#### 3DSM Progress report

4<sup>th</sup> User Committee meeting Zwolle, 19 january 2016

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#### Dealing with noise

Even for noisy points, 'good' ball is computed



# Dealing with noise

#### Dealing with noise

Without denoising

#### With denoising



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#### Robust MAT approximation

#### Robust MAT approximation

#### Simulated point clouds



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## Simulated point clouds

#### Scanning geometry

Flying height	Corridor width Iaser	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







Scalability

I. of computation (multiple cpu cores)

#### 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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#### Workflow







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## 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. [] C C

# Current work













#### Using difference of normals (as used in e.g. <u>PCL</u>)



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difference of normals









Red lines are Medial Bisectors

Red lines are Medial Bisectors

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

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

#### And more...

- I. improve quality MAT (outliers)
- 2. improve quality/orientation of normals in point cloud
- 3. object classification

### Thank you!

