From Many User-Contributed Polygons To One Polygon Consensus

Fabian Feitsch

Julius-Maximilians-Universität Würzburg

July 11, 2016

The History of New York

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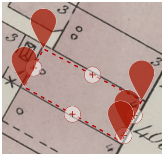

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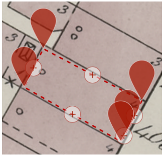

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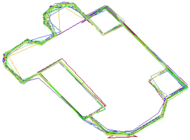

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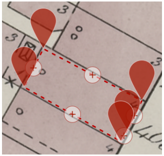

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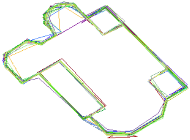

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Fourth: Which footprint was meant by the users?

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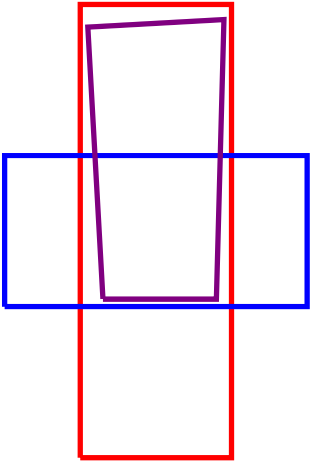
The Pile Algorithm



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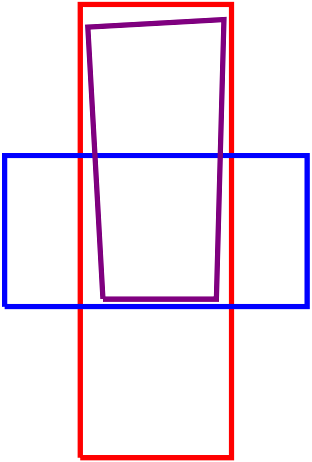
Return the area that is covered by at least k polygons.



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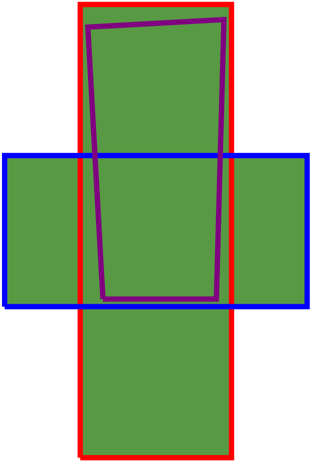

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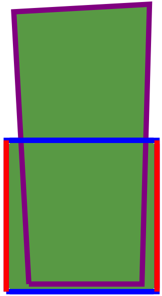

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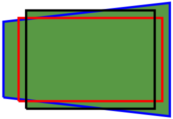

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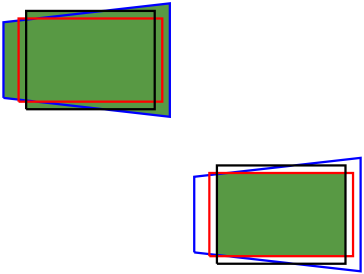

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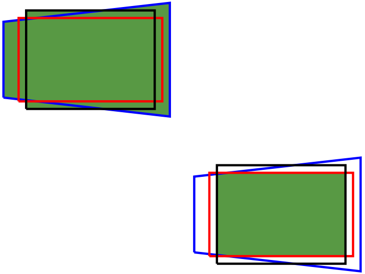

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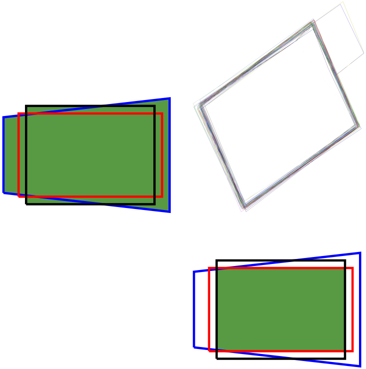

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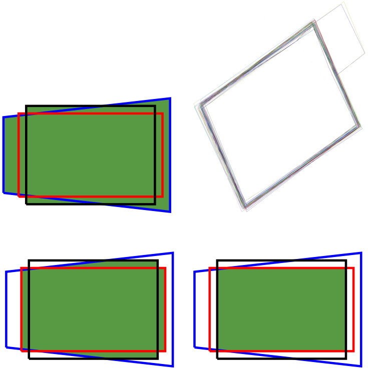

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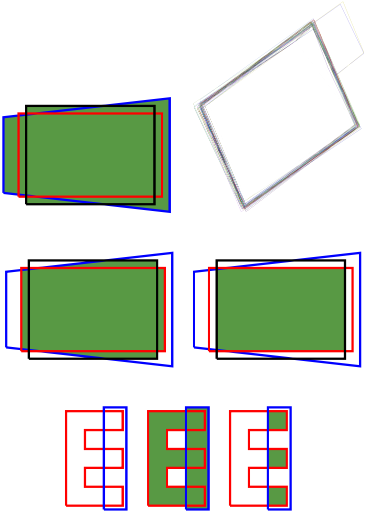

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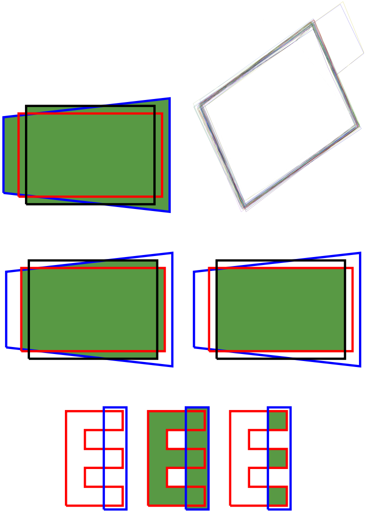

Conclusion

The Pile algorithm is not useful for the *Building Inspector*.

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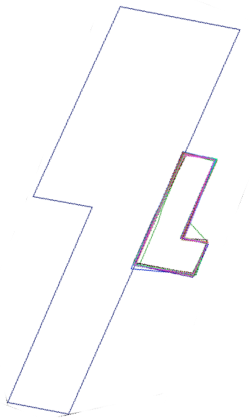

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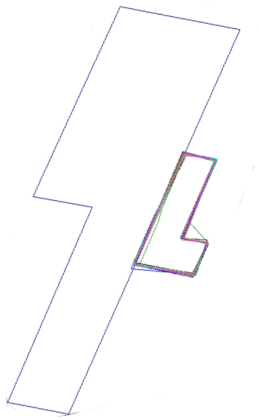

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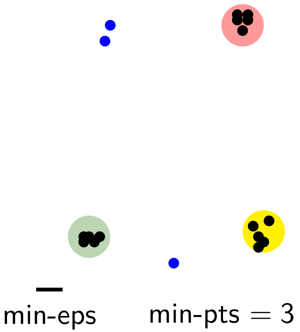

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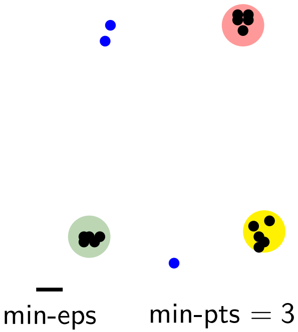

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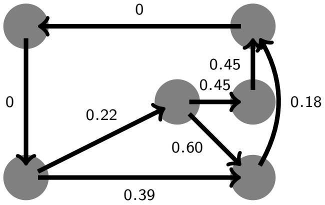

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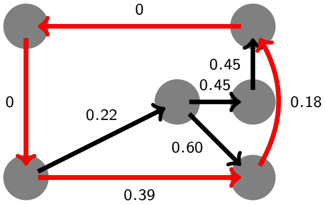

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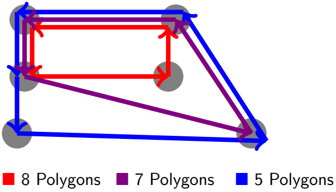

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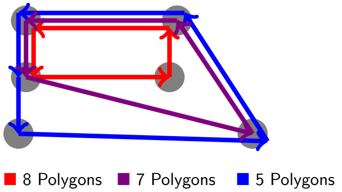

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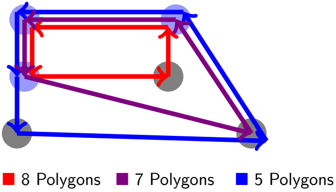

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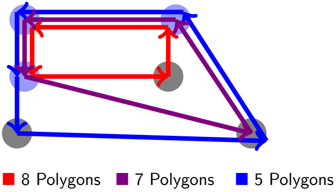

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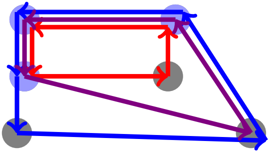

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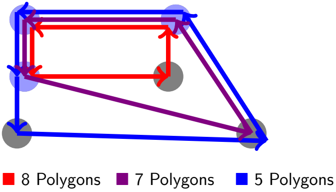

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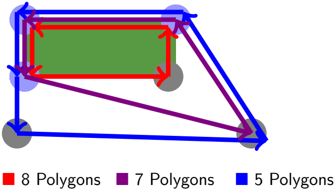

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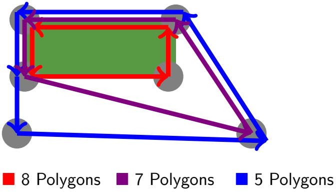

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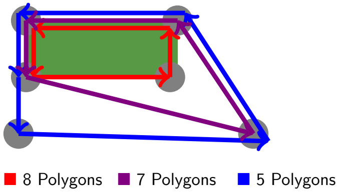

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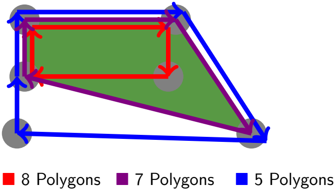

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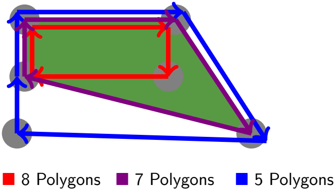

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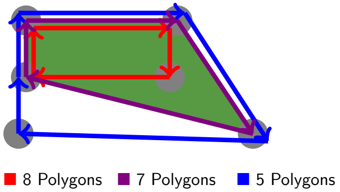

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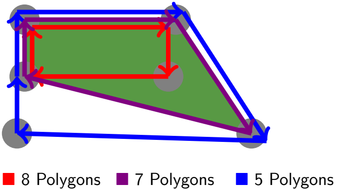

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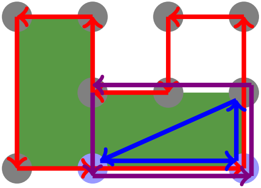

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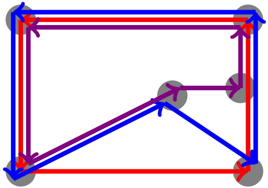

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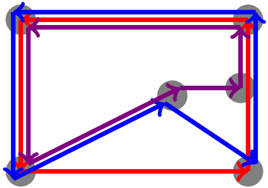

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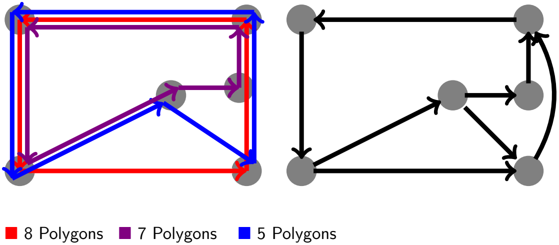

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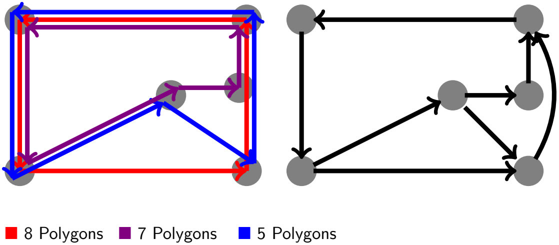

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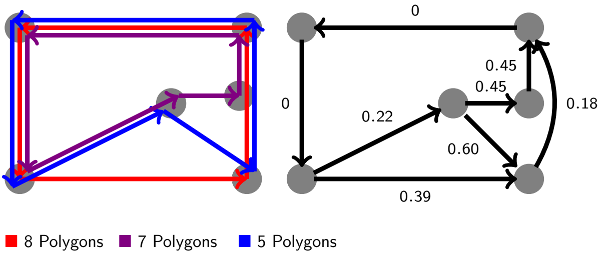

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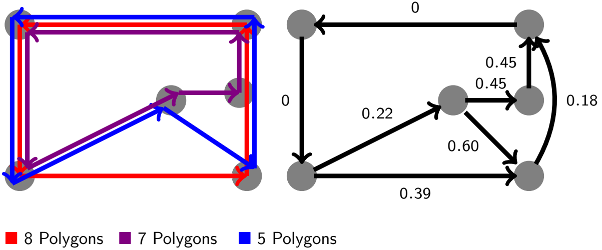

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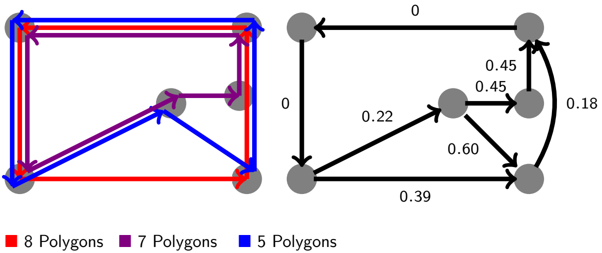

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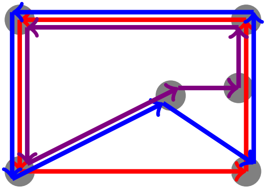

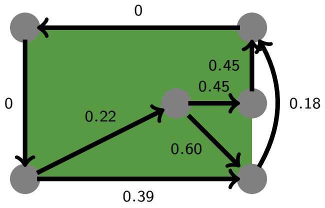

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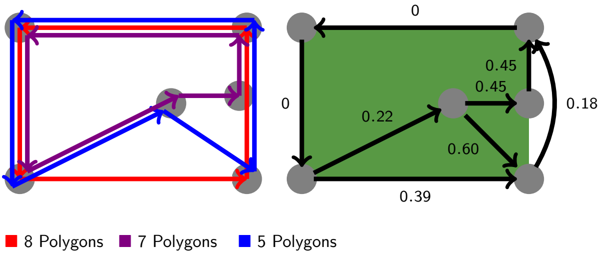

No more orientation-dependent!

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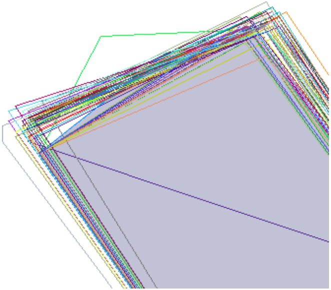

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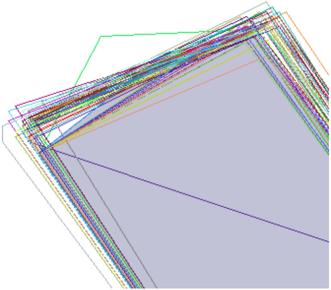

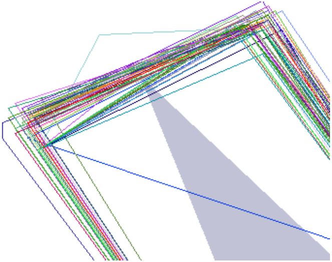

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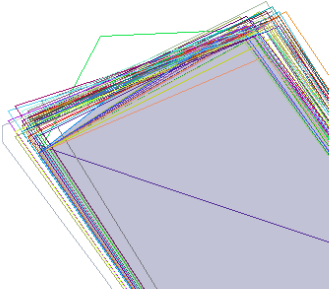
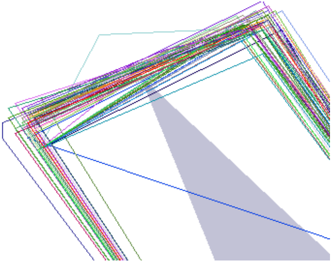
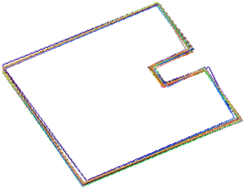
Hope: Find min-eps automatically

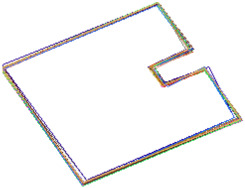


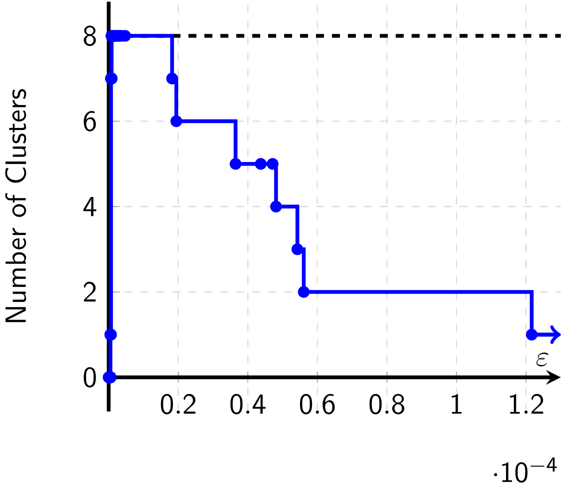


From an Observation to a Heuristic

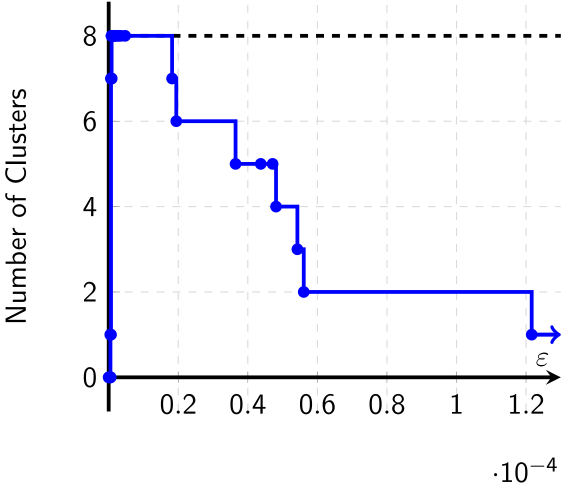


From an Observation to a Heuristic



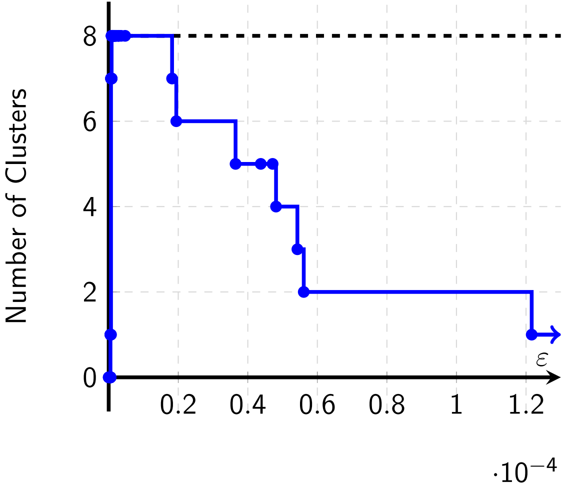


From an Observation to a Heuristic



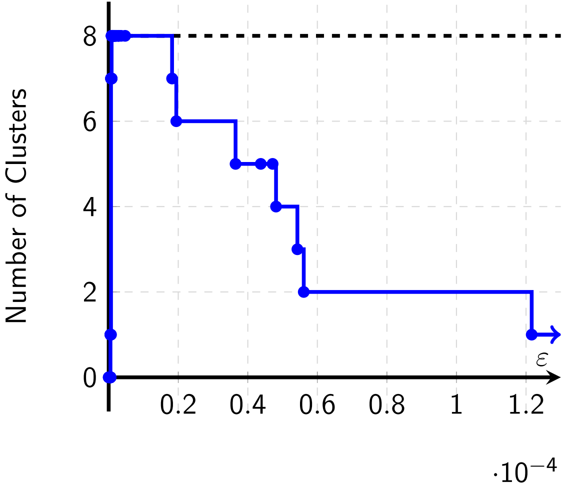
From an Observation to a Heuristic

- Calculate median.



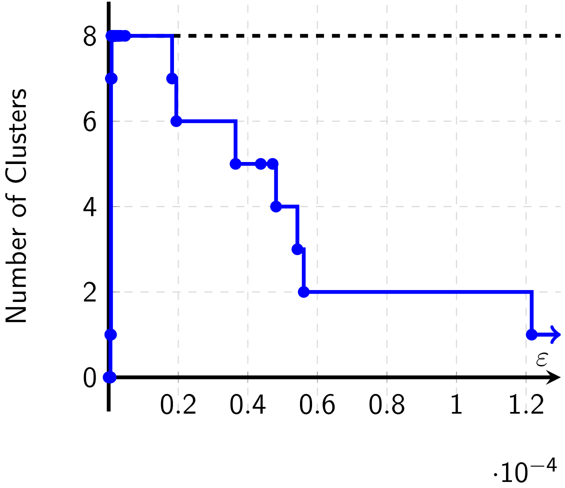
From an Observation to a Heuristic

- Calculate median.
- Allow only clusters of size $n/2$.



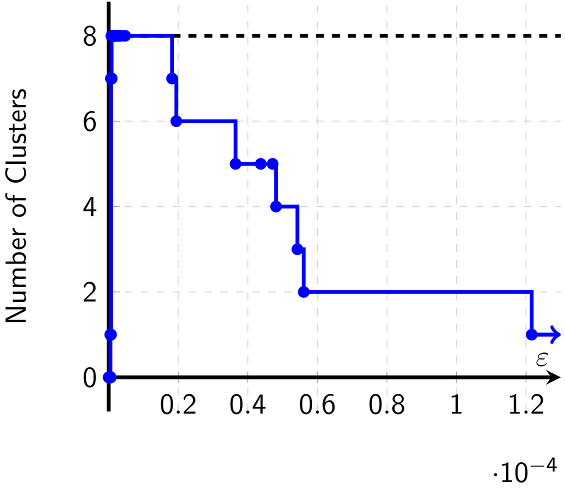
From an Observation to a Heuristic

- Calculate median.
- Allow only clusters of size $n/2$.
- Select longest plateau.



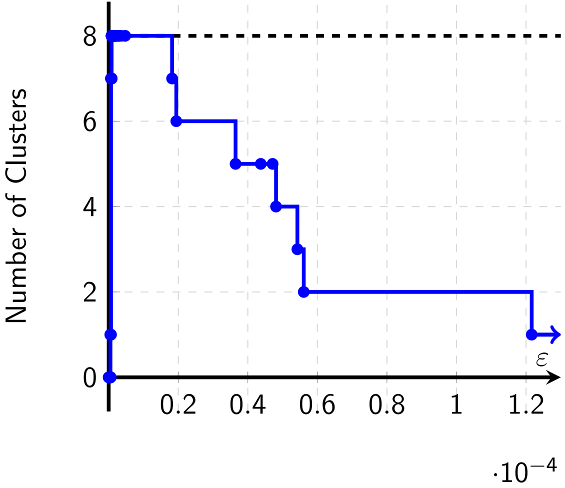
From an Observation to a Heuristic

- Calculate median.
- Allow only clusters of size $n/2$.
- Select longest plateau.
- Use Semi-Dynamic-Sets.



From an Observation to a Heuristic

- Calculate median.
- Allow only clusters of size $n/2$.
- Select longest plateau.
- Use Semi-Dynamic-Sets.
- Running time $\mathcal{O}(n^2 \log n)$.



Evaluation Process

Evaluation Process

Sources

Evaluation Process

Sources

detected,

Evaluation Process

Sources

detected, user,

Evaluation Process

Sources

detected, user,
mmwc-autoeps,

Evaluation Process

Sources

detected, user,
mmwc-autoeps, mmwc-raw,

Evaluation Process

Sources

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mmwc-autoeps, mmwc-raw, mmwc-clean,

Evaluation Process

Sources

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mmwc-autoeps, mmwc-raw, mmwc-clean,
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Evaluation Process

Sources

detected, user,
mmwc-autoeps, mmwc-raw, mmwc-clean,
voting-autoeps, voting-raw, voting-clean

Semantics

Check if the polygons fit to footprints of buildings.

Evaluation Process

Sources

detected, user,
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voting-autoeps, voting-raw, voting-clean

Semantics

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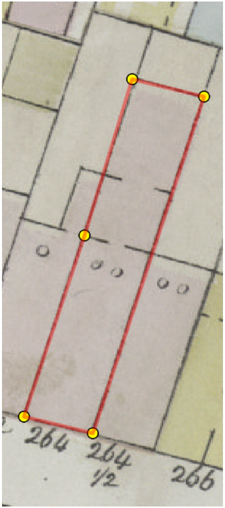


Evaluation Process

Sources

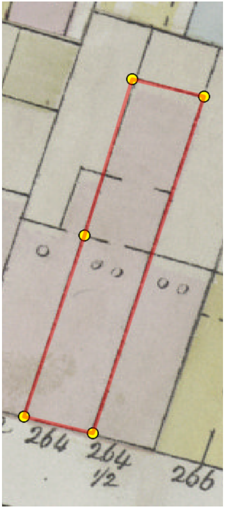
detected, user,
mmwc-autoeps, mmwc-raw, mmwc-clean,
voting-autoeps, voting-raw, voting-clean

Semantics

Check if the polygons fit to footprints of buildings.

Accuracy

Extract the average brightness of the pixels *under* the polygon edges automatically. The lower the better!



Evaluation Process

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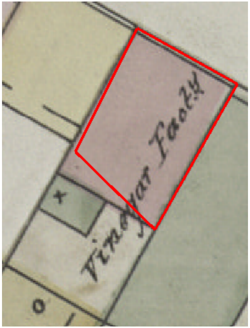

Value: 0.48

Evaluation Process

Sources

detected, user,
mmwc-autoeps, mmwc-raw, mmwc-clean,
voting-autoeps, voting-raw, voting-clean

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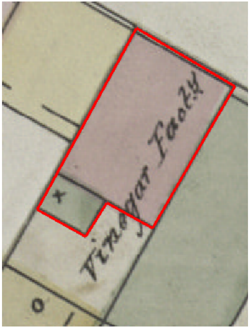

Value: 0.38

Evaluation Process

Sources

detected, user,
mmwc-autoeps, mmwc-raw, mmwc-clean,
voting-autoeps, voting-raw, voting-clean

Semantics

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Accuracy

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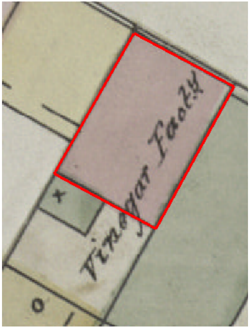

Value: 0.36

Sematical Results

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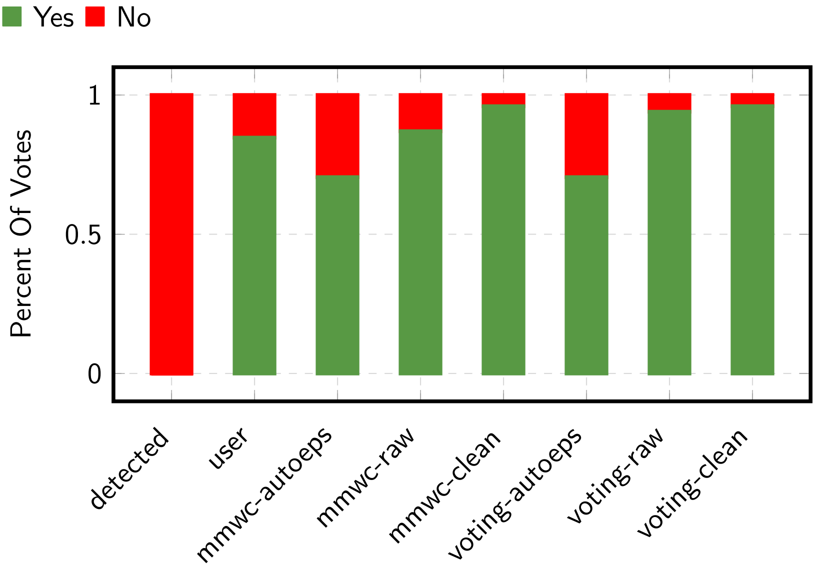
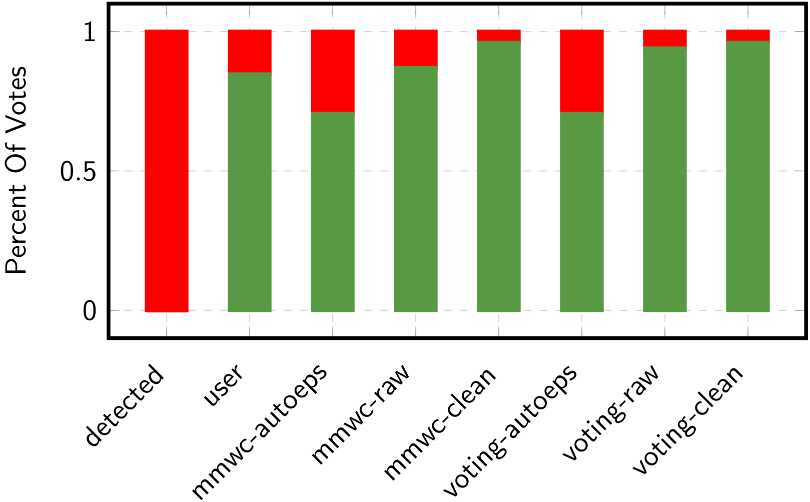


Sematical Results

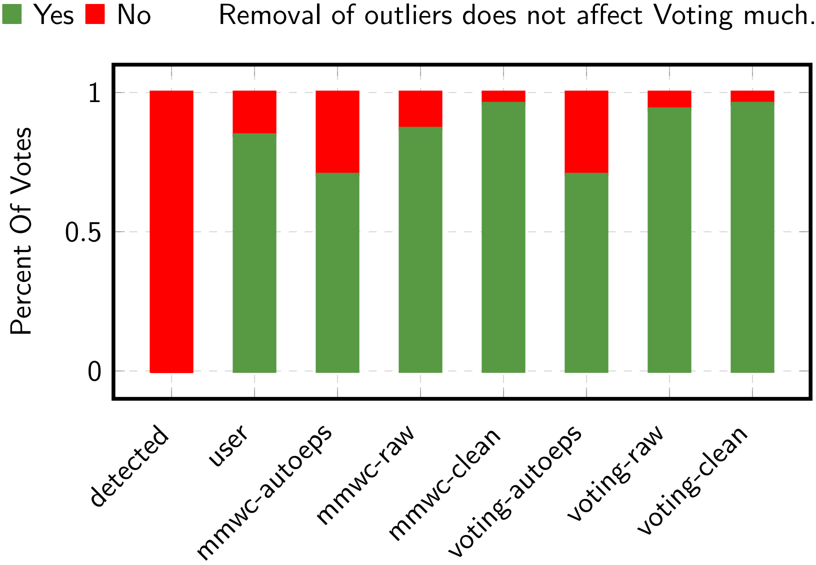
Yes No

MMWC was not better than Voting!



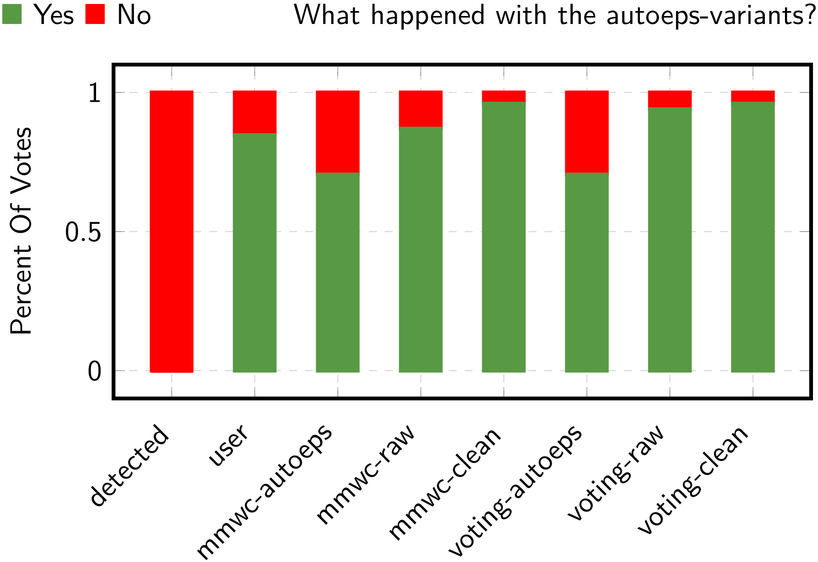
Sematical Results

Removal of outliers does not affect Voting much.



Sematical Results

What happened with the autoeps-variants?



Analysis of the auto-eps Variants

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There were 45 groups where both autoeps-variants failed.

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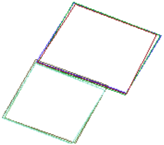
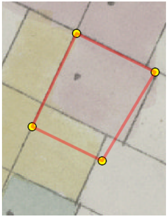
Example:





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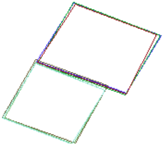

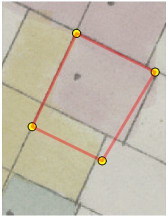

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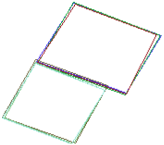

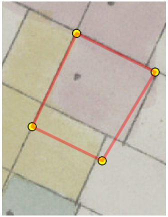

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There were two groups only the autoeps-variants could solve.

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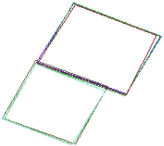

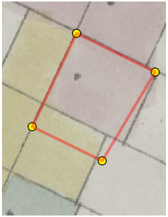

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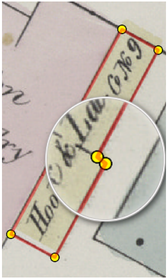

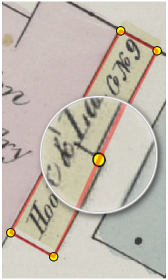

Brightness Results

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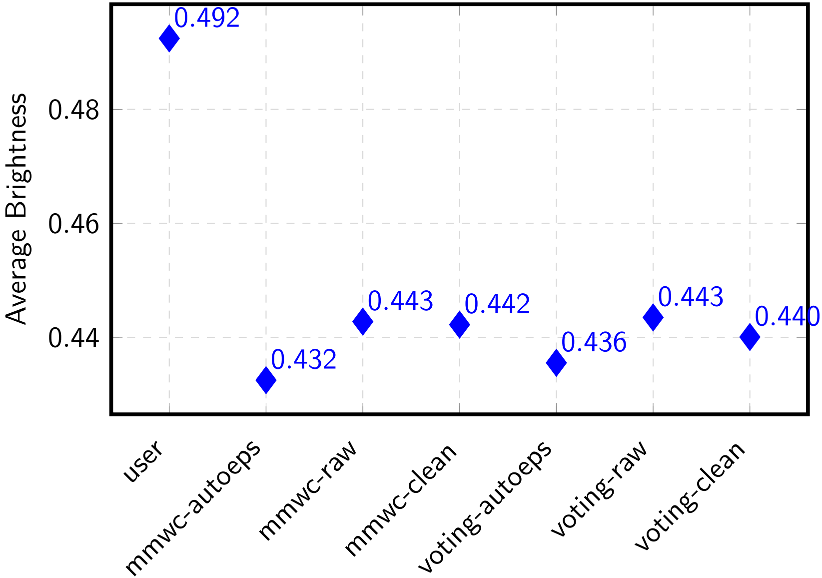

Conclusion

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Algorithmically

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We proposed three Algorithms to solve the problem, using pure geometry or cluster-based approaches.

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Implications from the Results

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The cluster-based algorithms need two pre-processing steps.

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The Voting Algorithm performs better than the MWWC Algorithm.