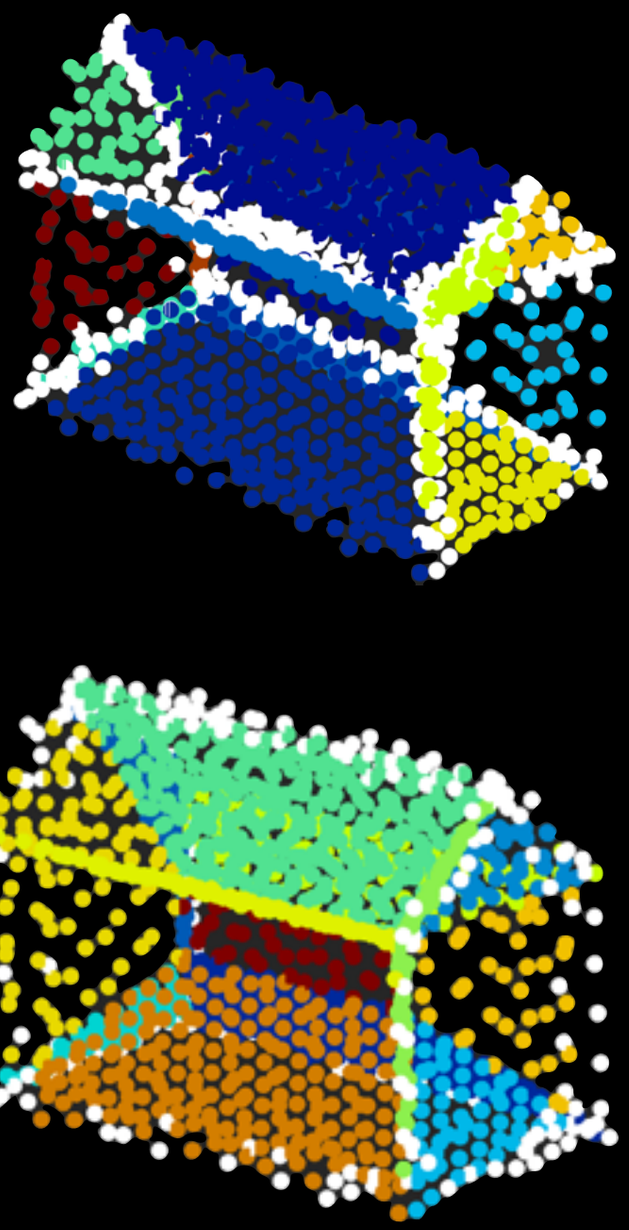
MAT segmentation

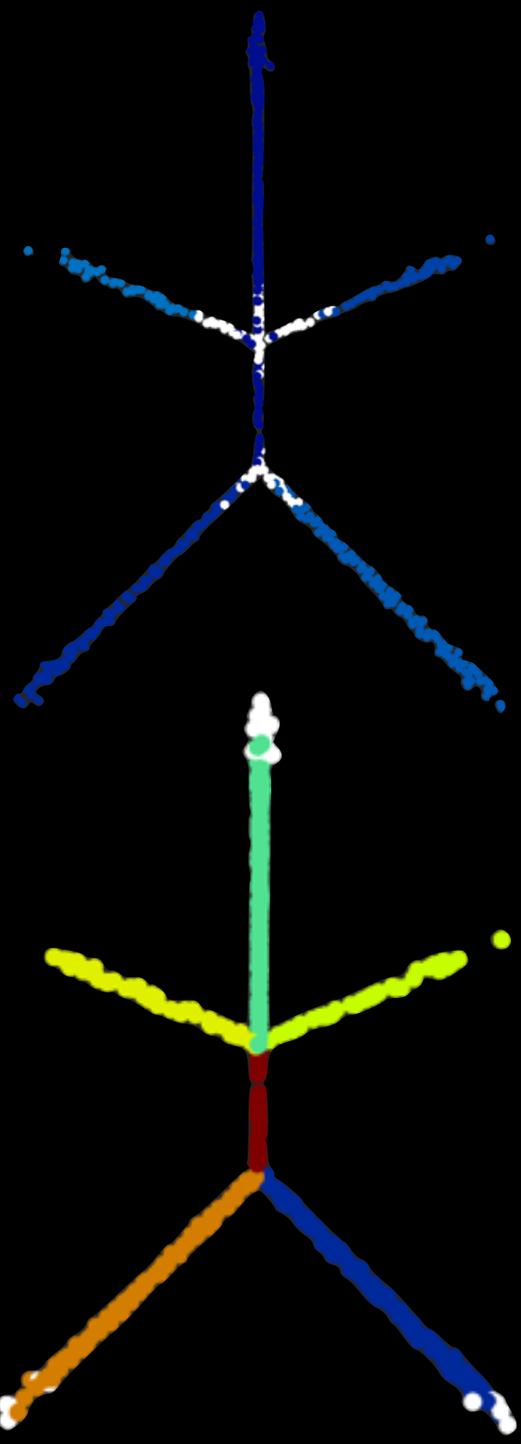


Red lines are Medial Bisectors

MAT segmentation

difference
of normals





difference
of bisectors

Different colors mean different segments (medial sheets)
White means no segment

Next steps

- deal with over/undersegmentation if a problem
- find neighbour relations [match feature points between MAT sheets]
- build graph/hierarchy

Future work

Case studies

1. Point cloud simplification
2. Detect watercourses (`*watergangen*`)
3. Detect (features of) buildings
   (first step: `*daklijnen*`)

And more…

1. improve quality MAT (outliers)
2. improve quality/orientation of normals in point cloud
3. object classification
4. …

Thank you!