Julius-Maximilians-
UNIVERSITÄT
WÜRZBURG

Institut für Informatik

Optimising Active Ranges for Point Selection in Dynamic Maps

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ICA Generalisation Workshop '13

[1]Lehrstuhl für Informatik I
Universität Würzburg, Germany

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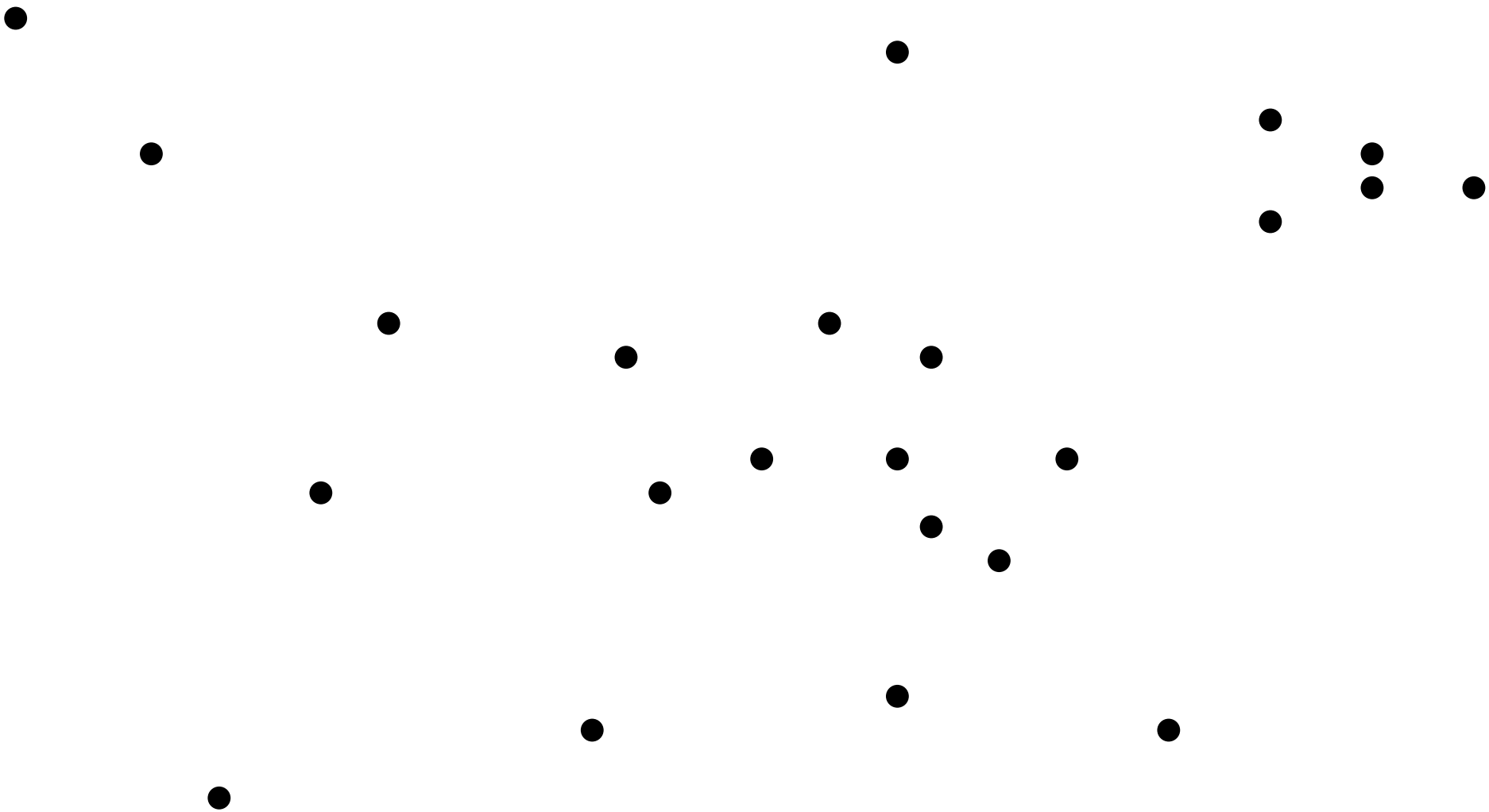
Hildesheim, Germany

Problem



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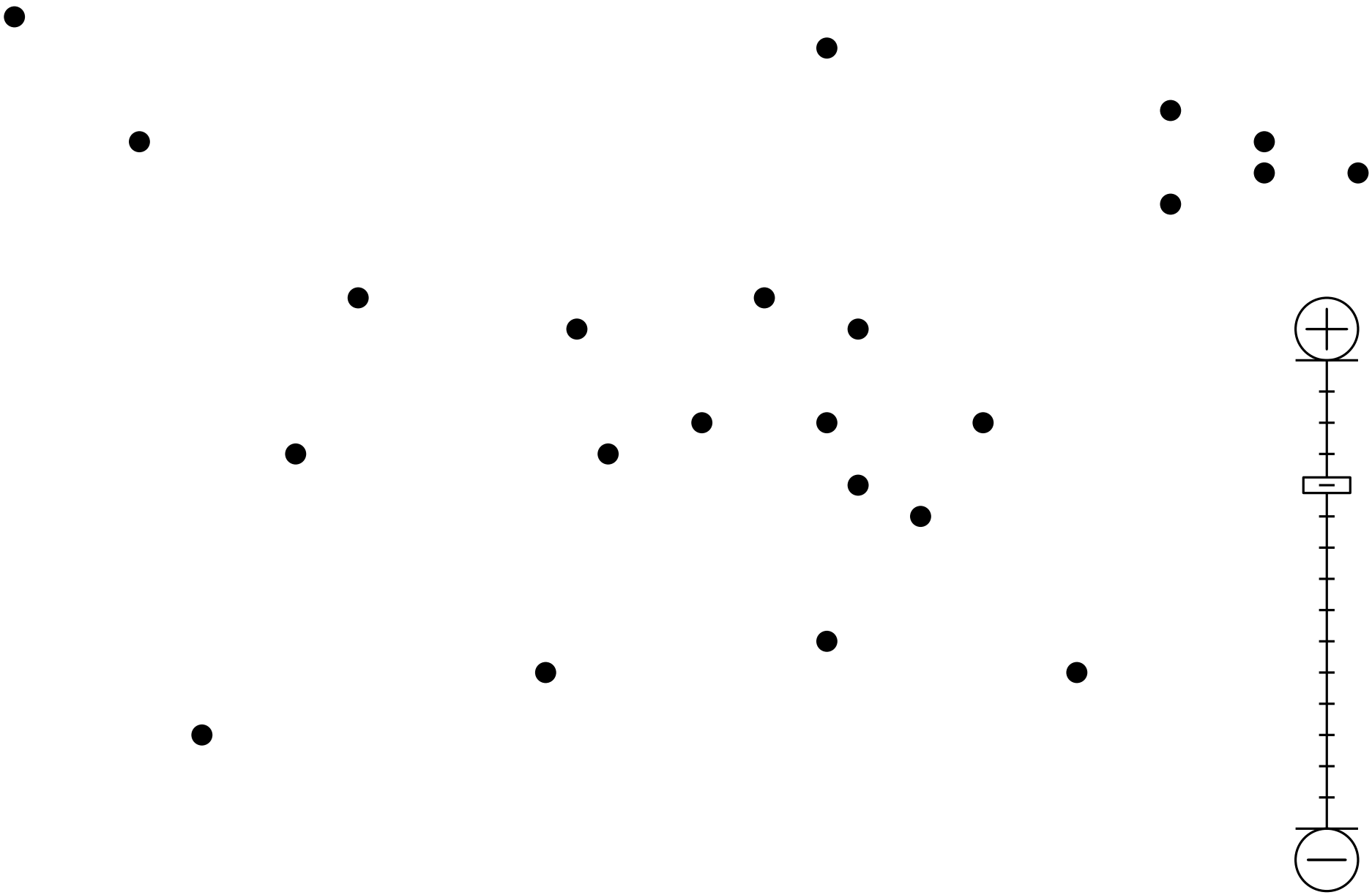

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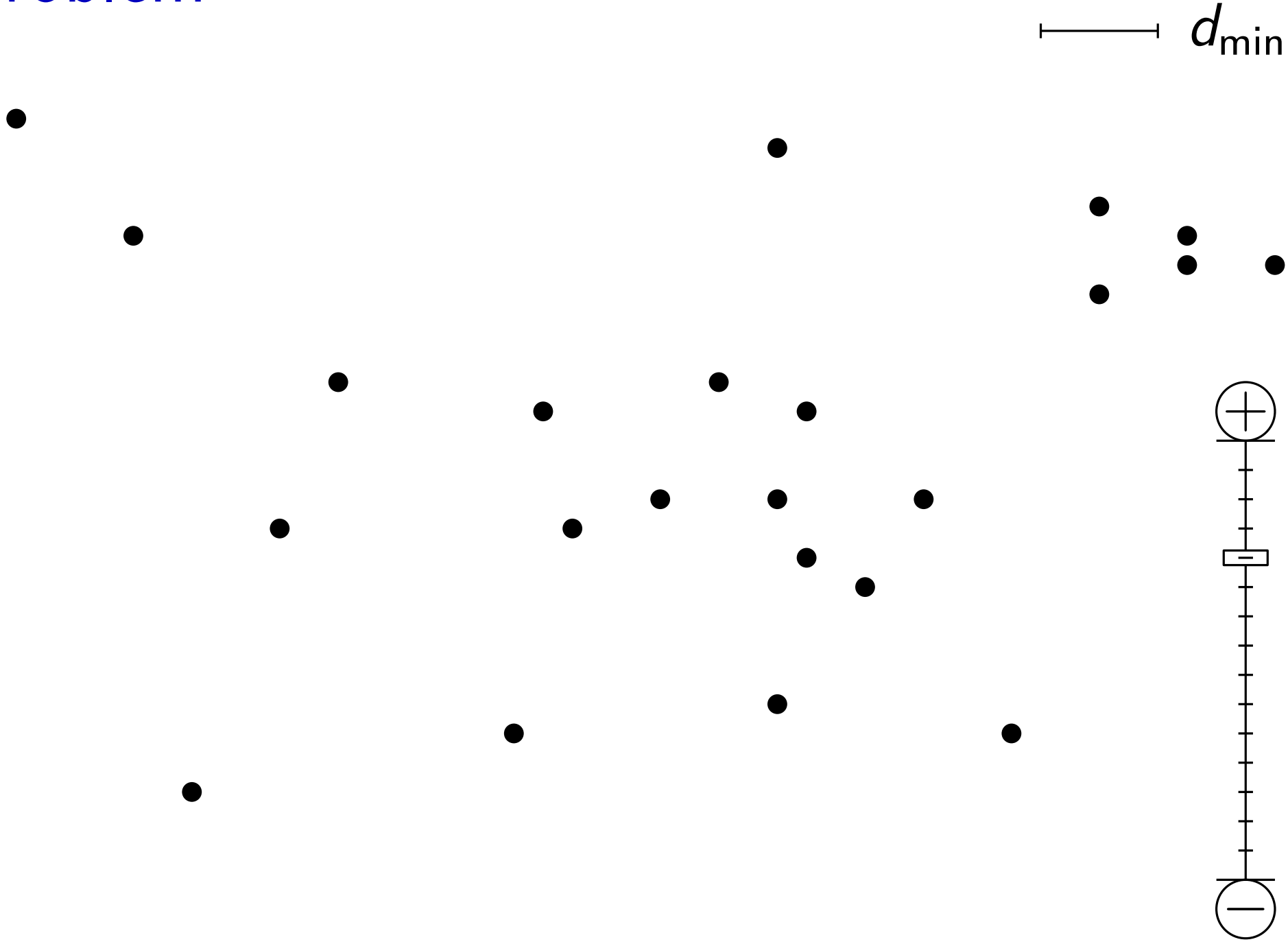

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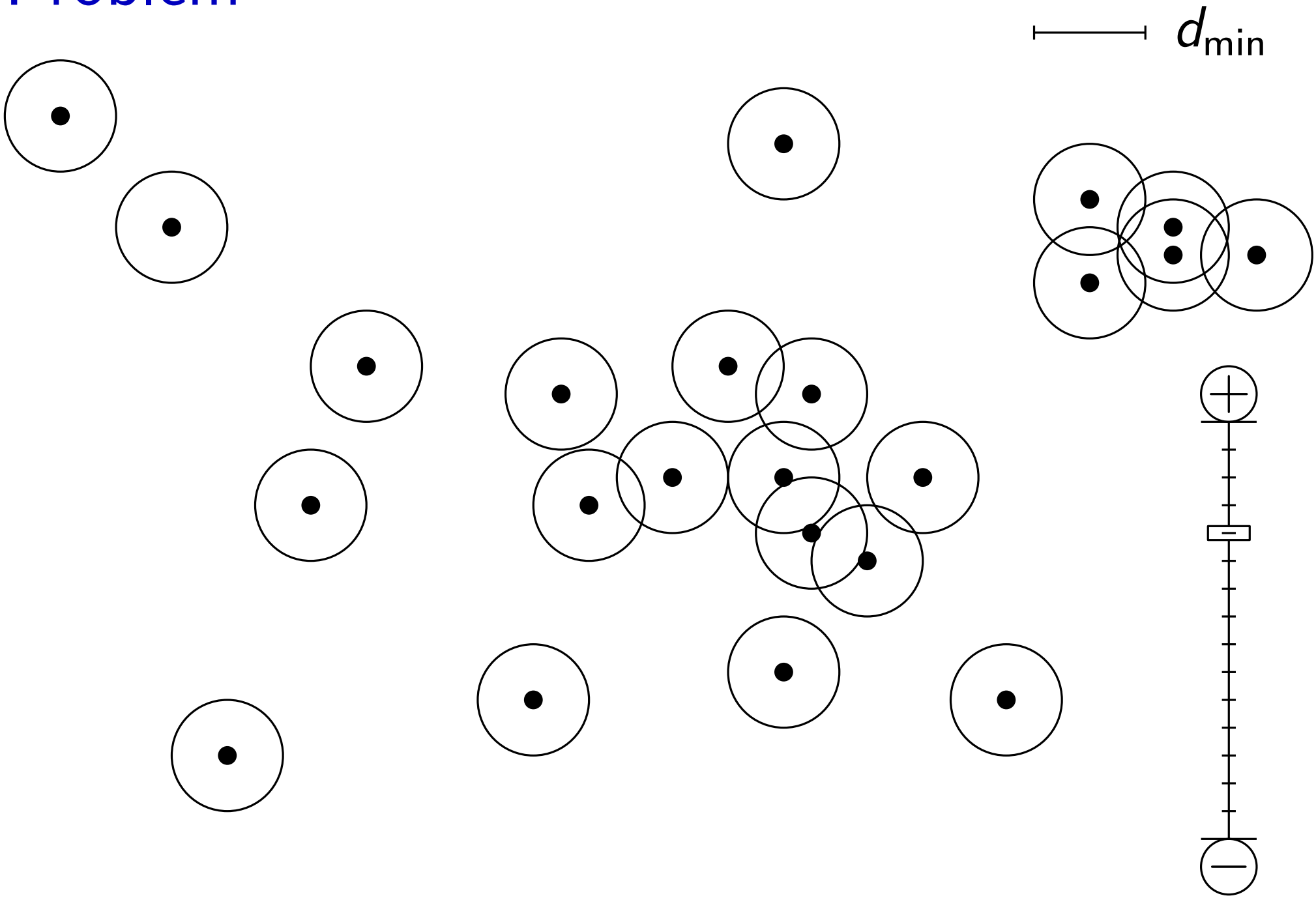

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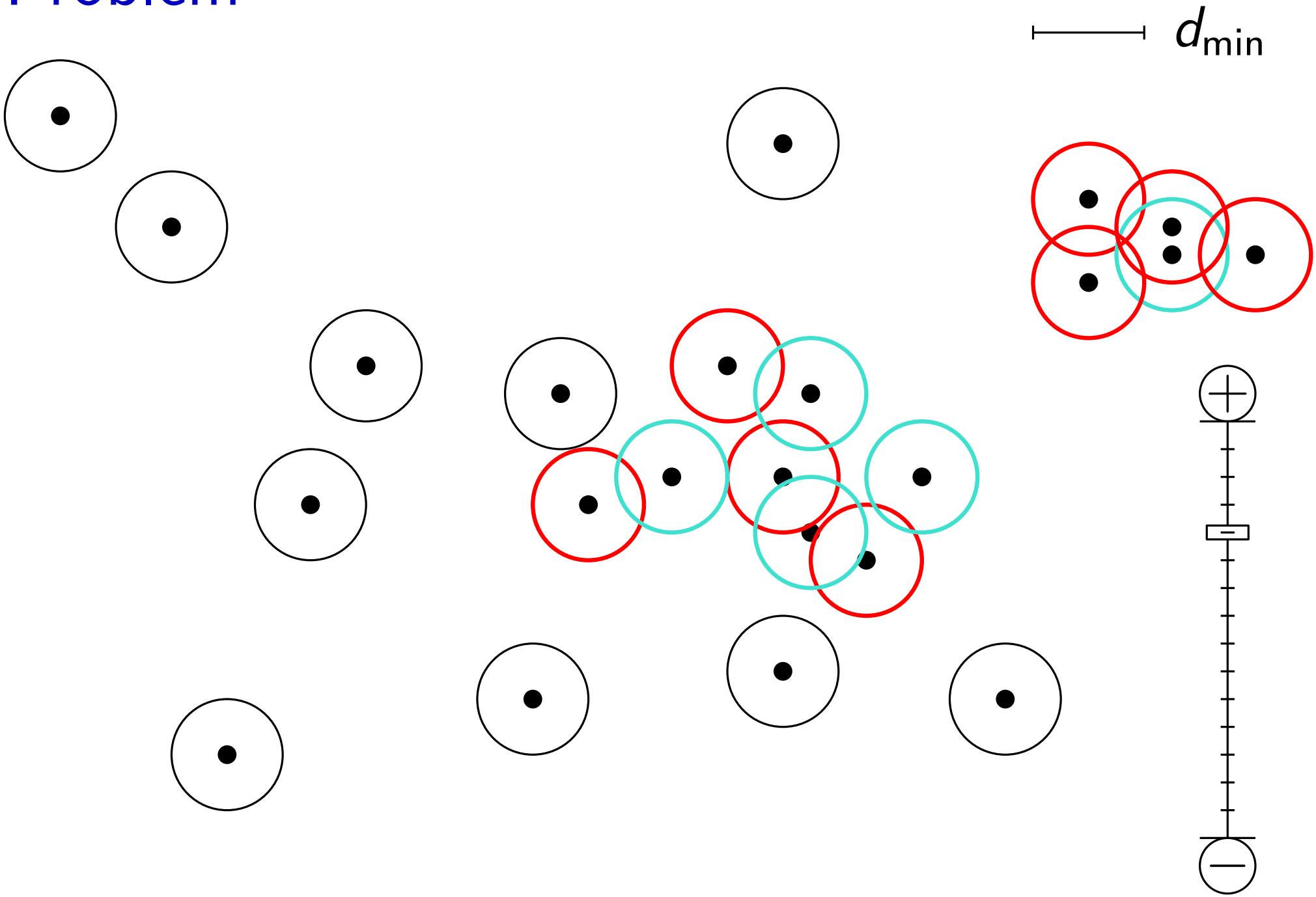

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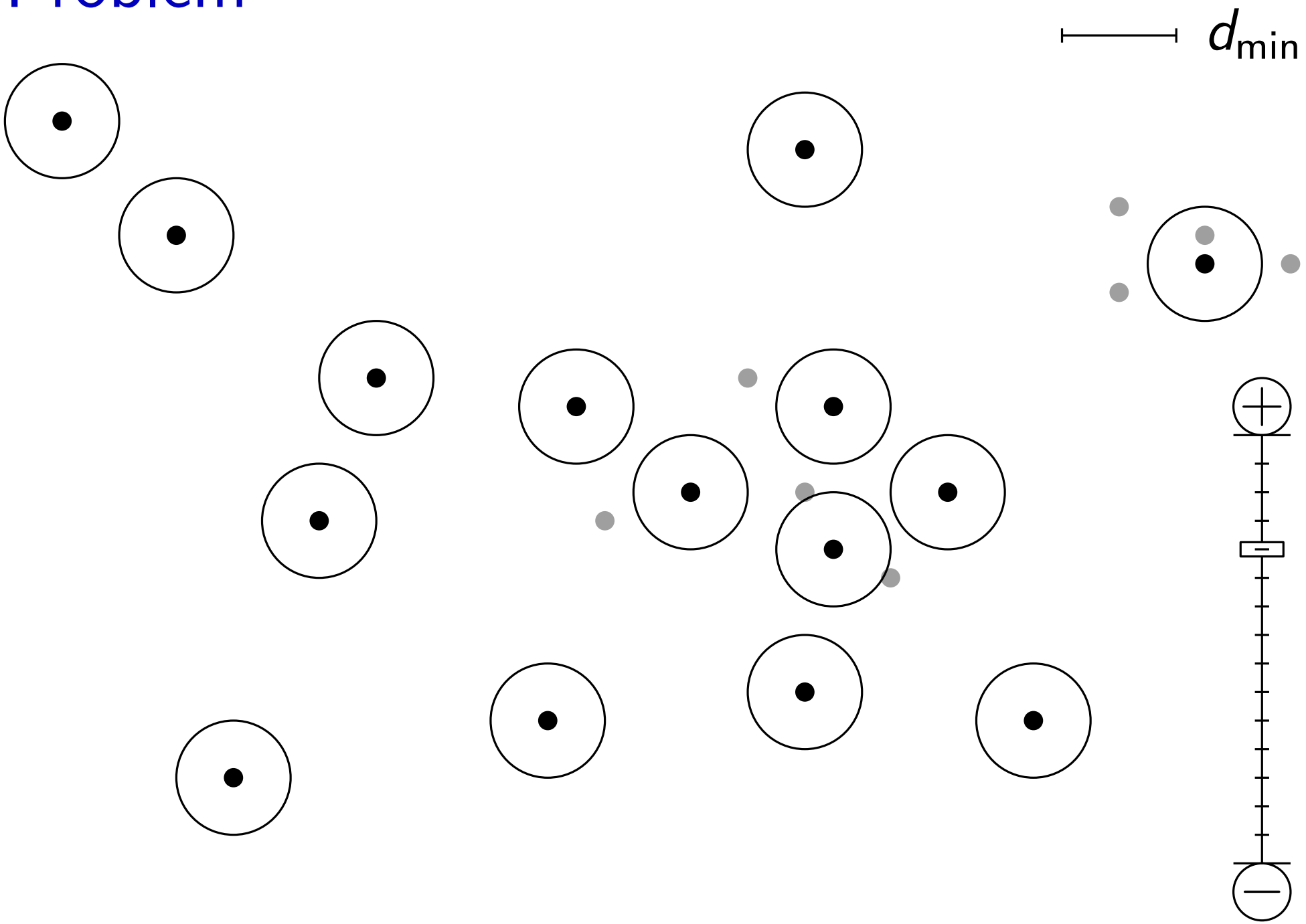

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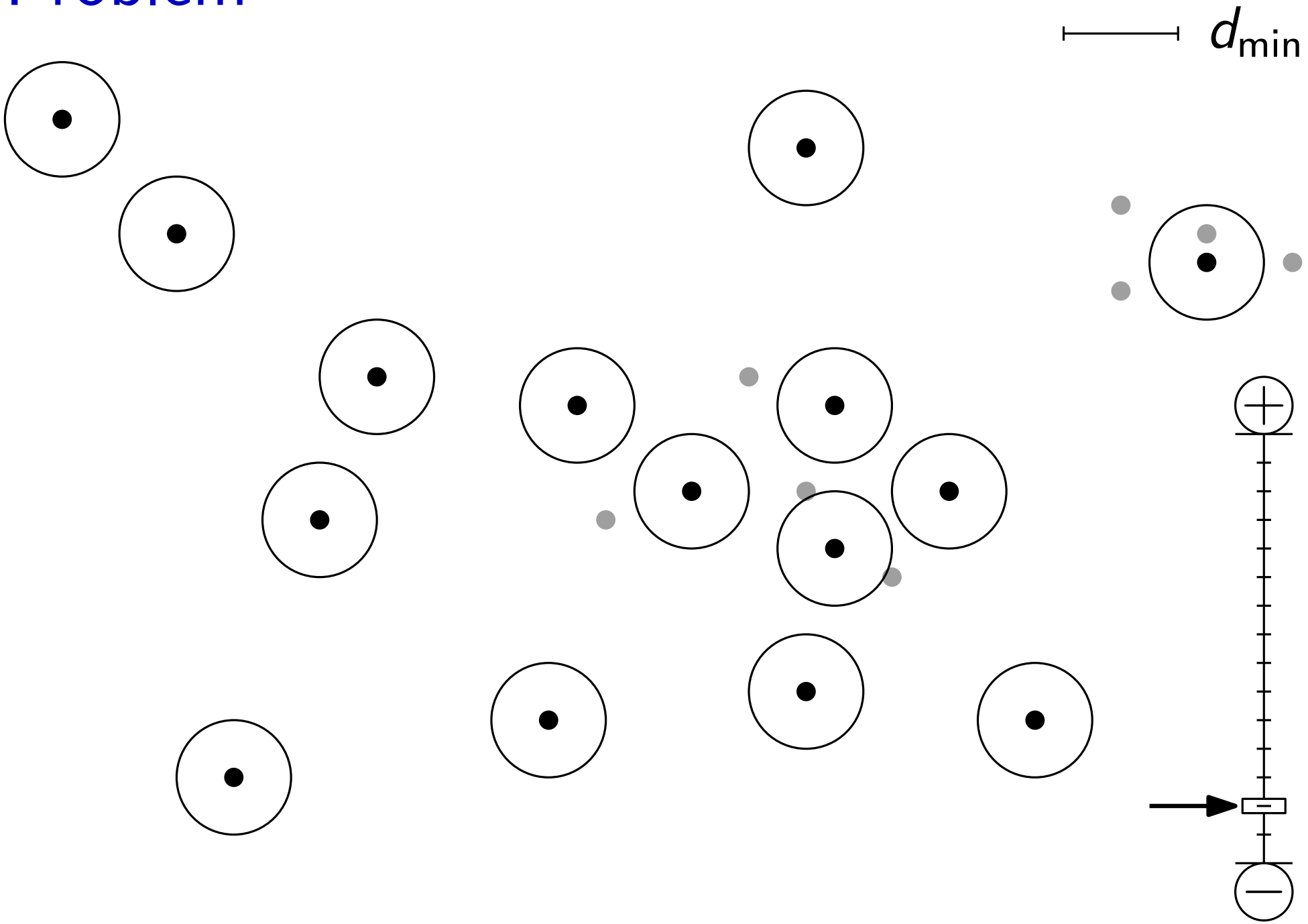

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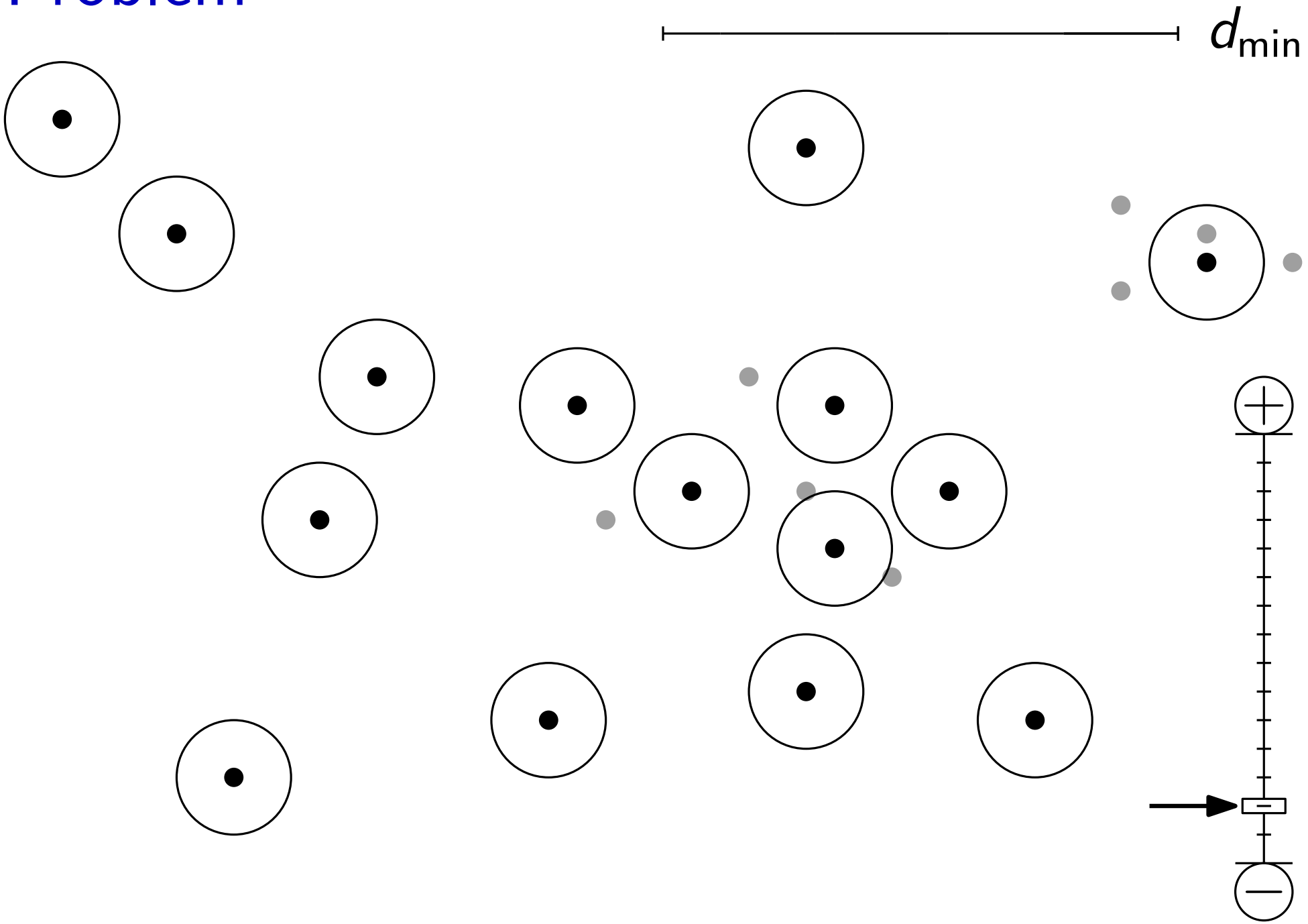

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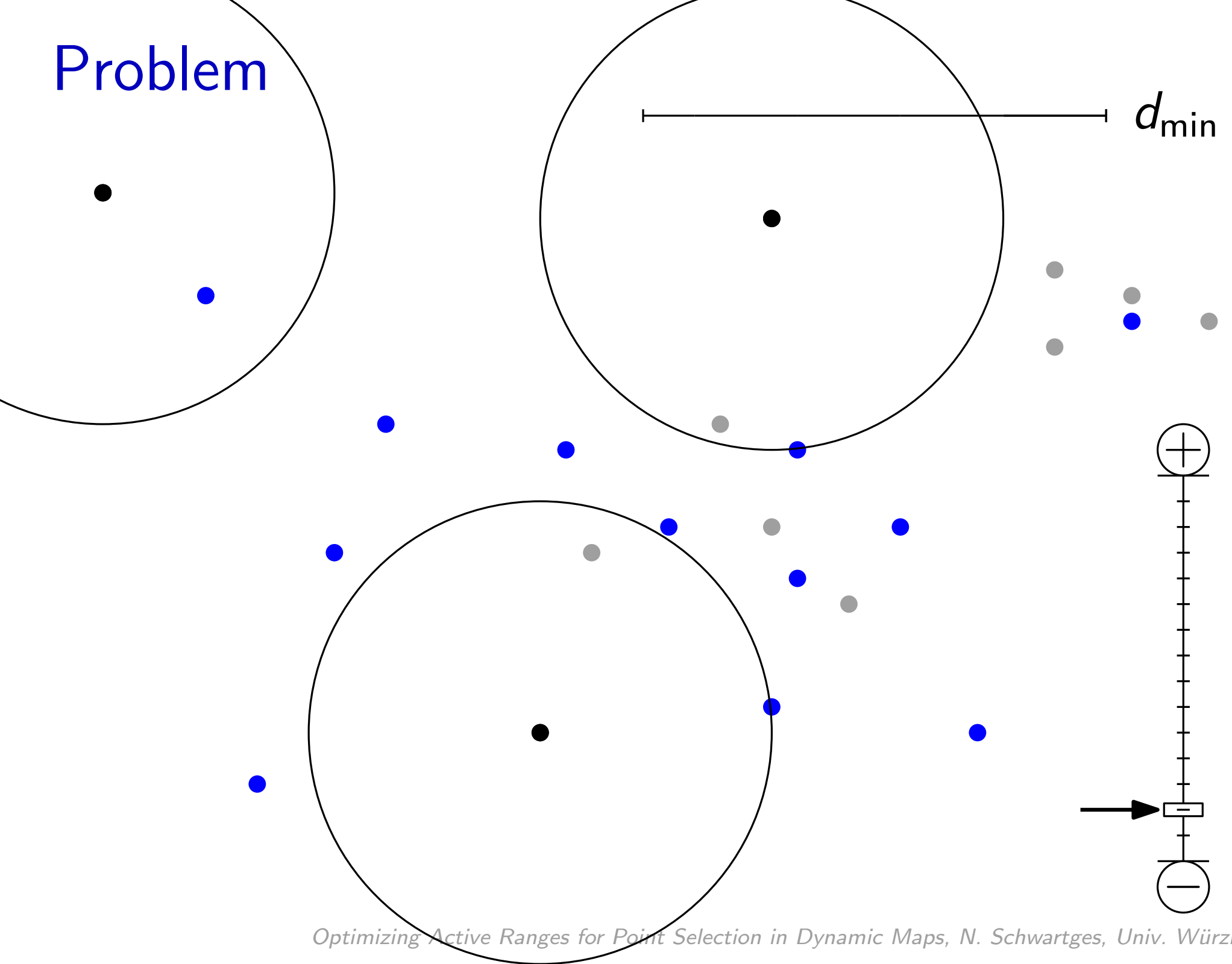

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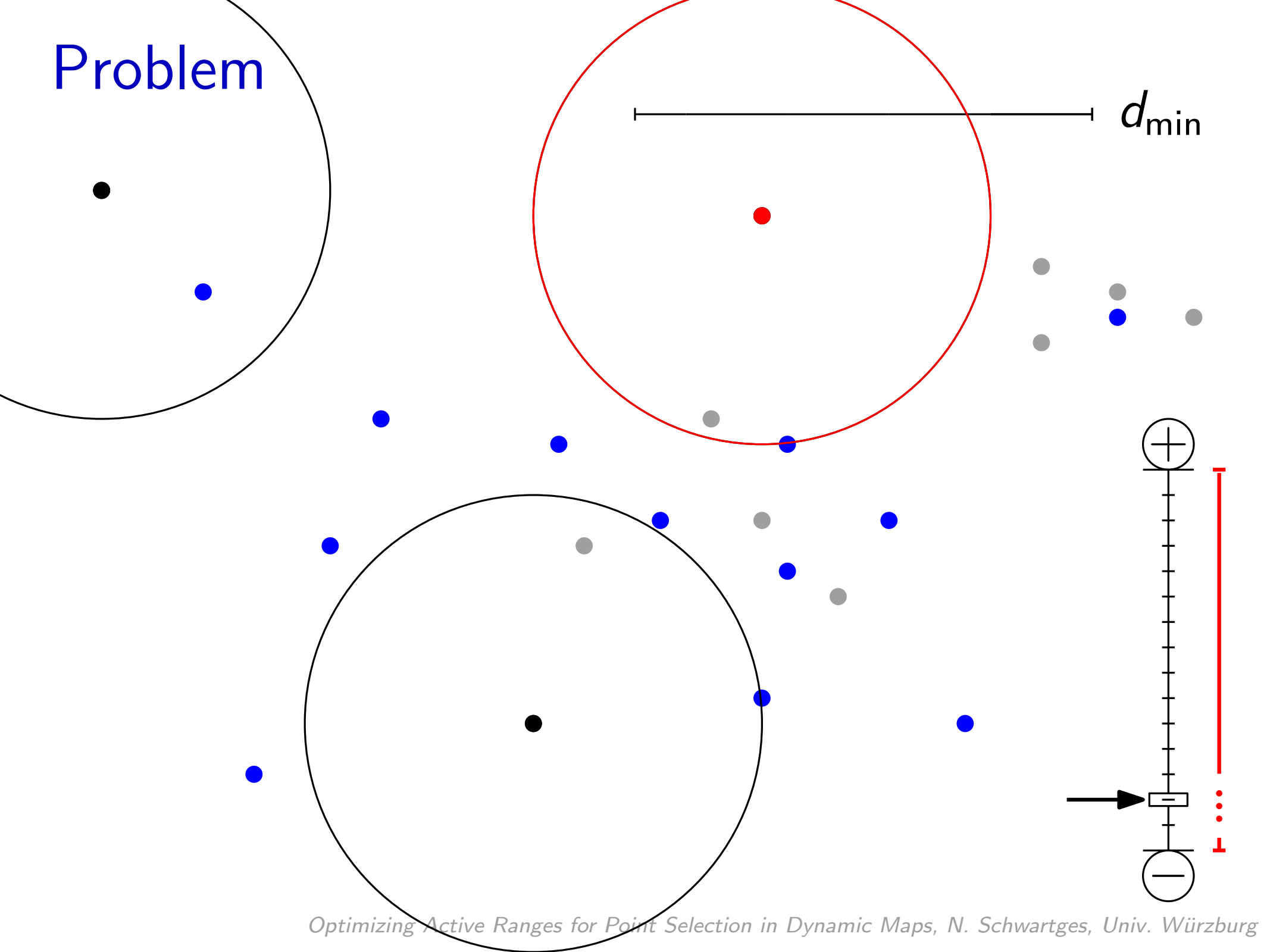

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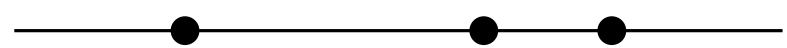

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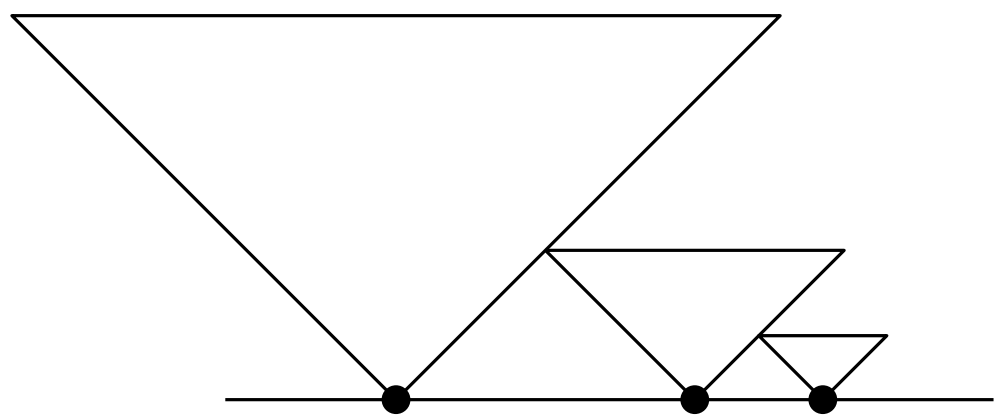

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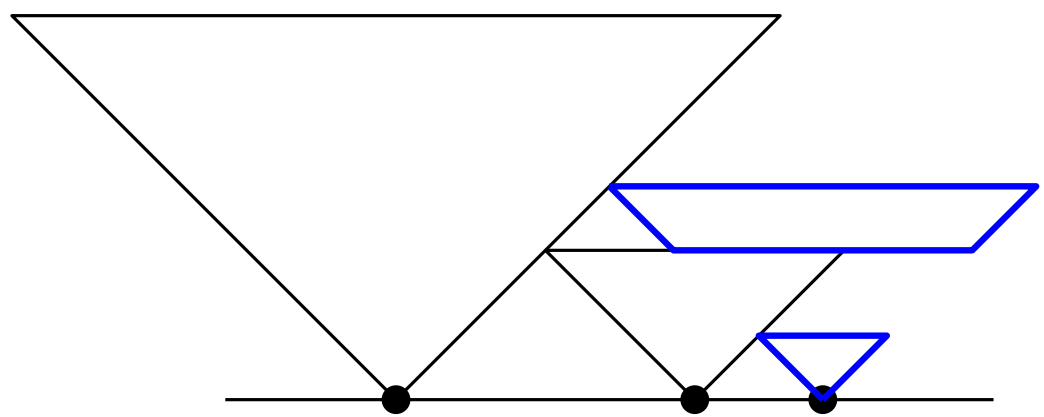

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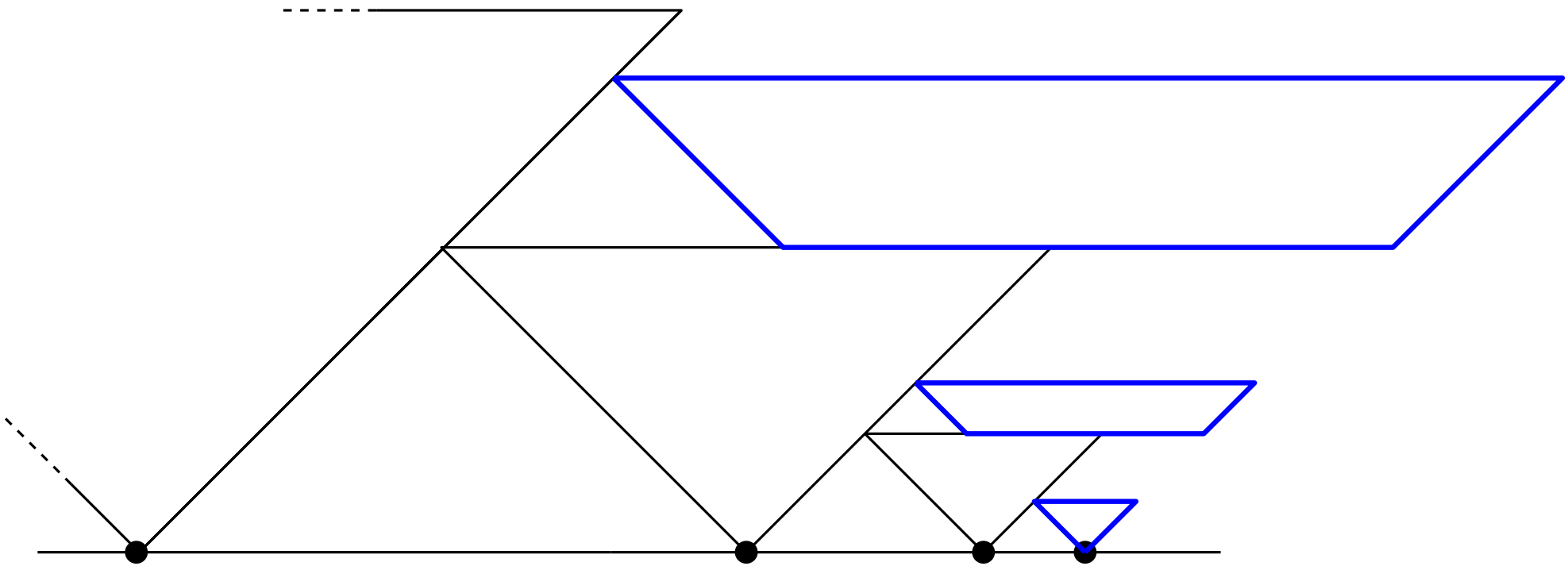
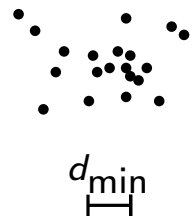


Active Range Optimisation

Given: set of points P

constant d_{min}



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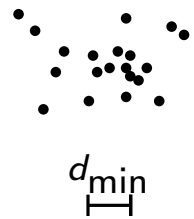

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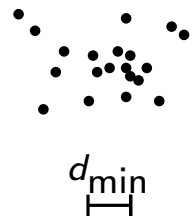

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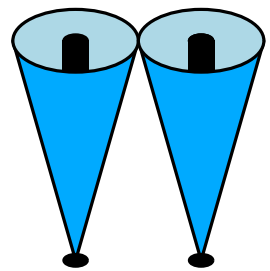

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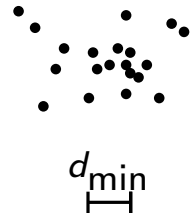

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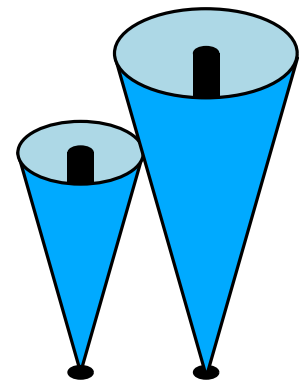

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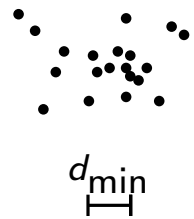

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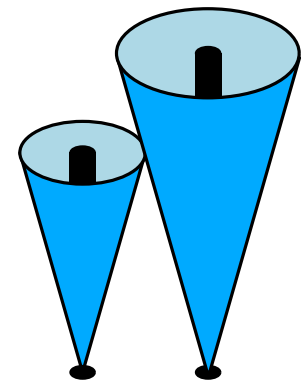
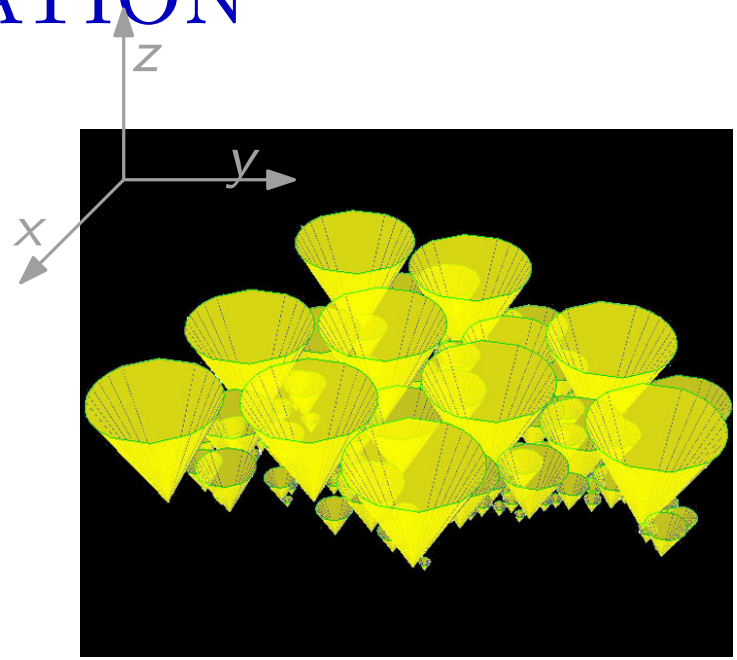


in order to query selected points at run time

Active Range Optimisation



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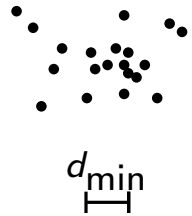

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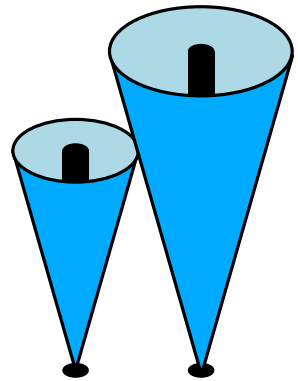

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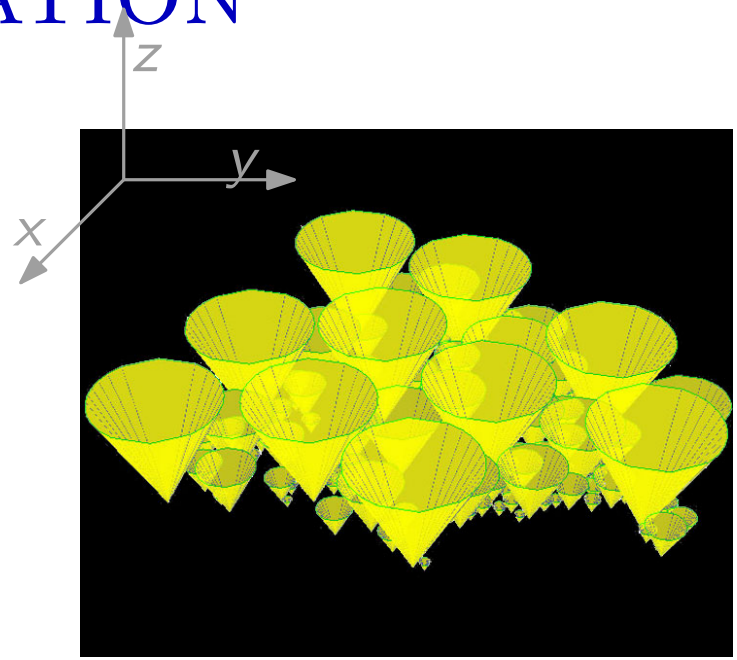

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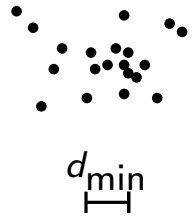

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constrained-based map generalization
(Weibel and Dutton, 1998)

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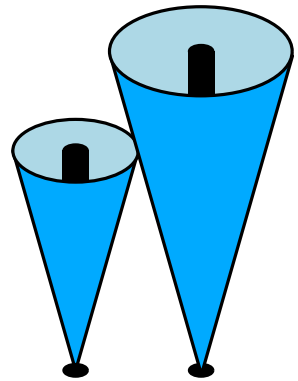

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Generalisation (Burghardt et al., 2007)

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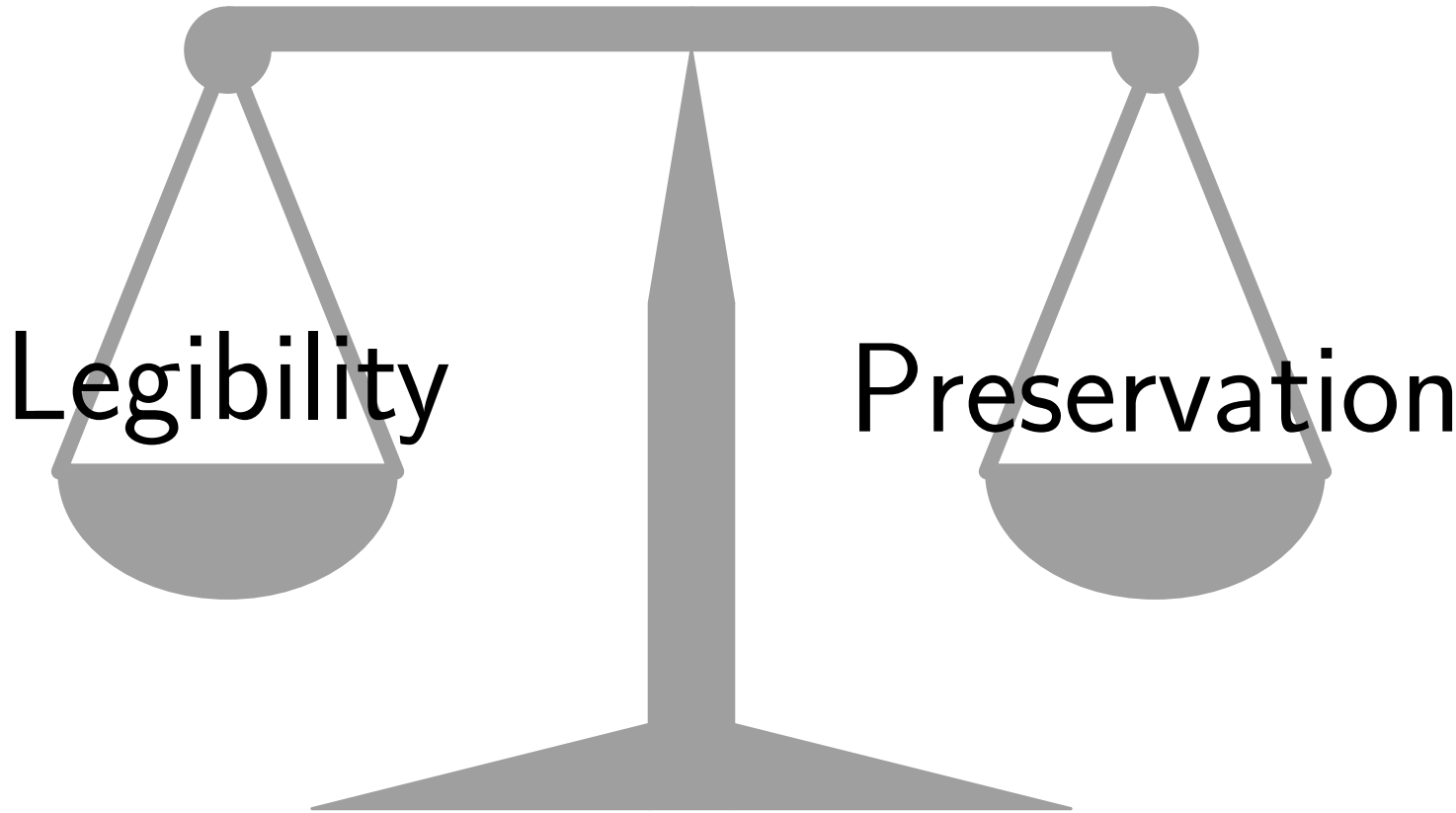

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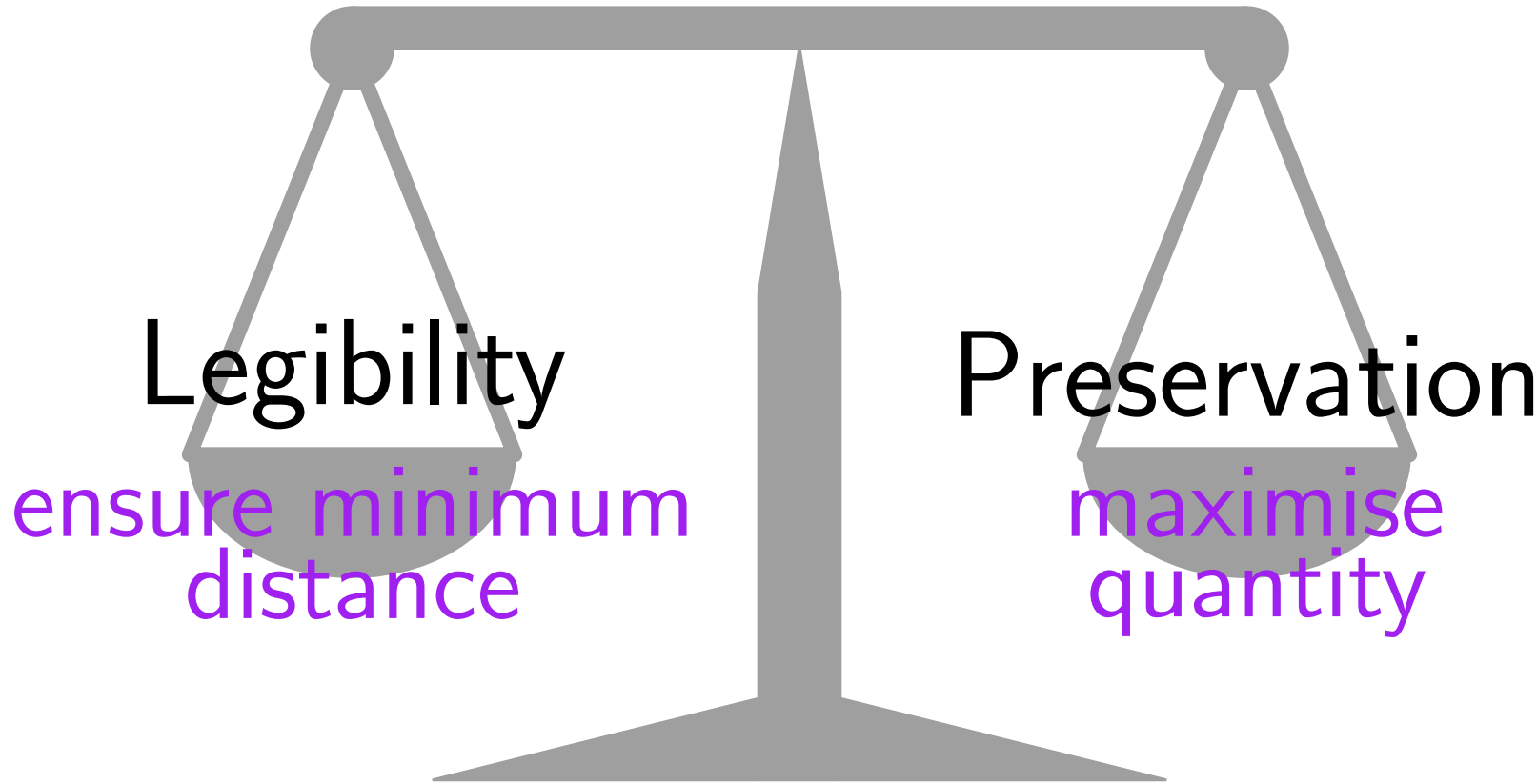

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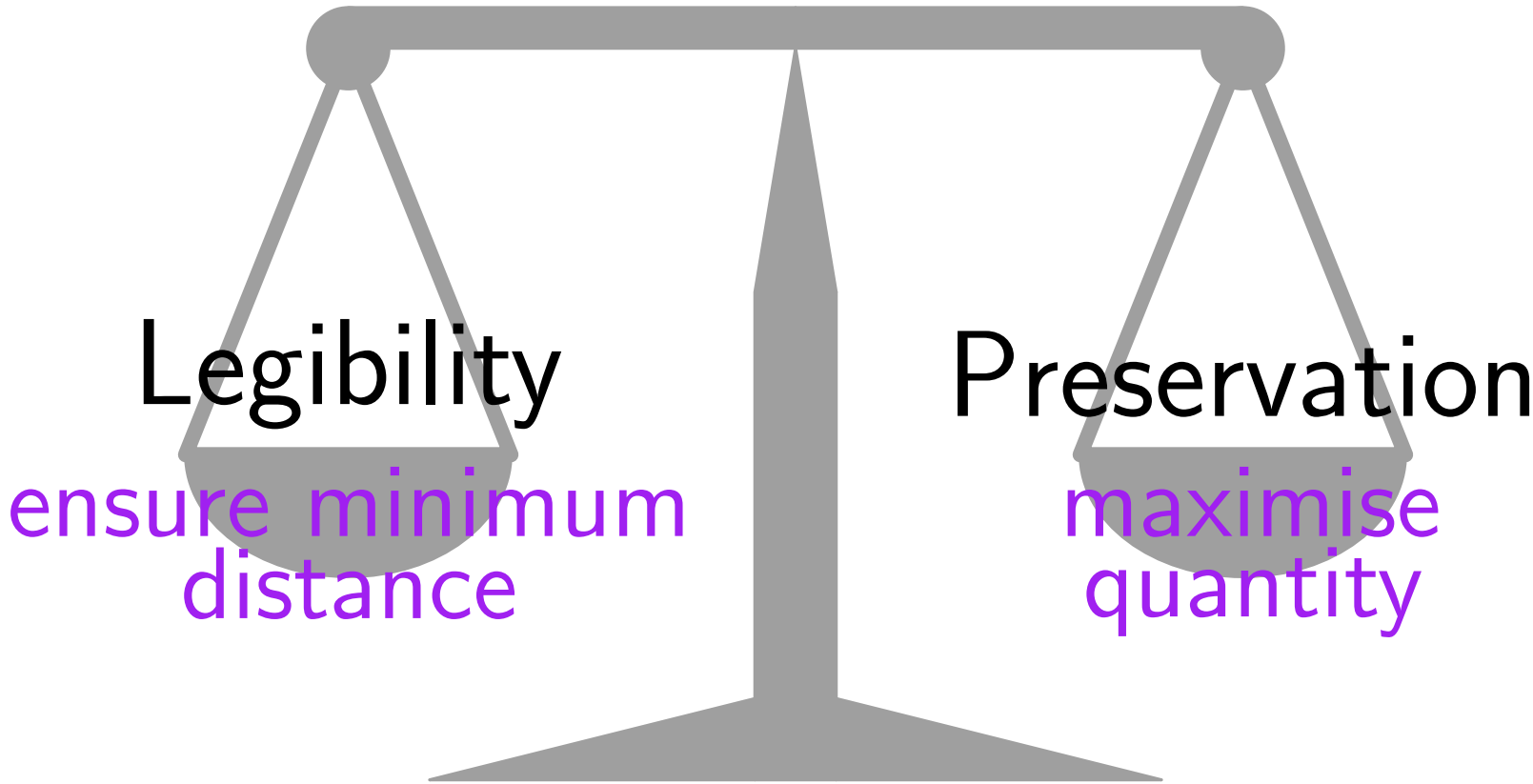
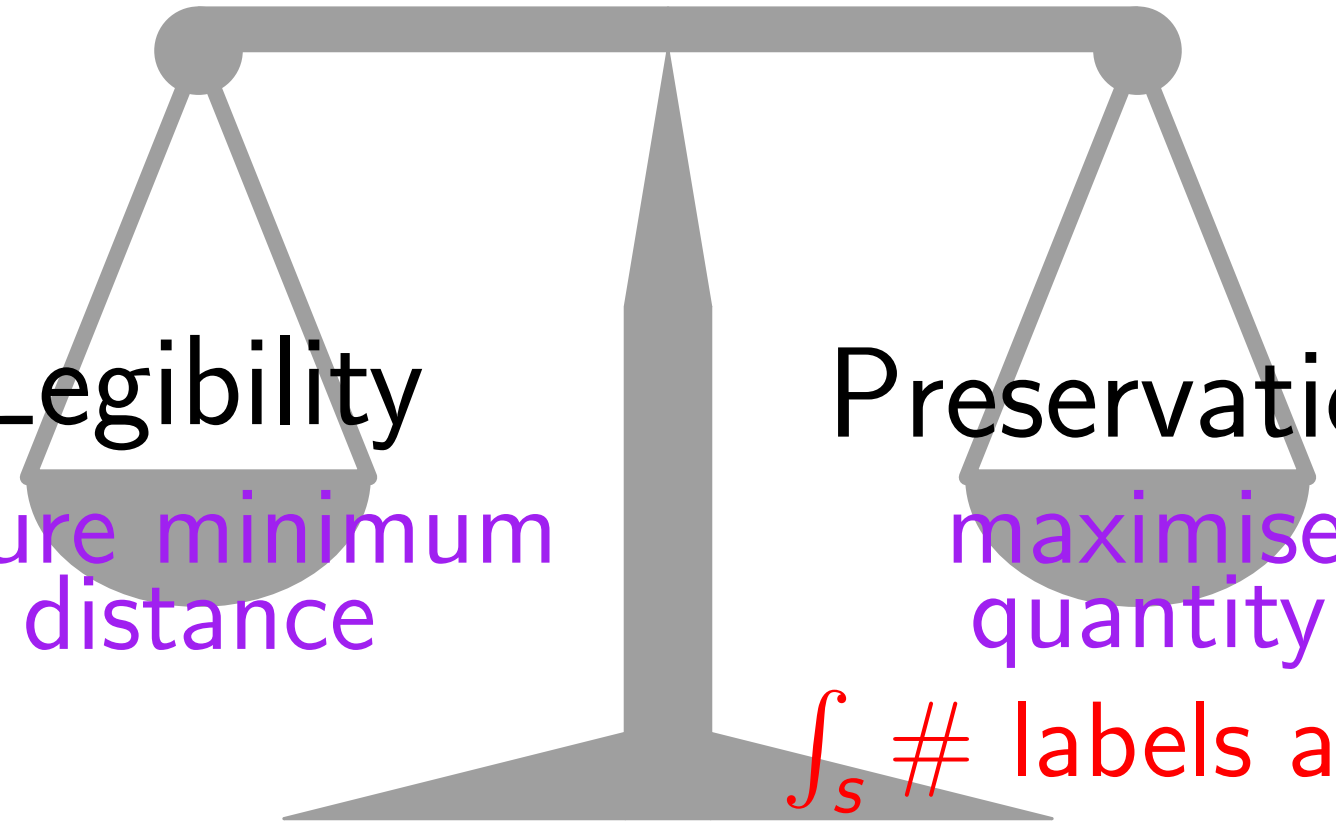


solution: optimise for each scale

Generalisation (Burghardt et al., 2007)



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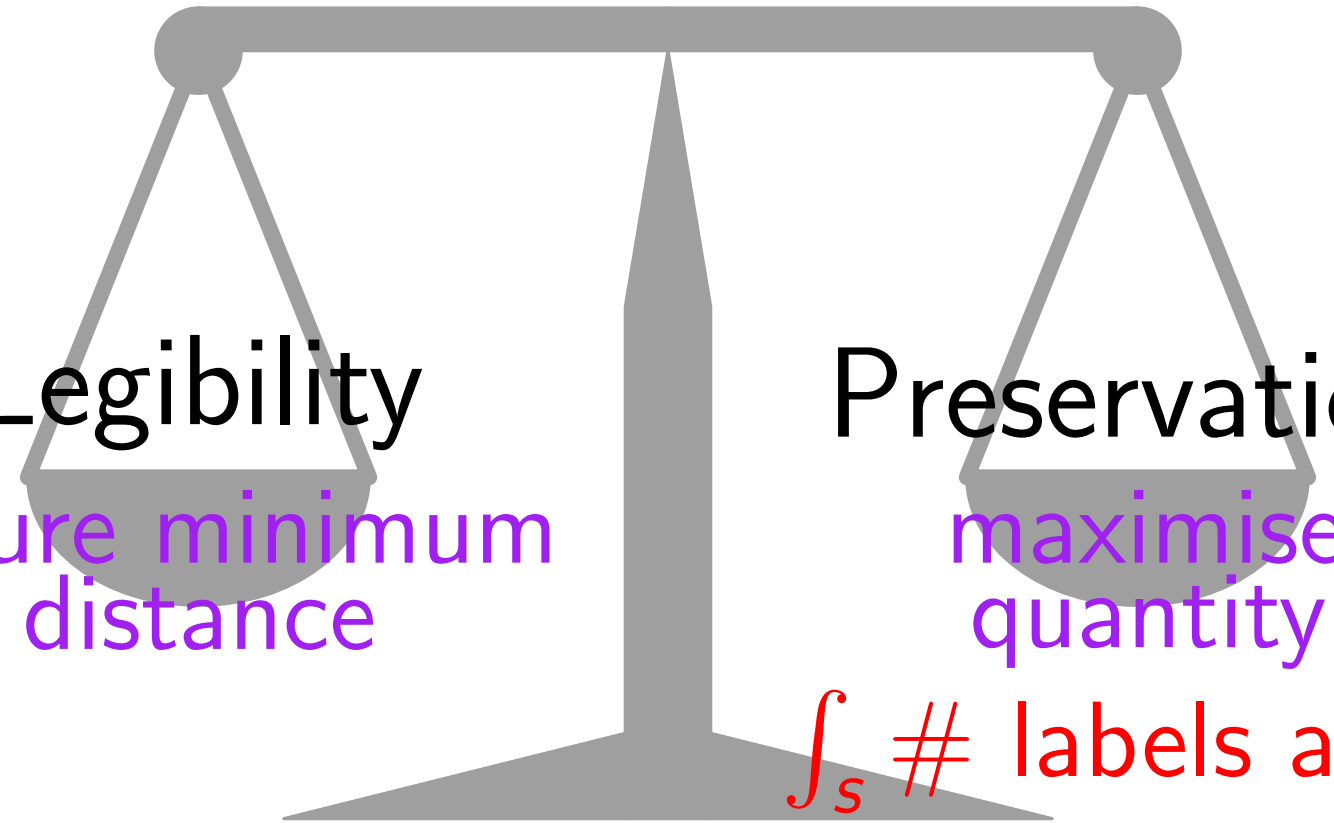

Legibility

ensure minimum distance

Preservation

maximise quantity

$\int_s$ # labels at scale s

over all scales

solution: optimise ~~for each~~ in advance

$\Rightarrow$ **no flickering**

Optimisation

Mixed-Integer Linear Program (MIP)

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optimal solutions

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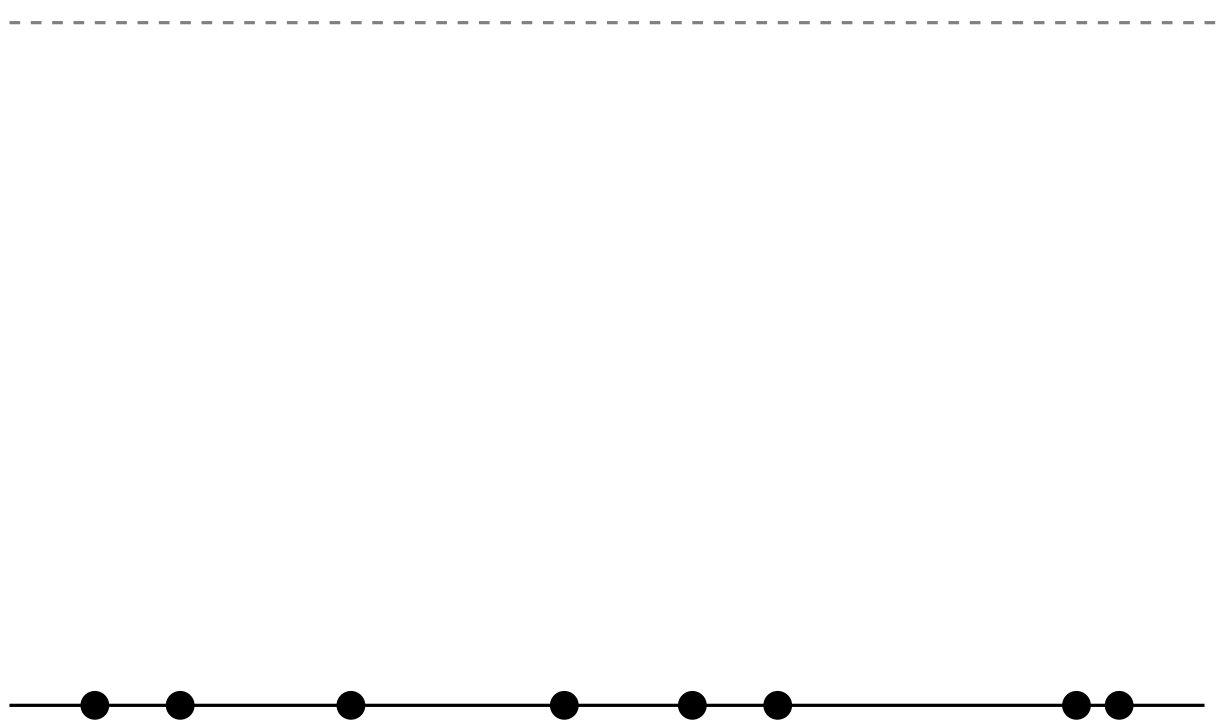

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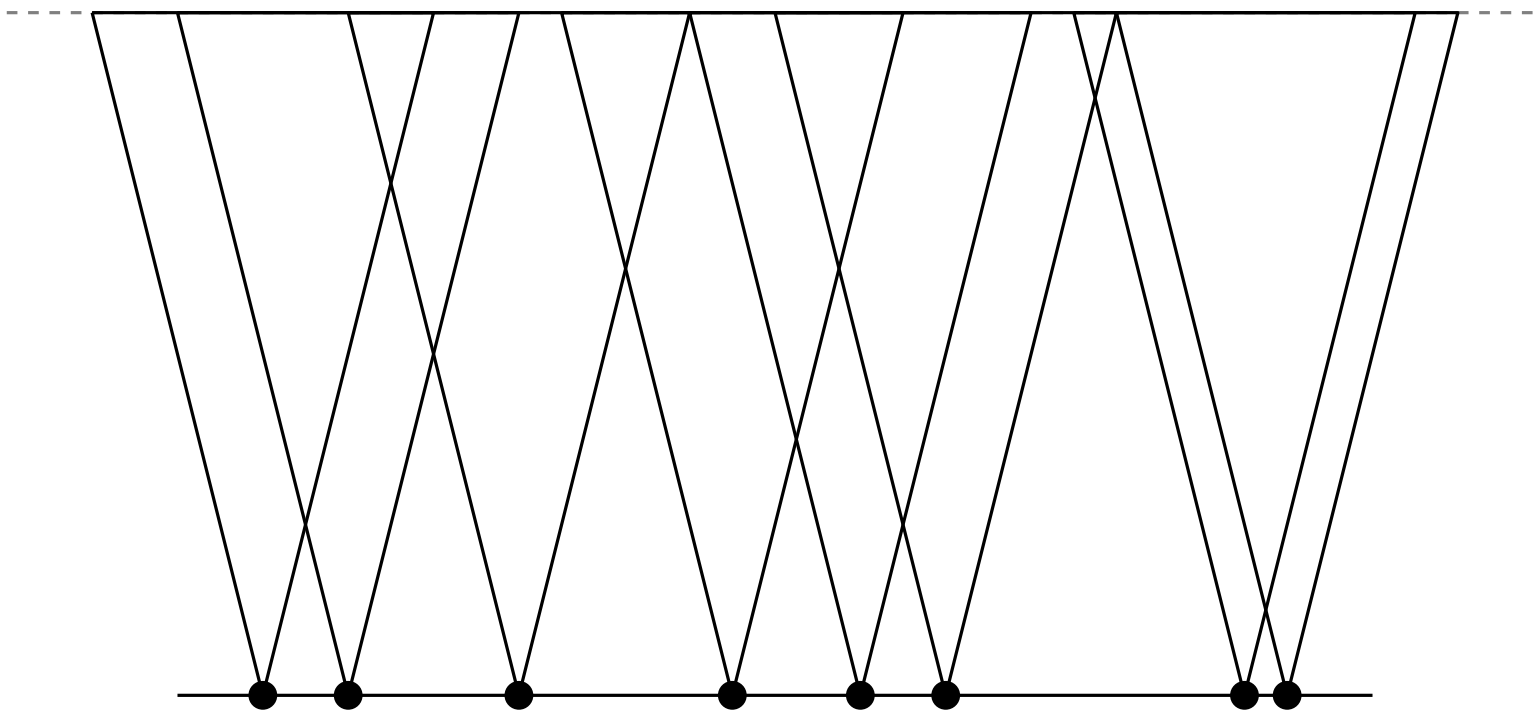

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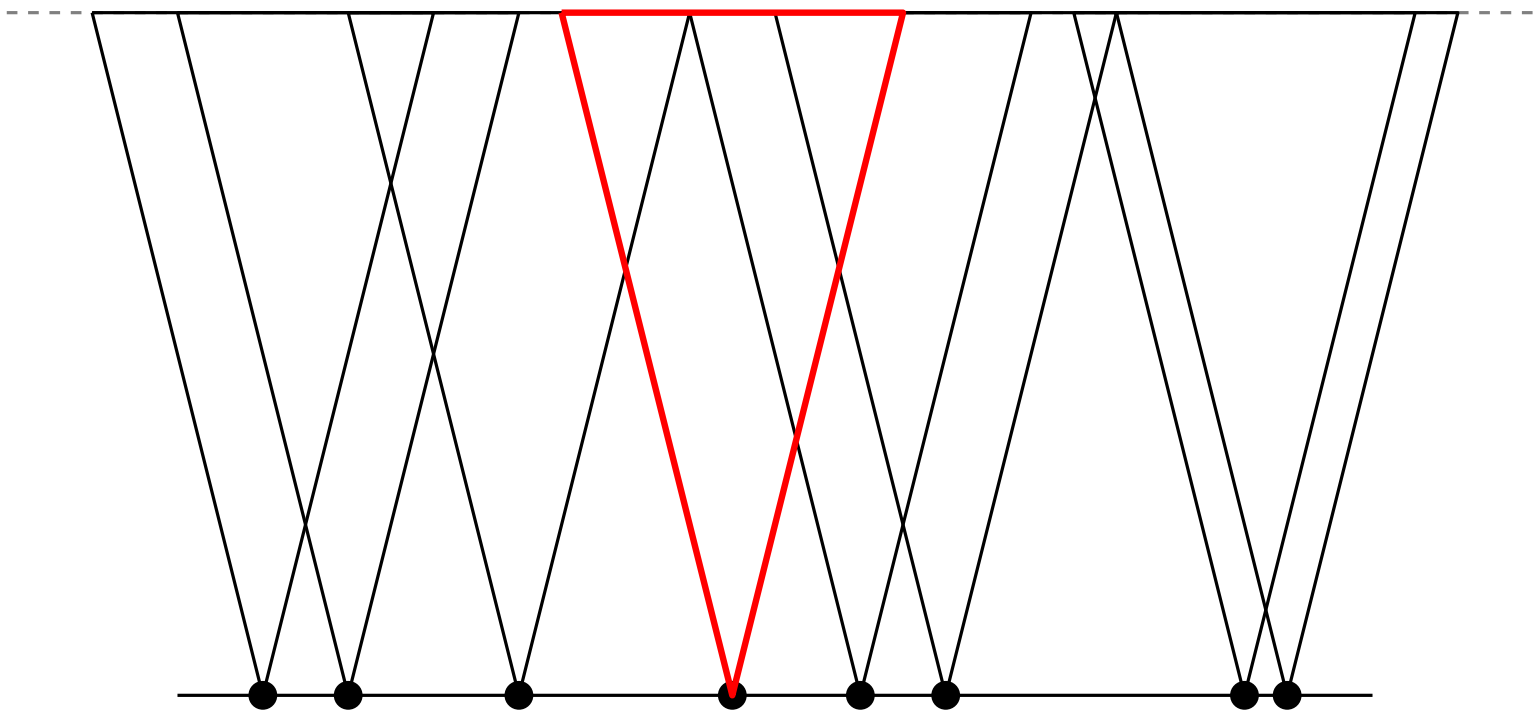

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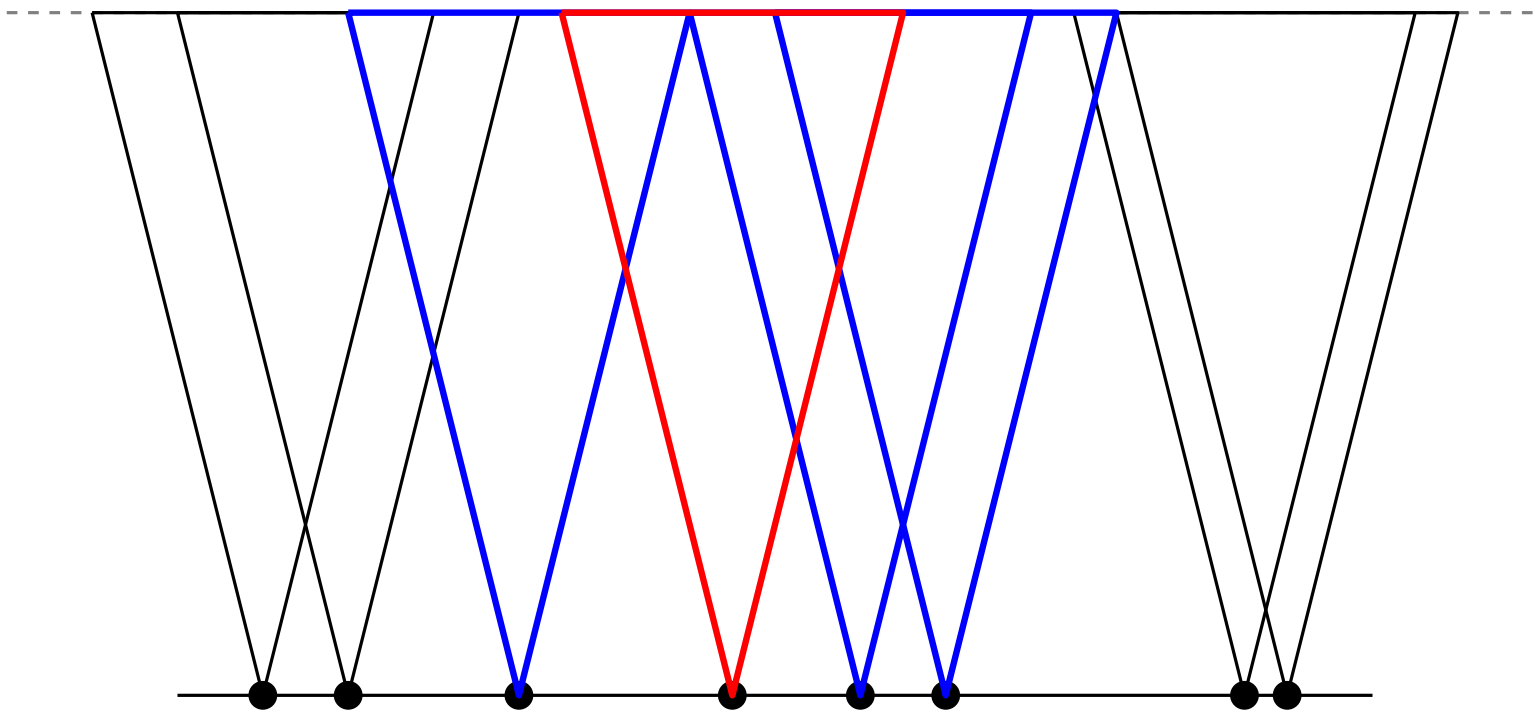

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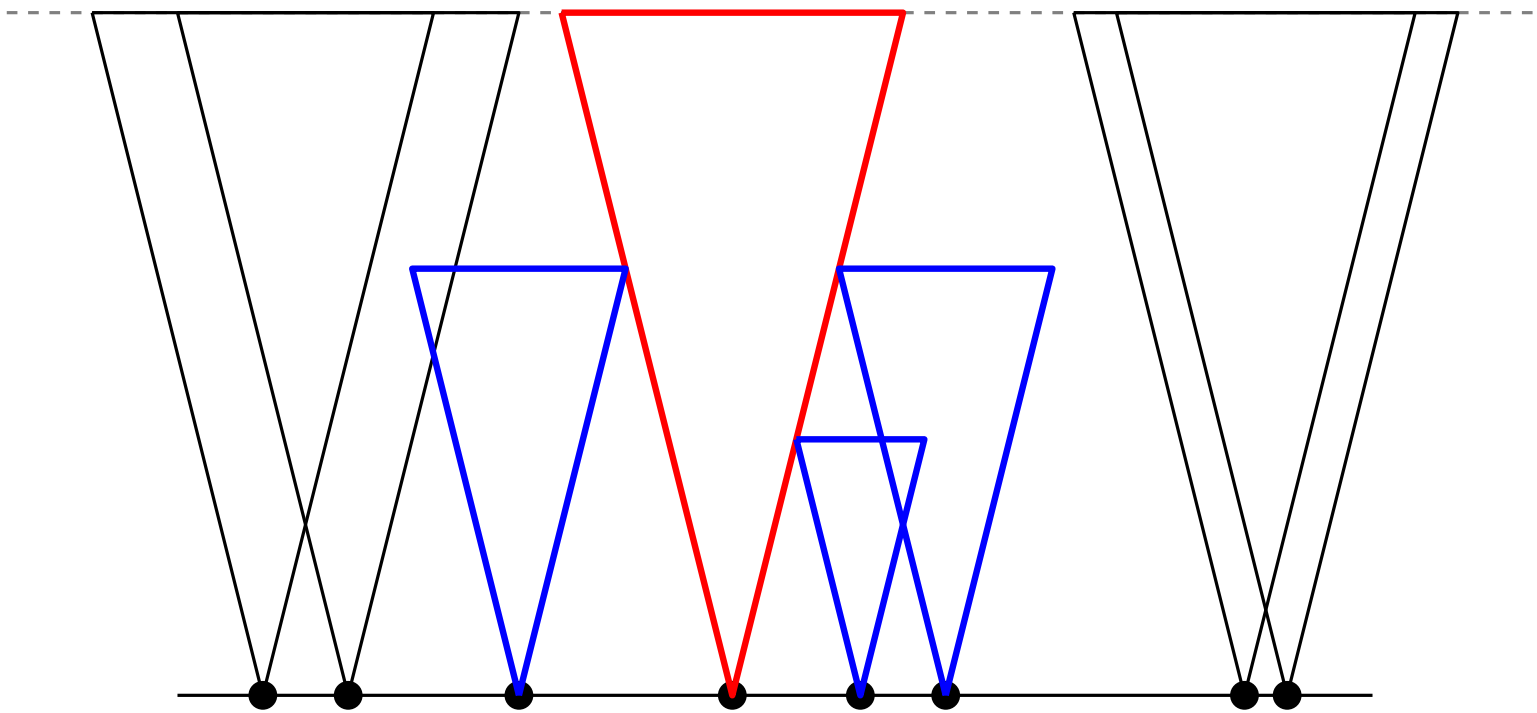

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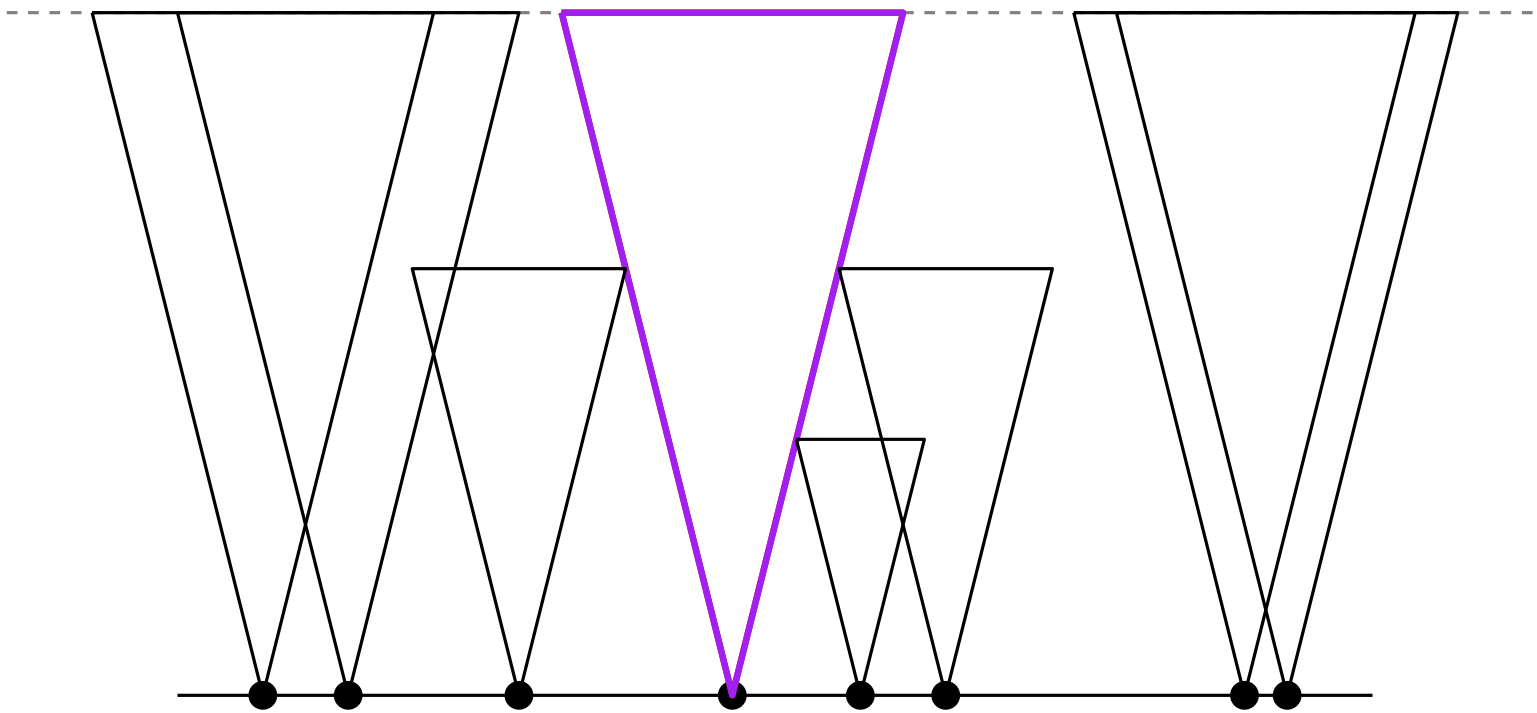

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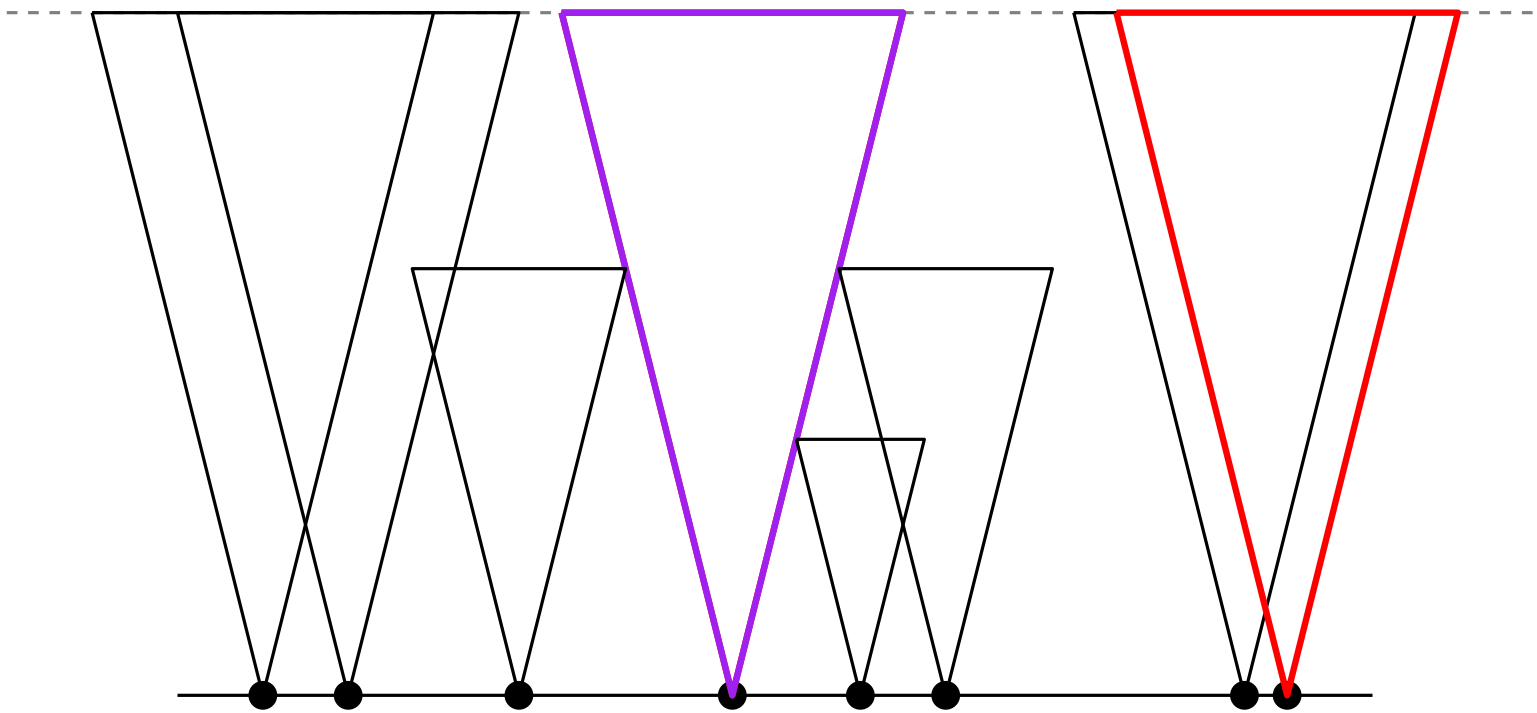

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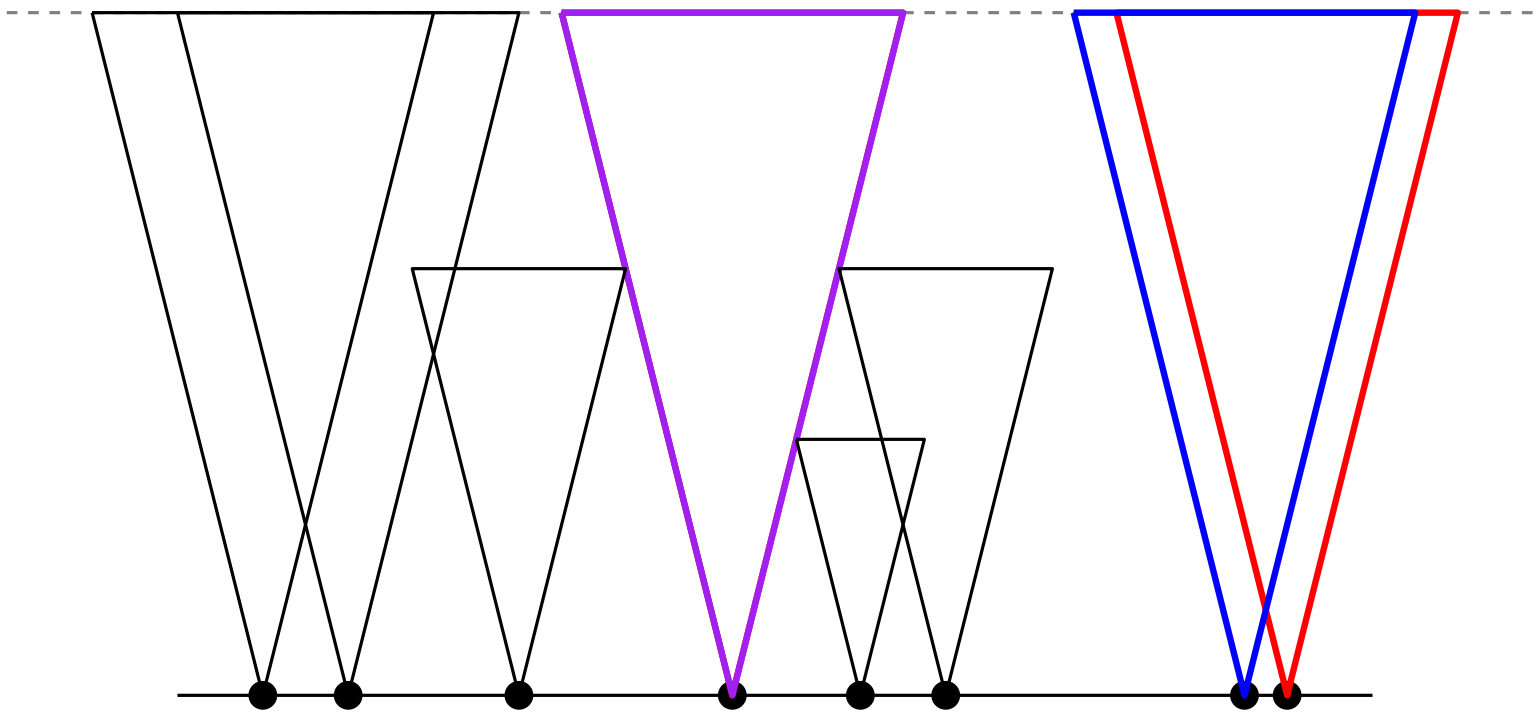

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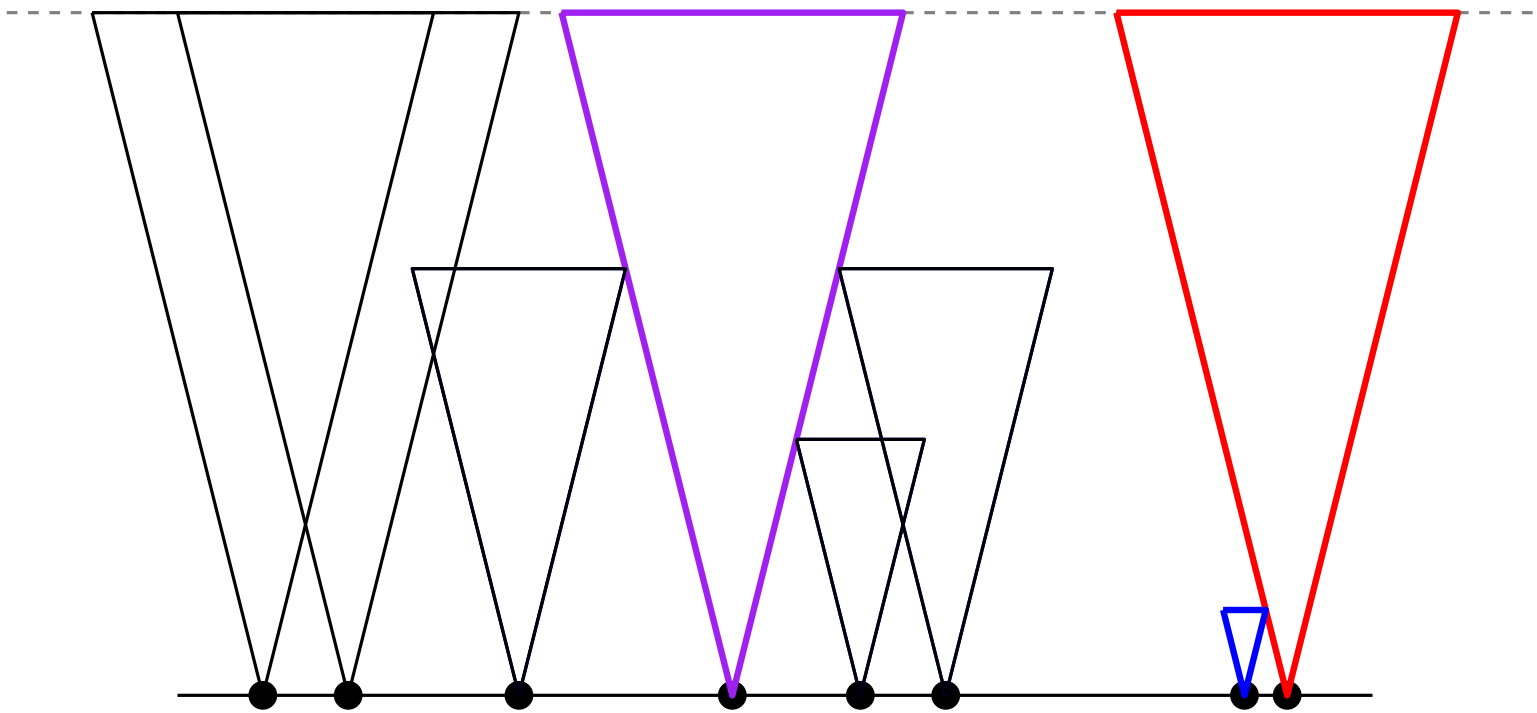

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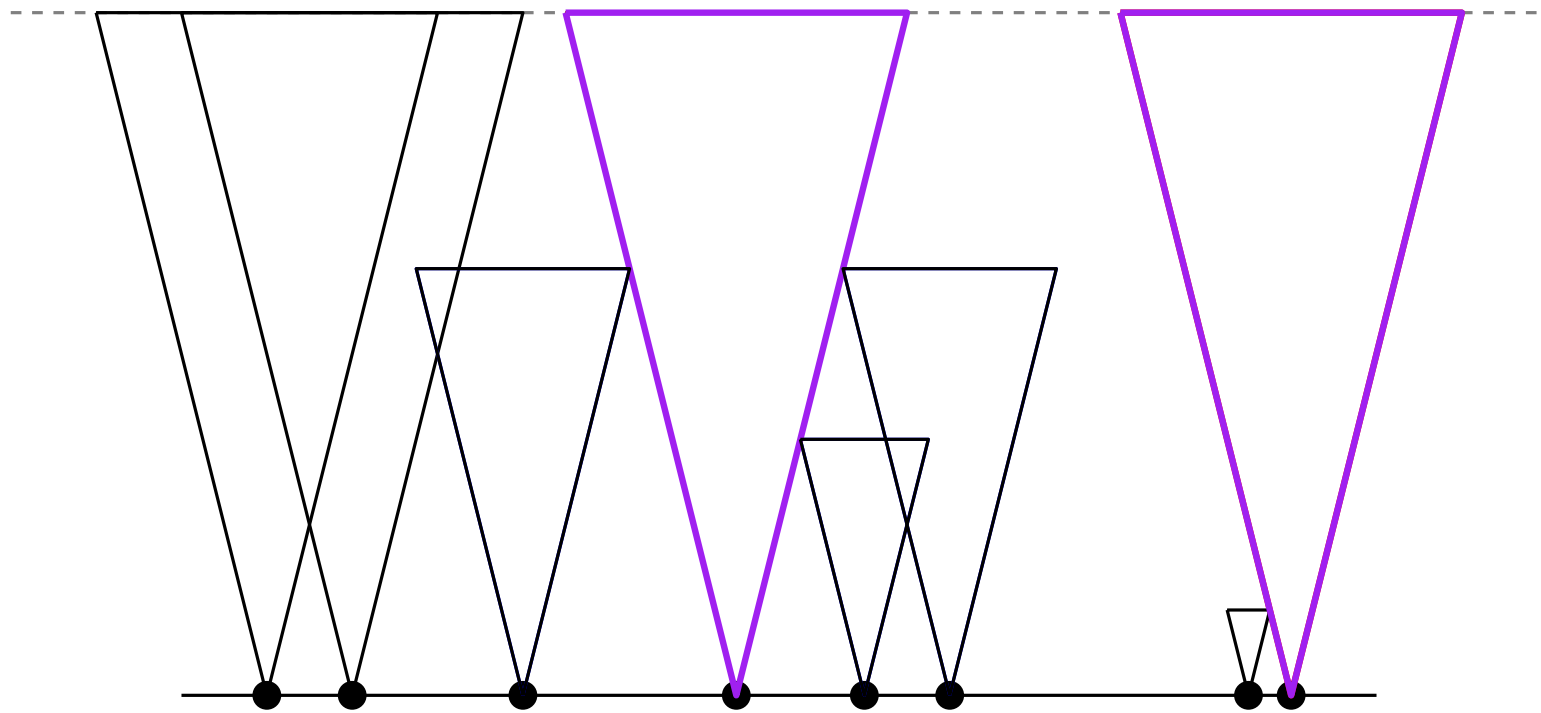

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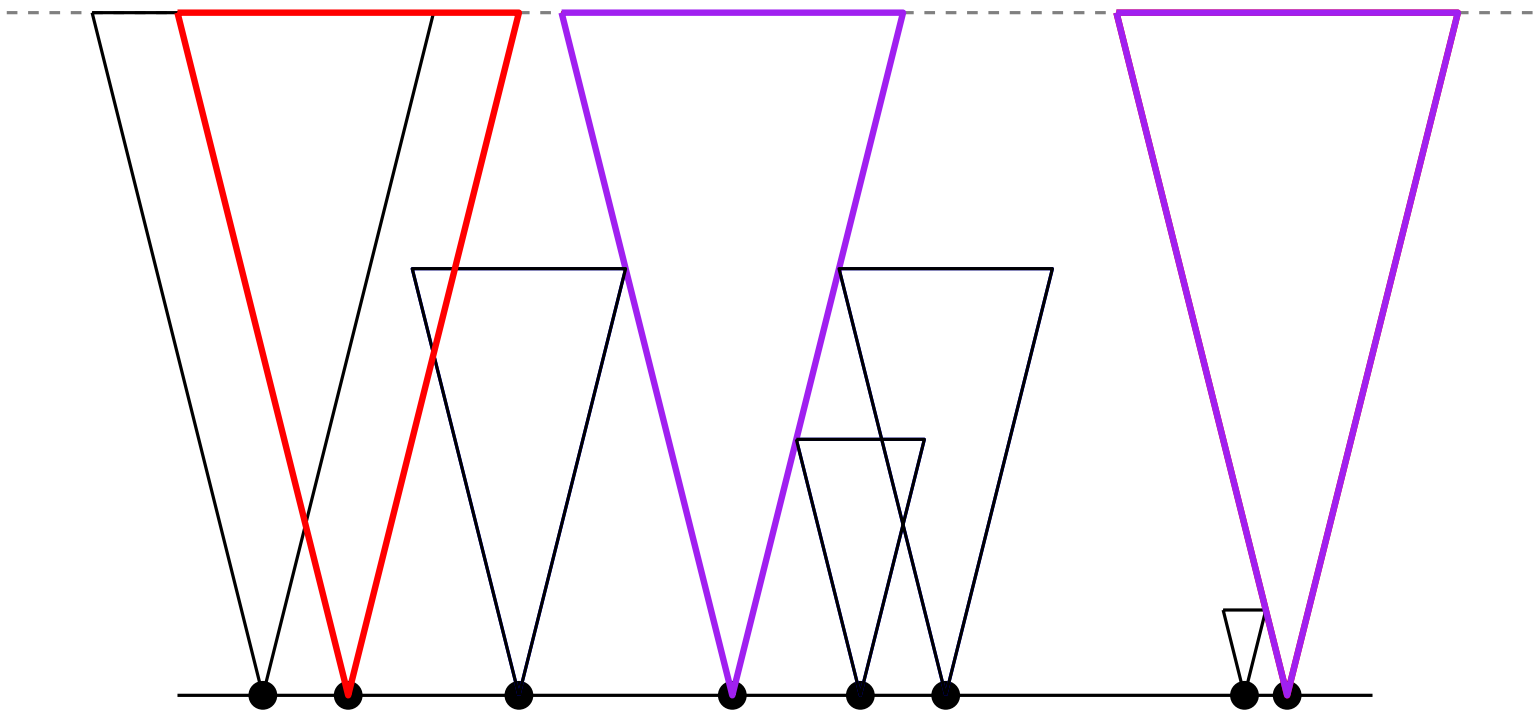

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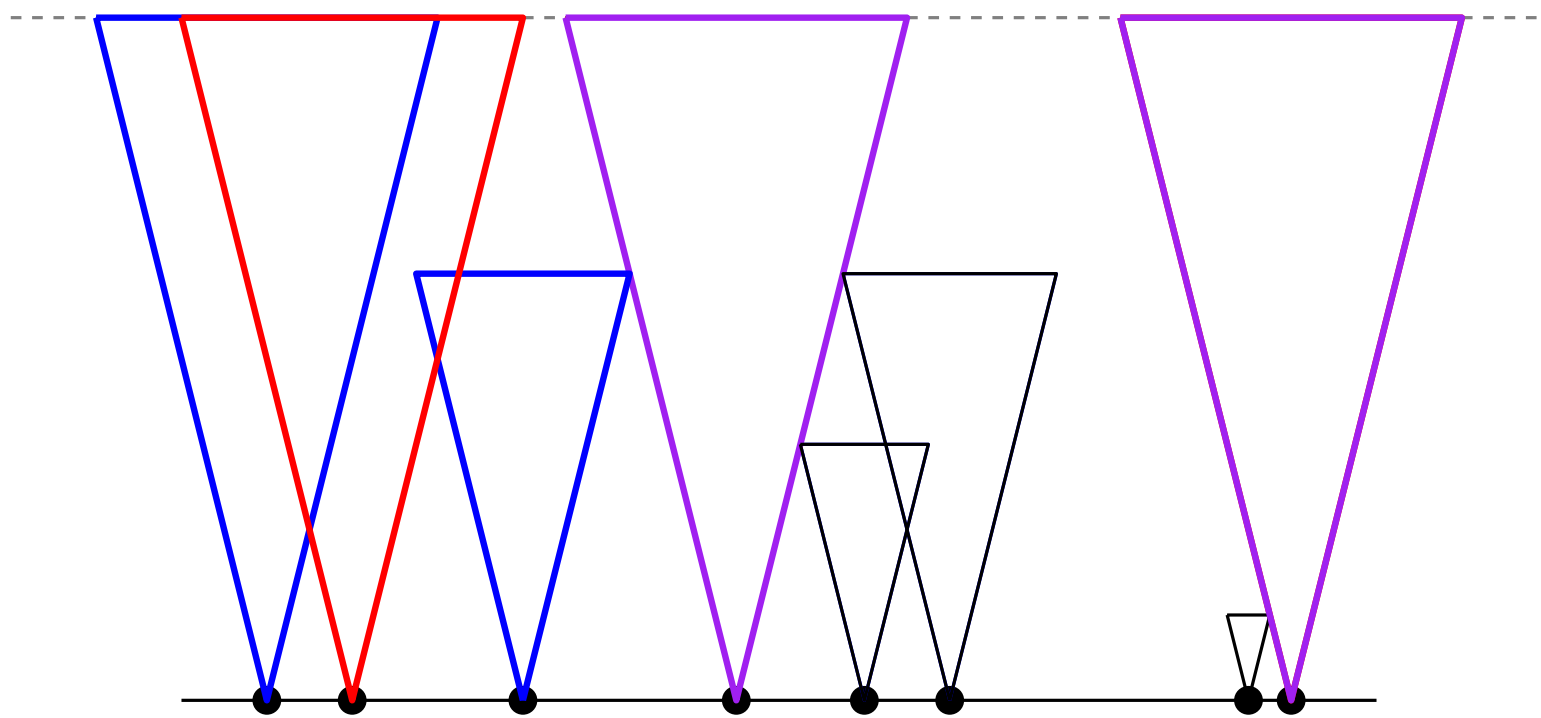

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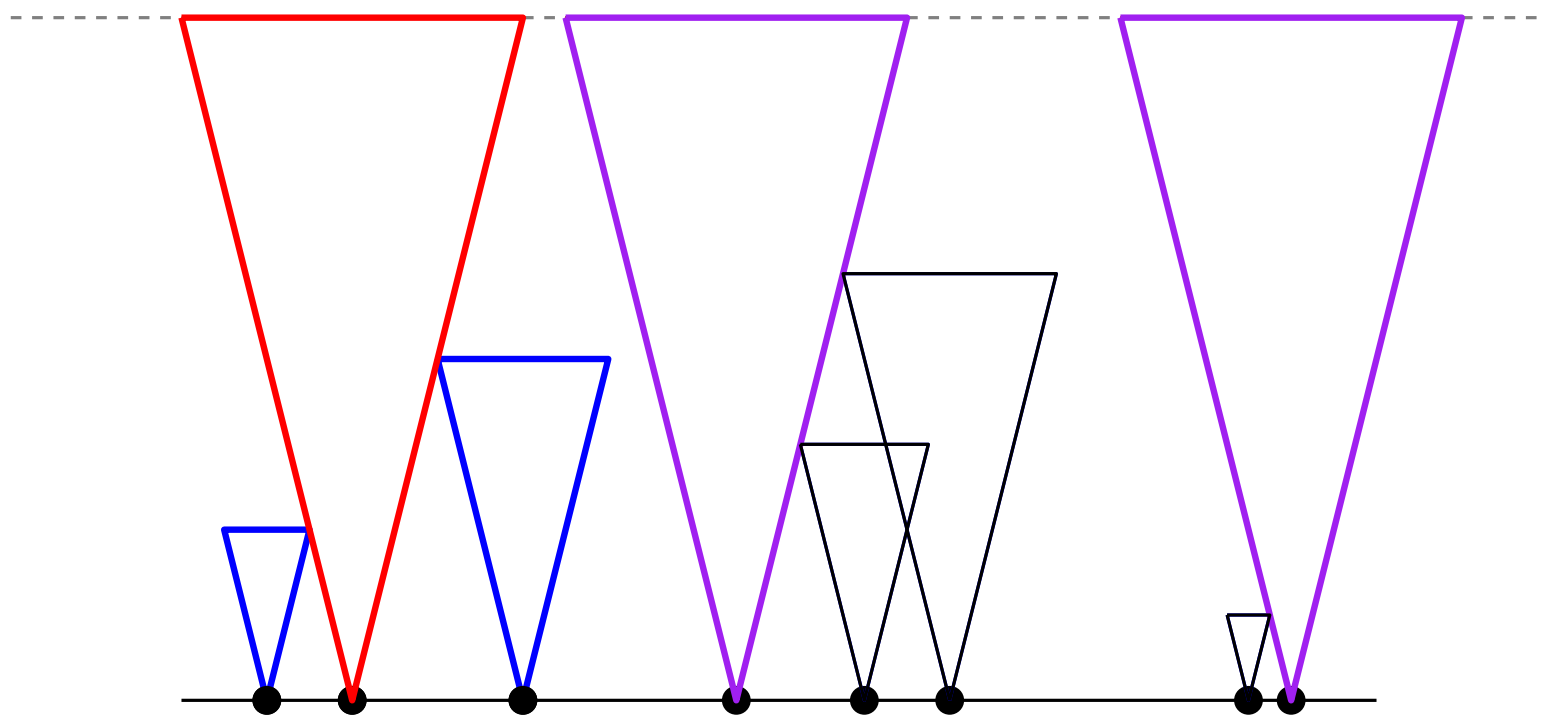

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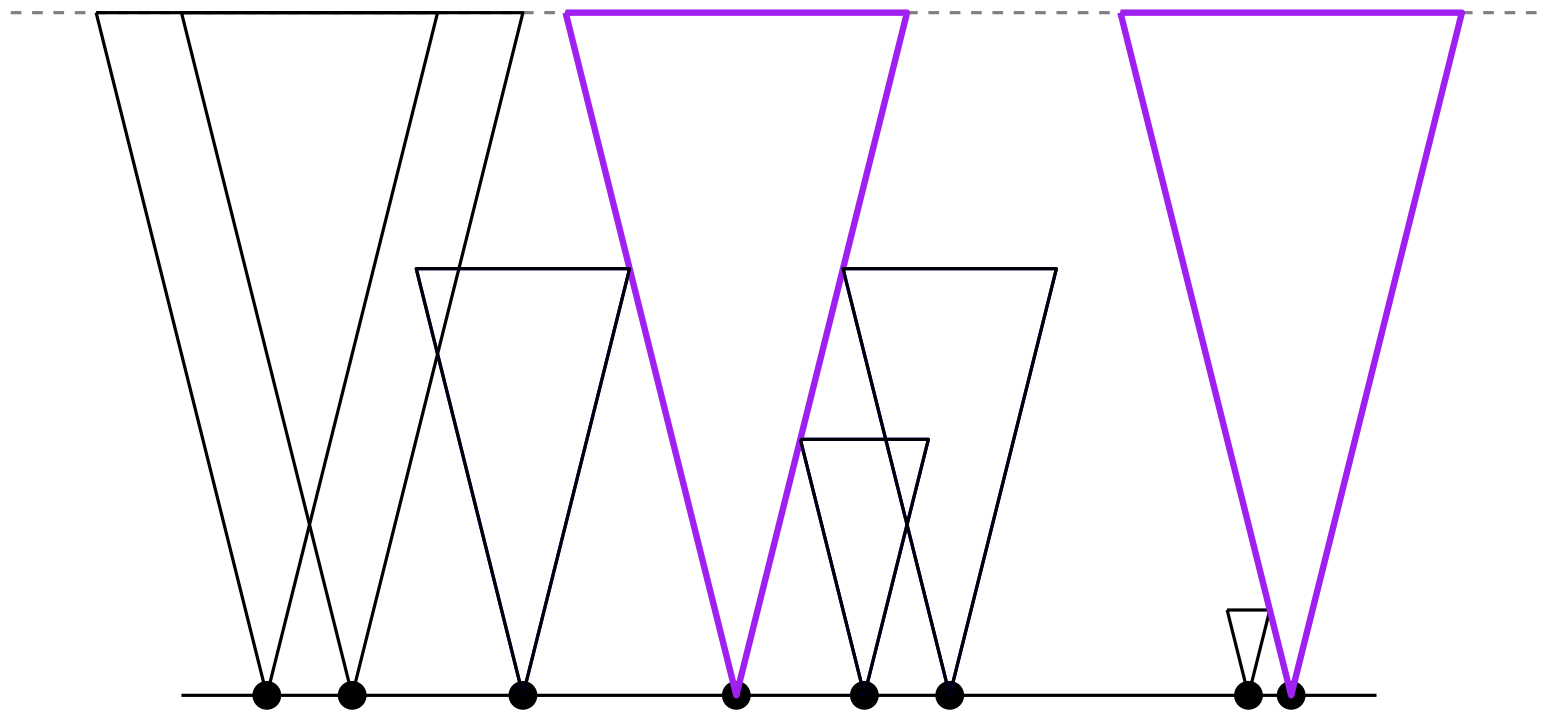

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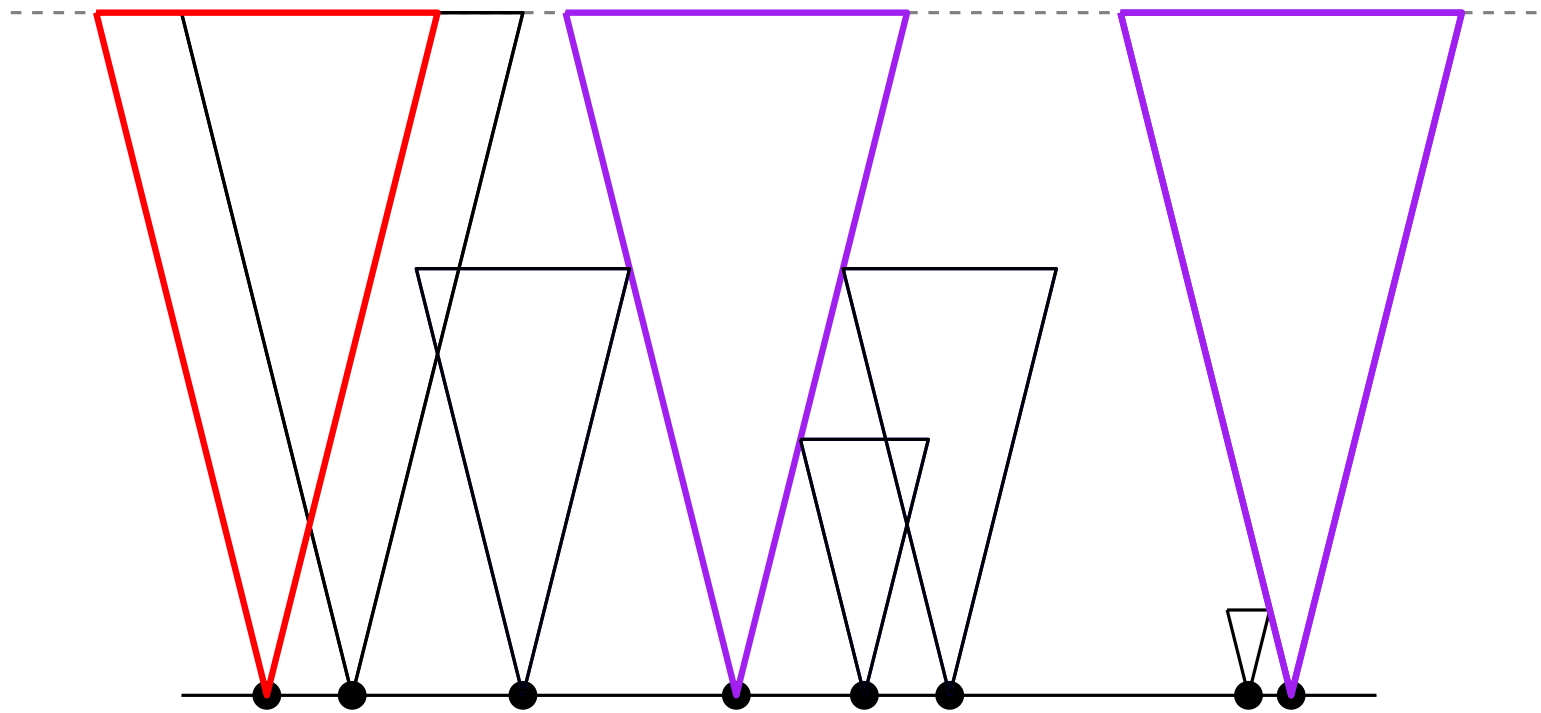

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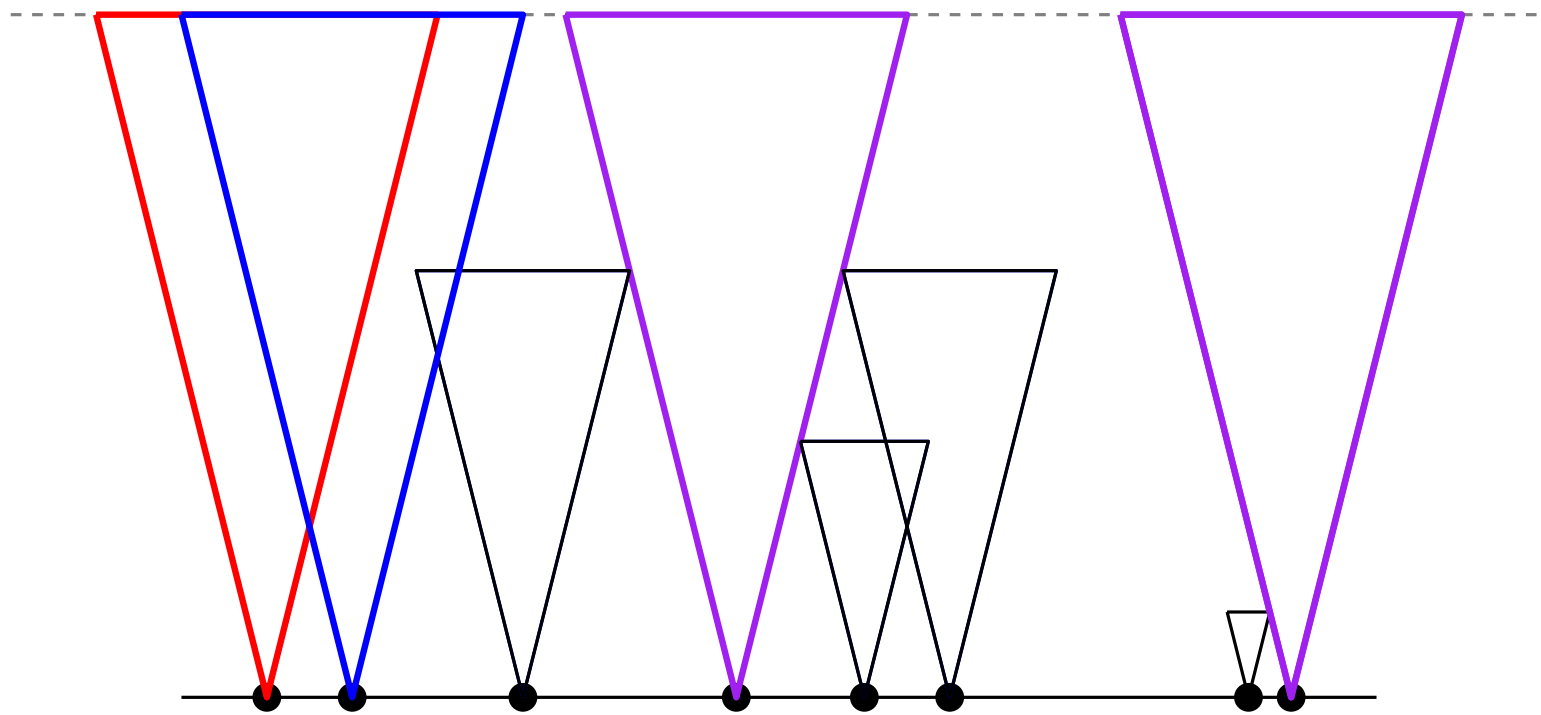

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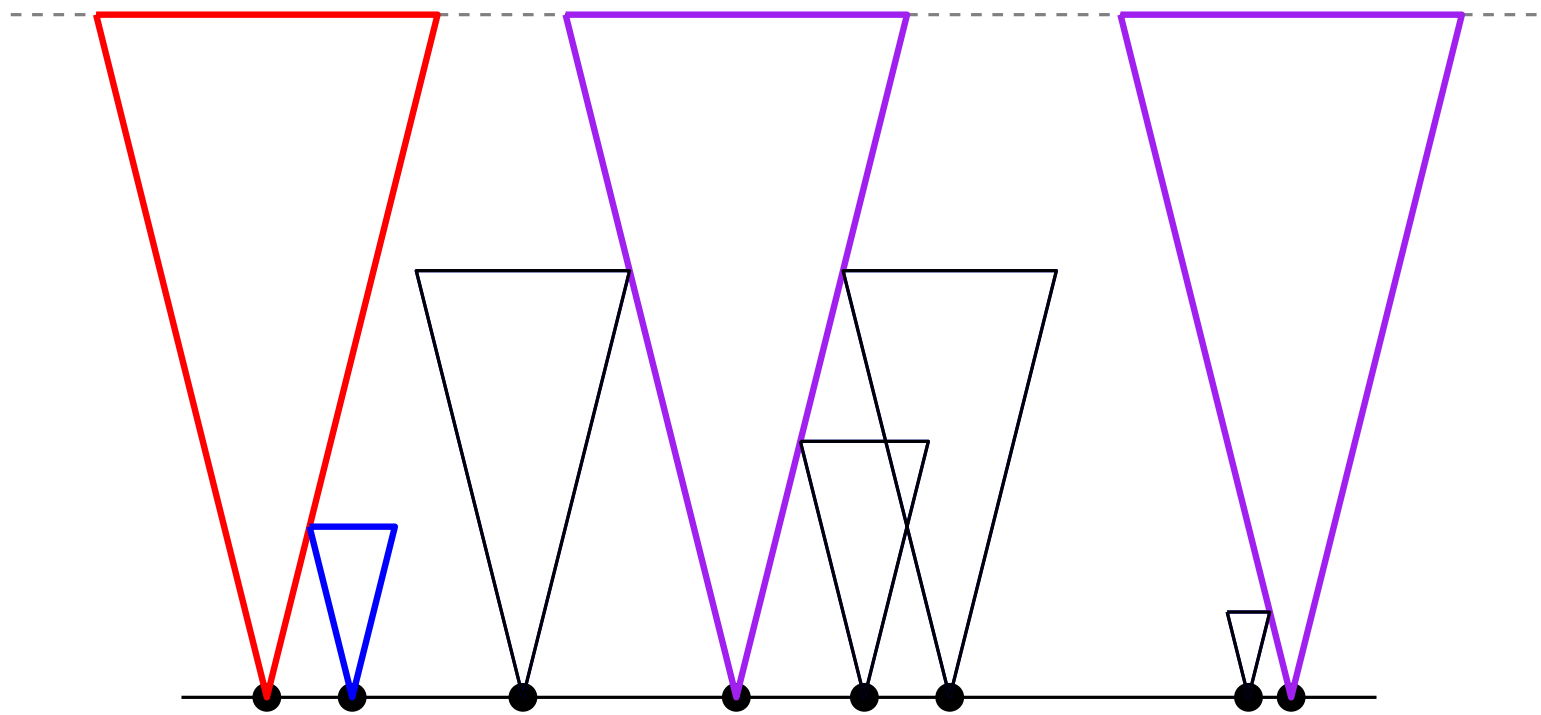

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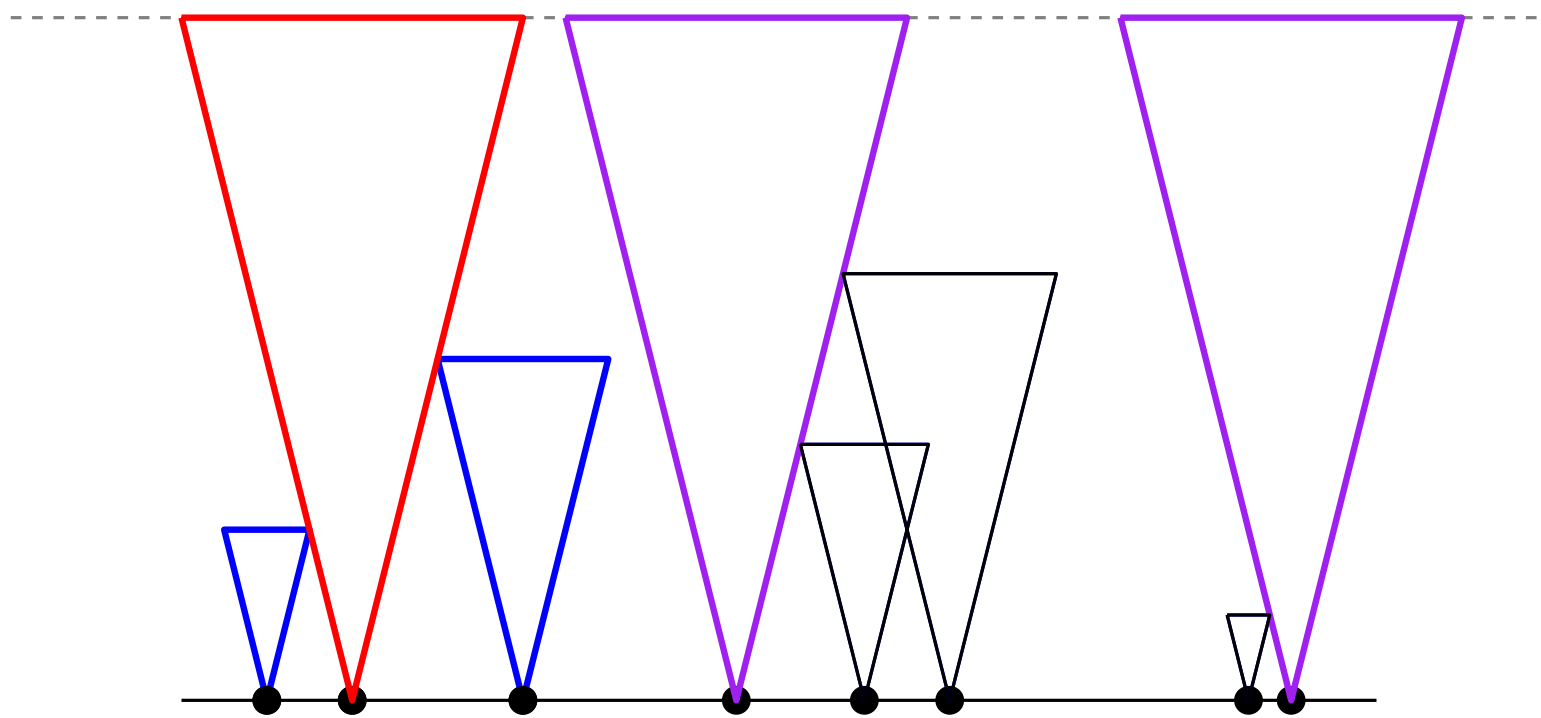

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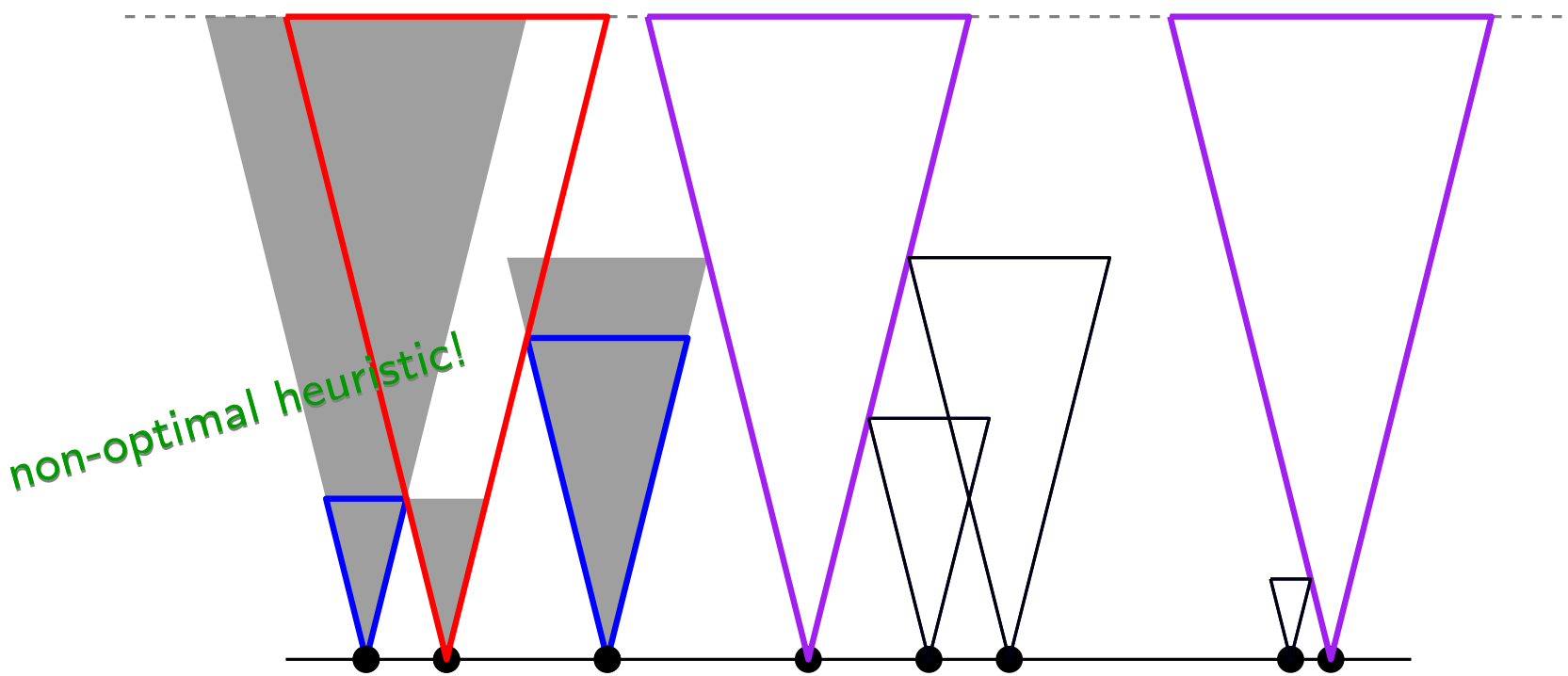

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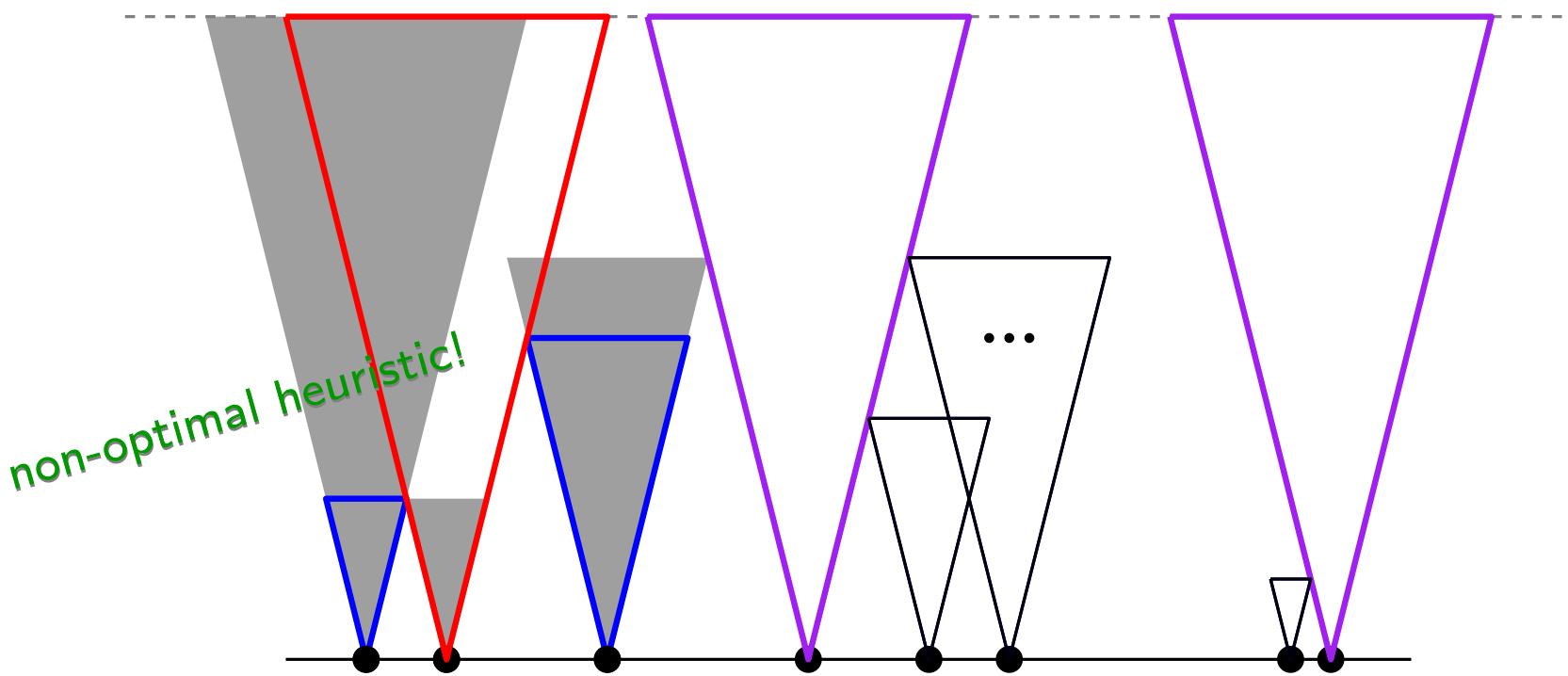

Growing Cones (M0)

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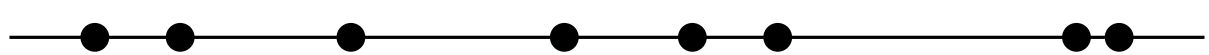

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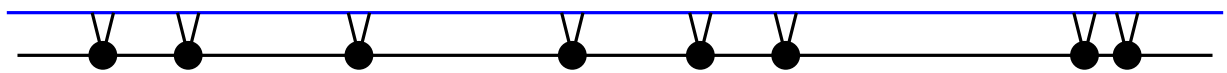
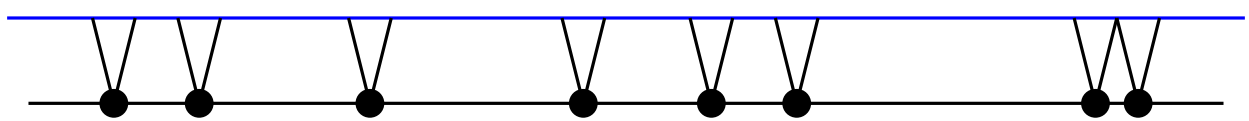


Growing Cones (M0)



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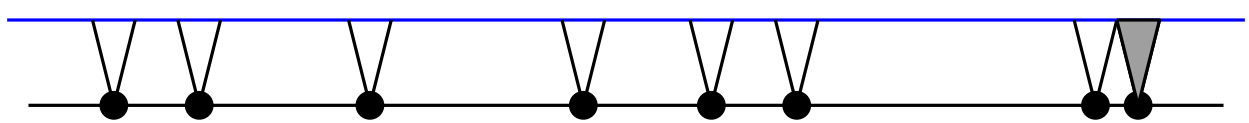

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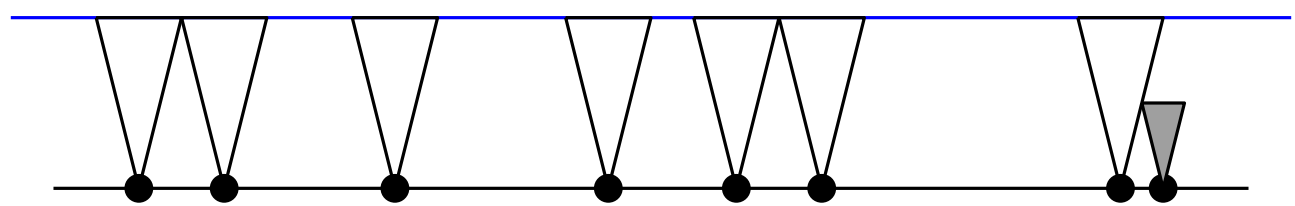

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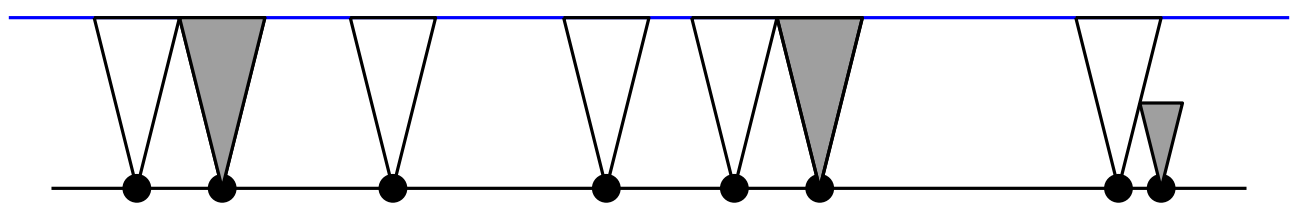

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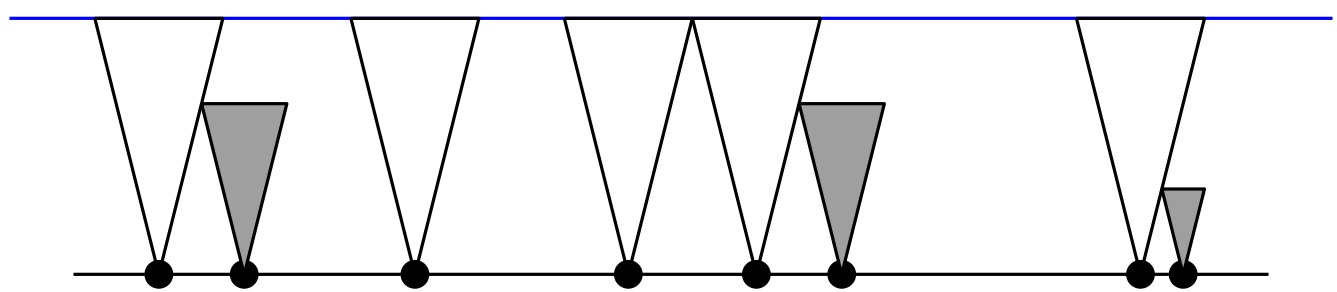

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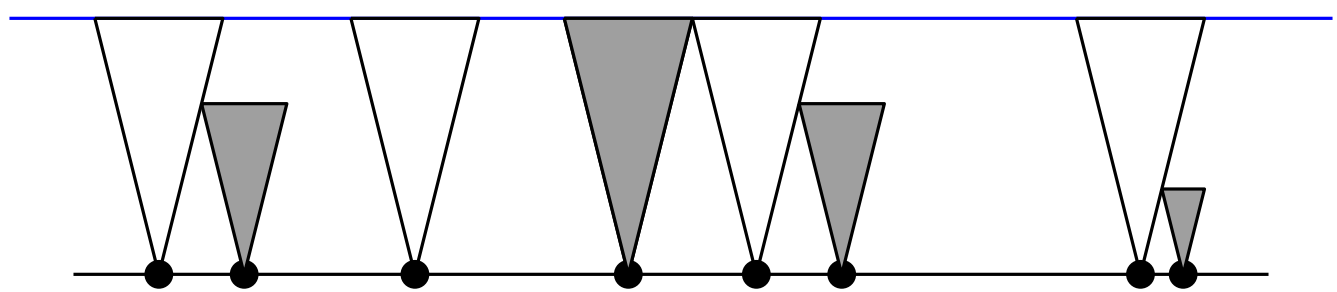

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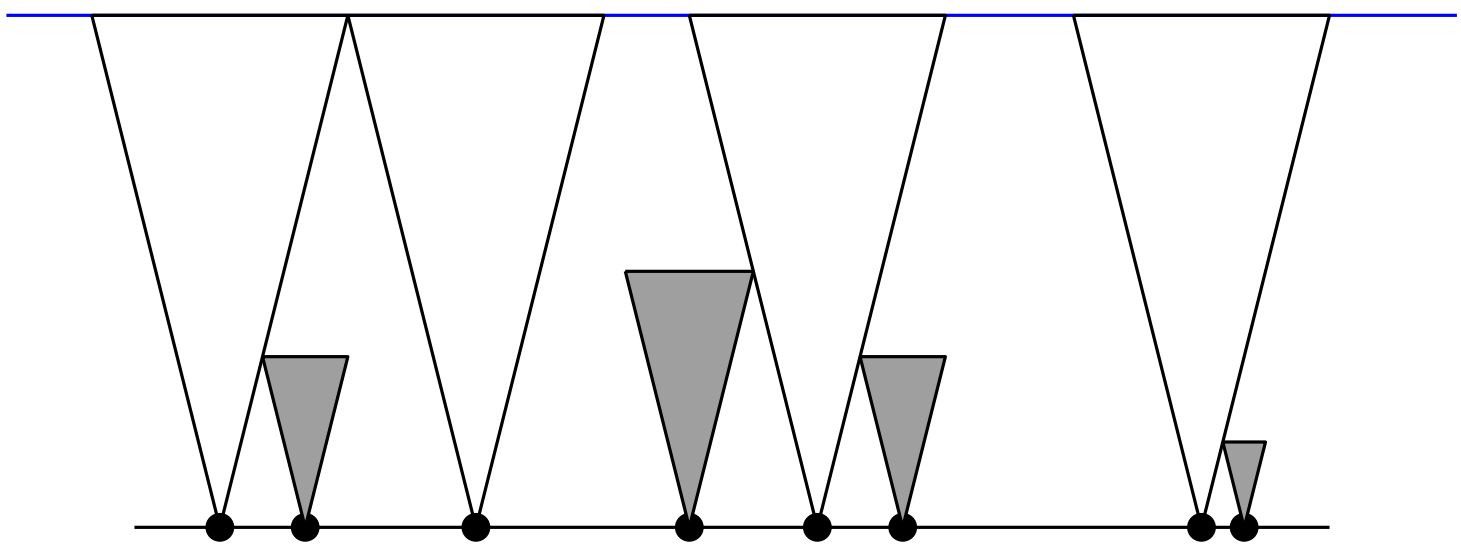

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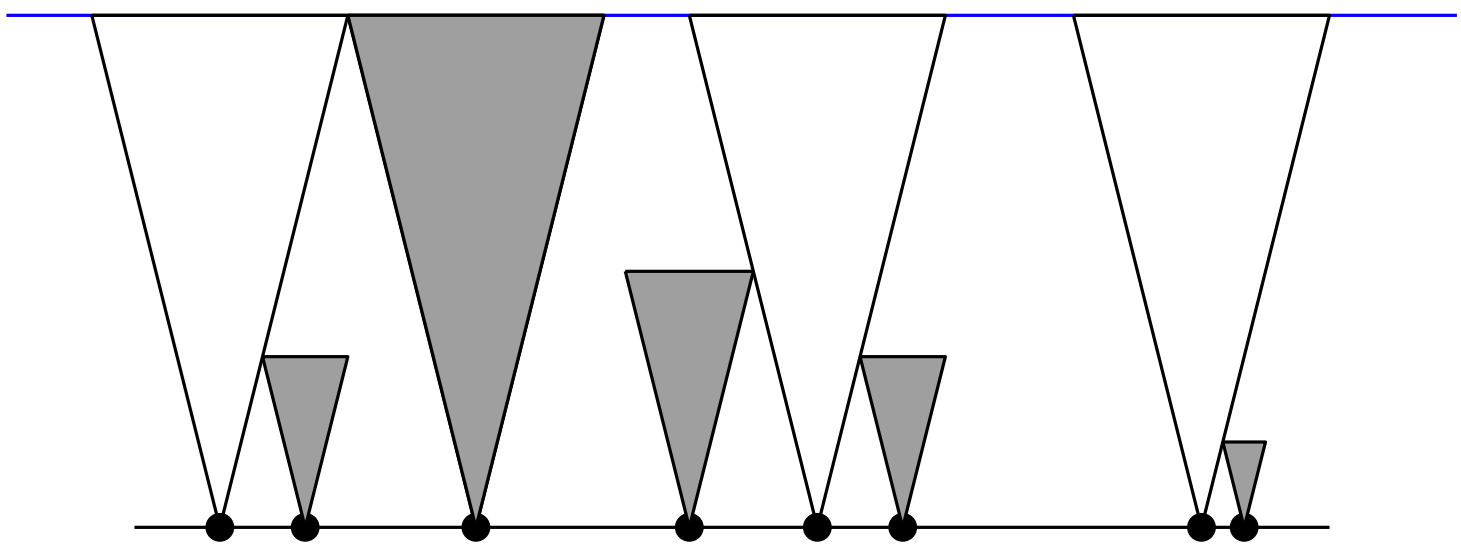

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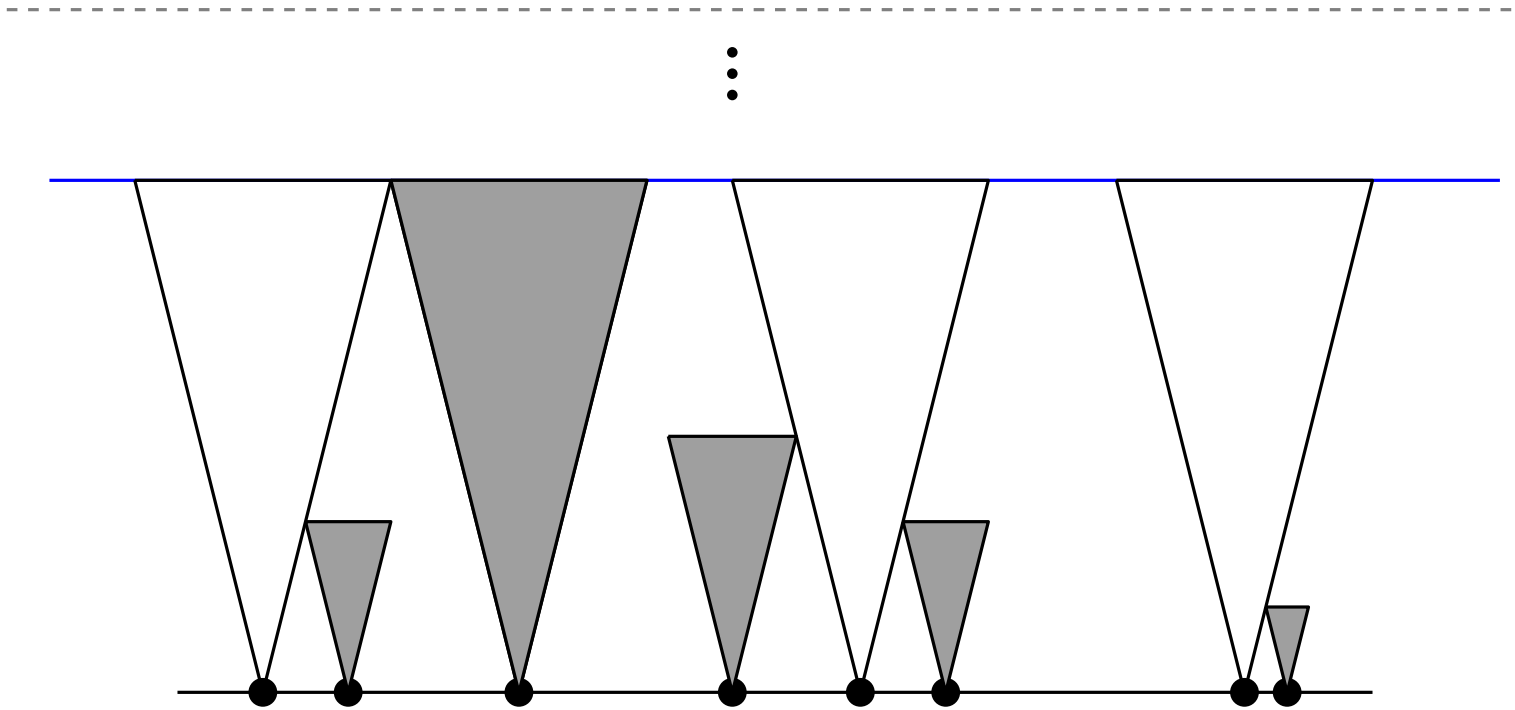
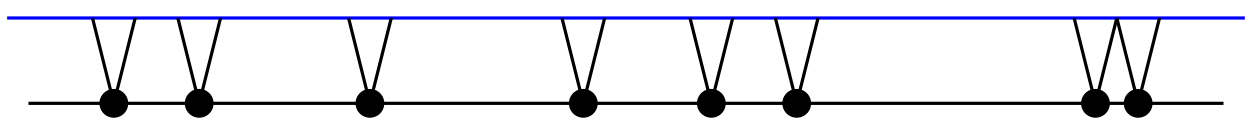
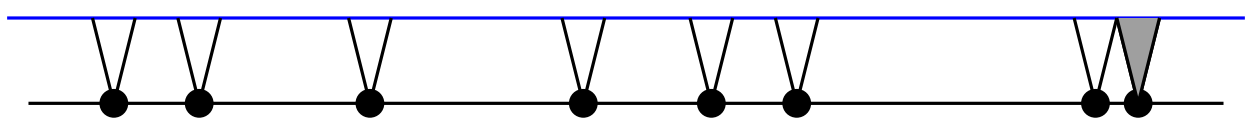


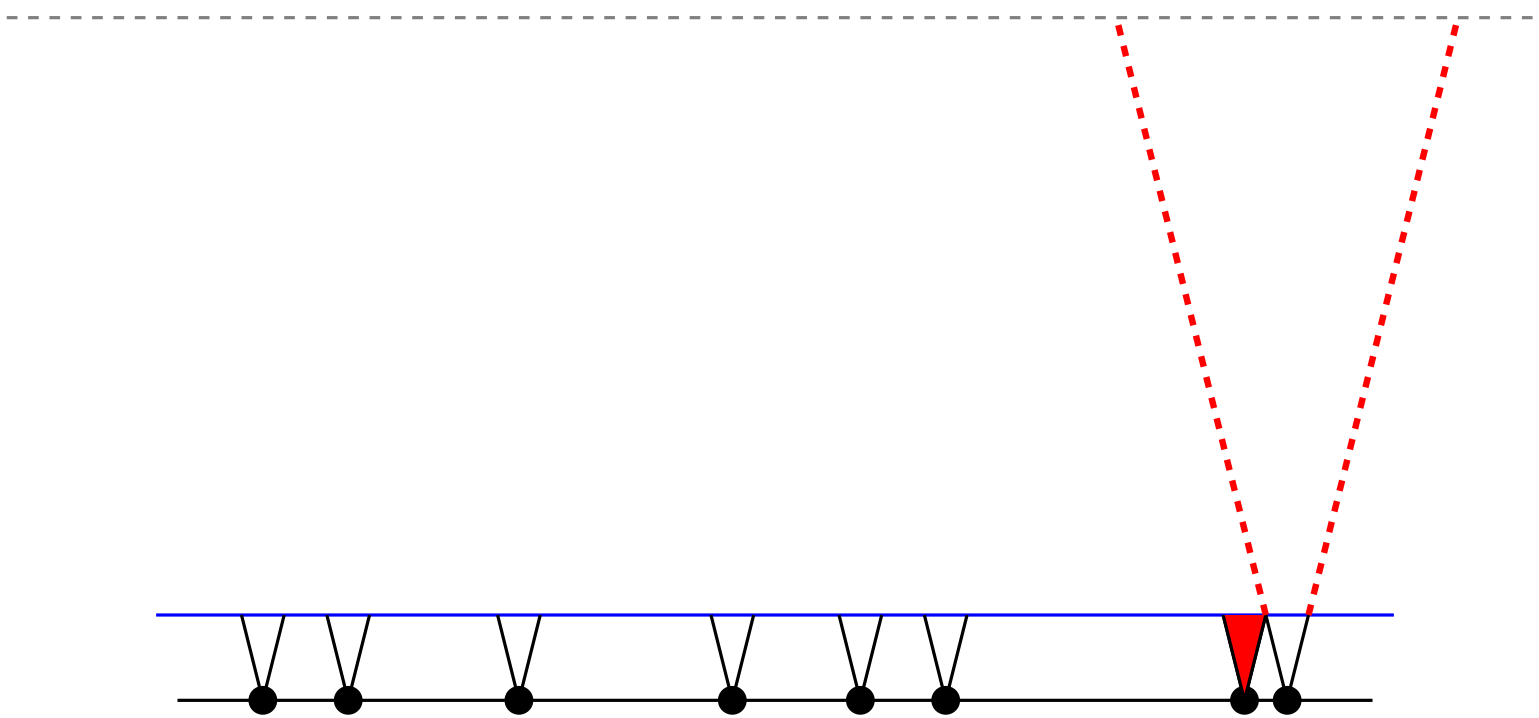
Growing Cones (M1)



Growing Cones (M1)



Growing Cones (M1)



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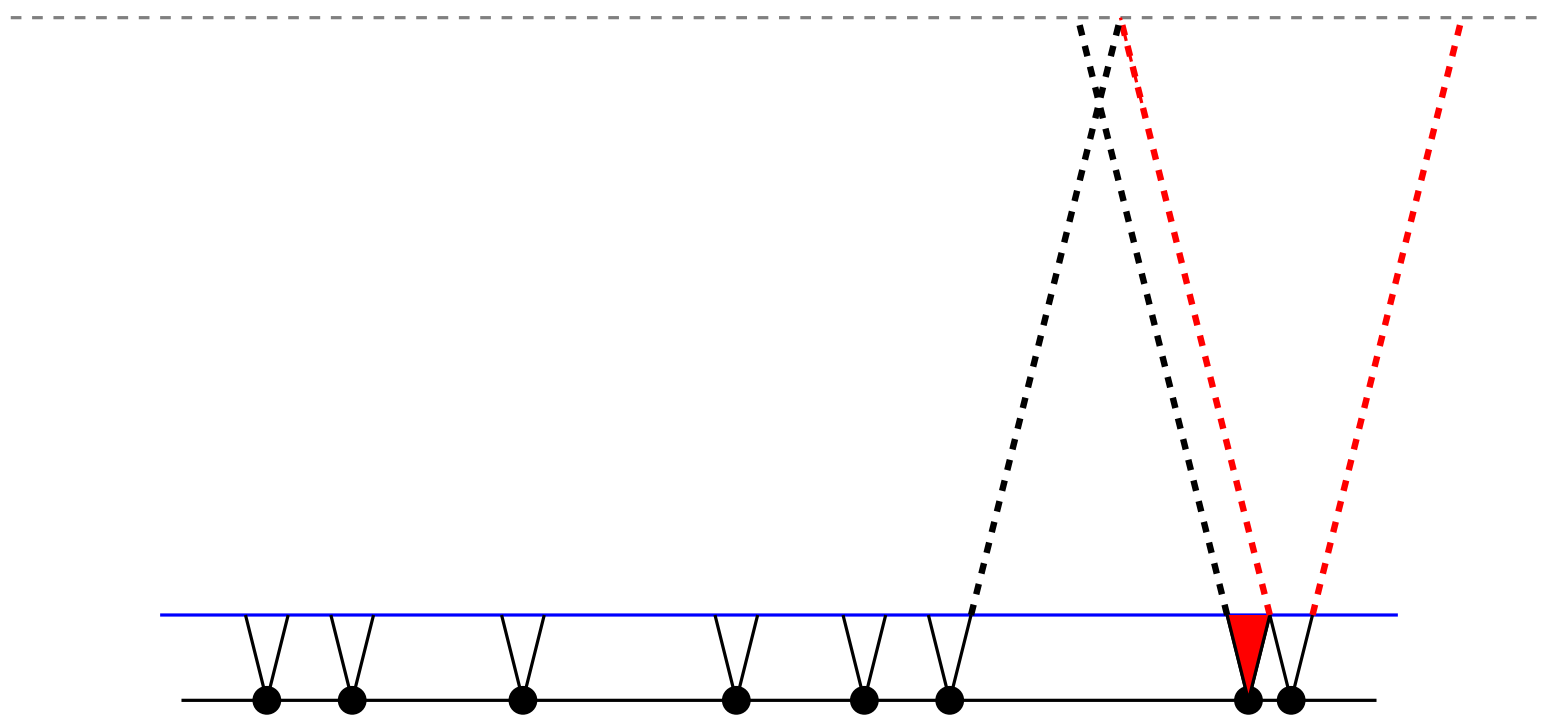

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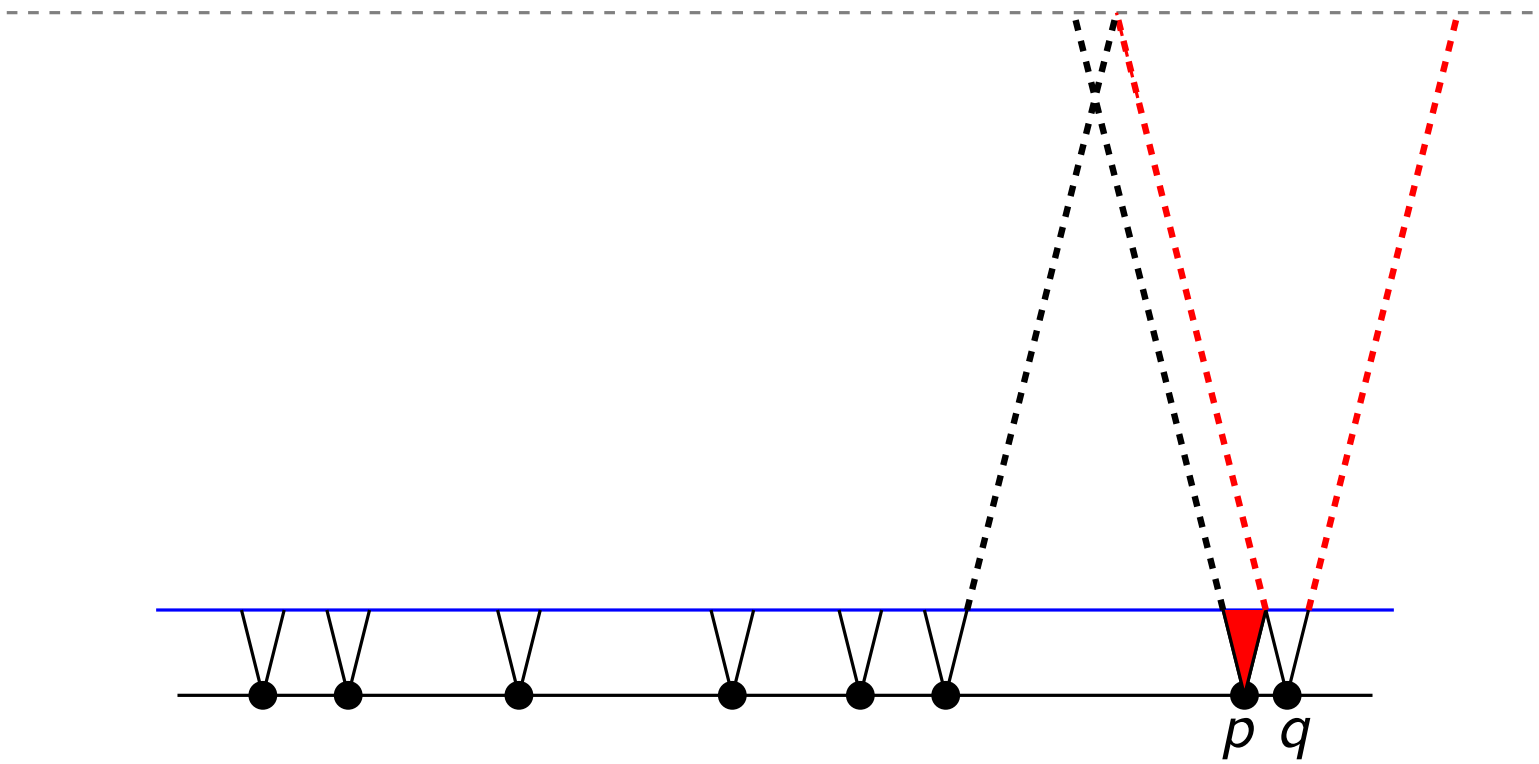

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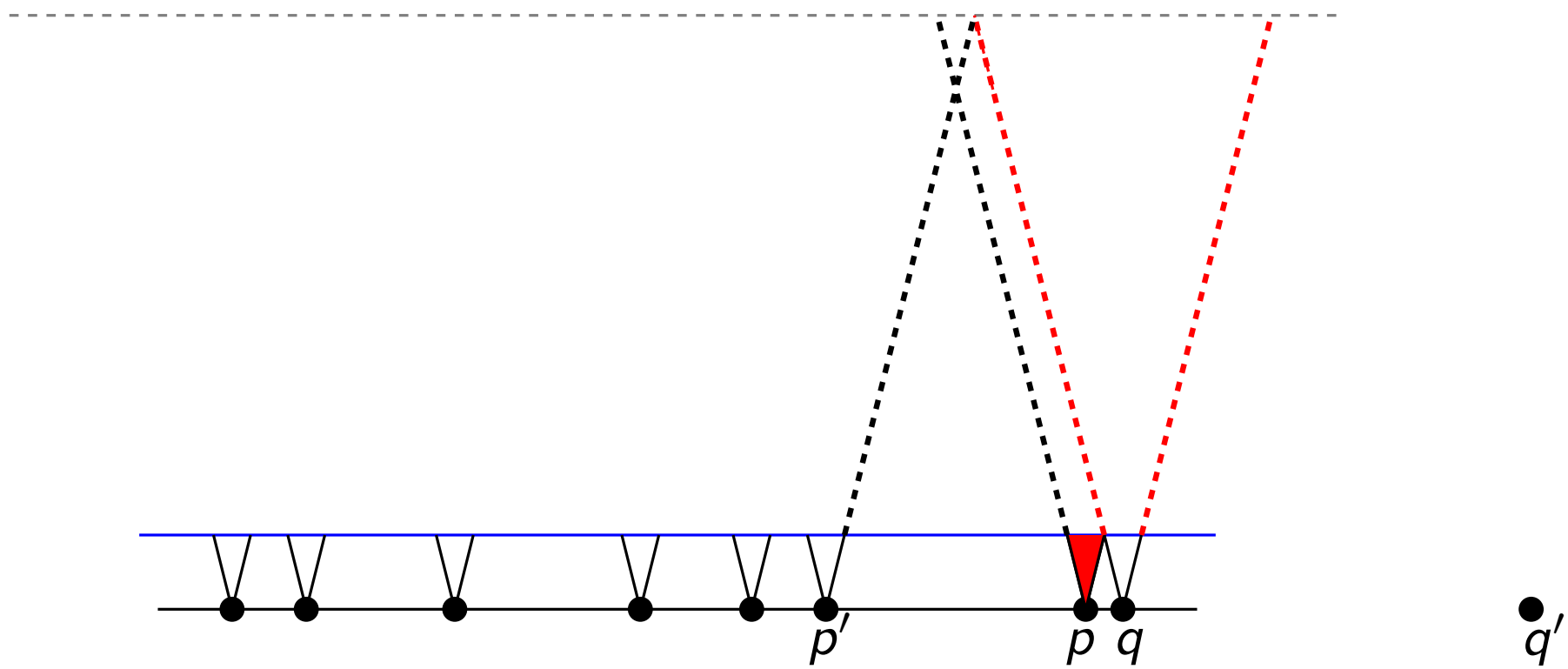

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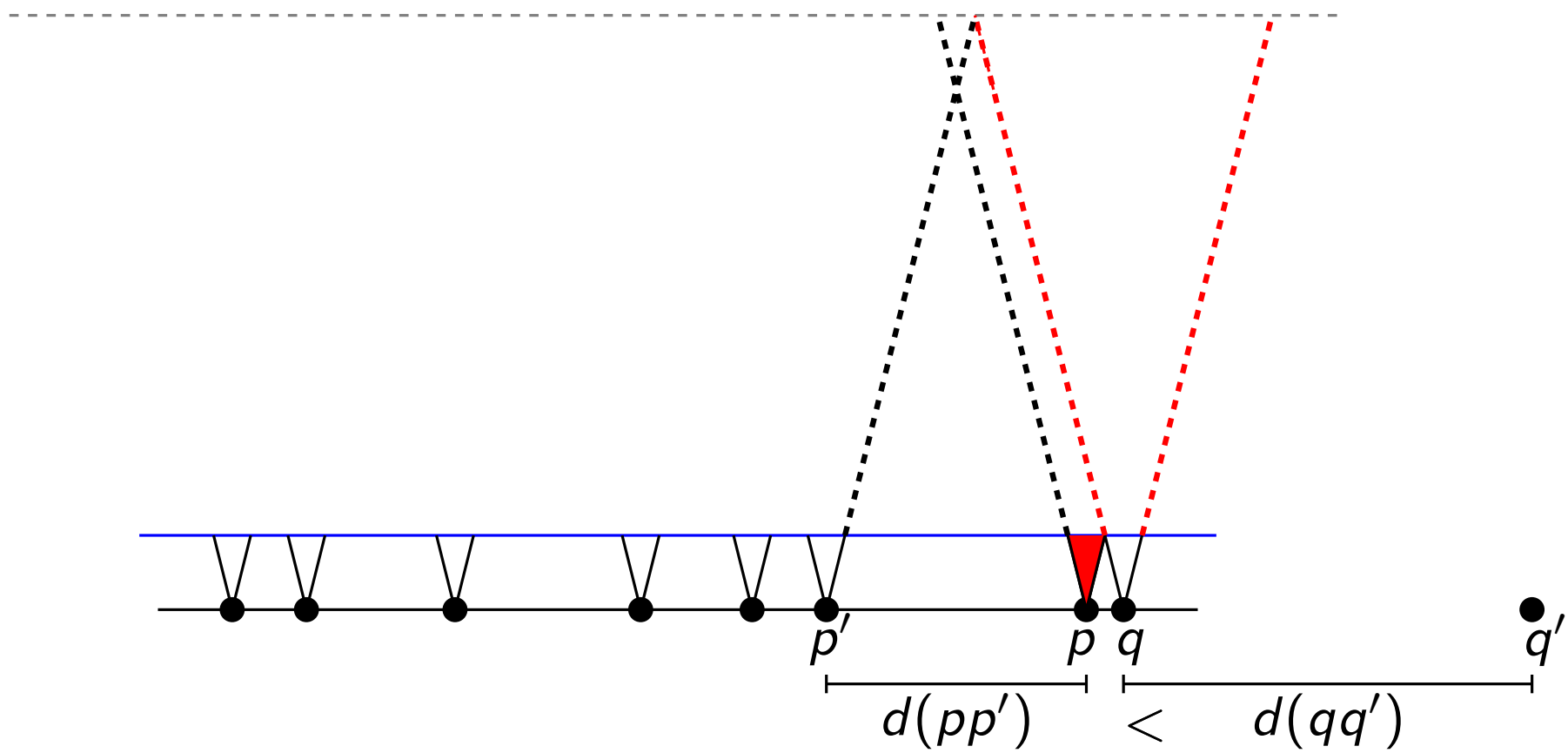

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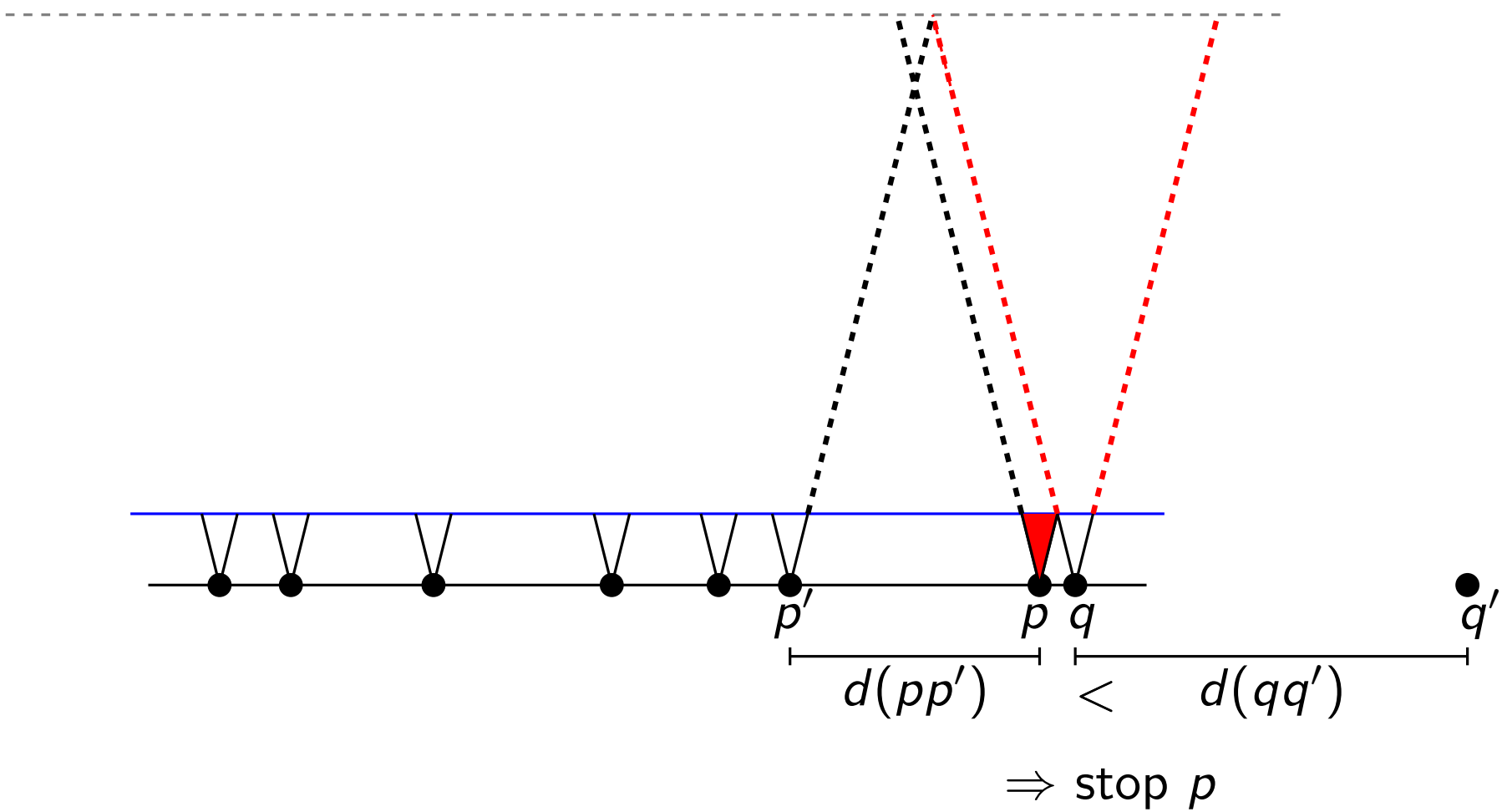

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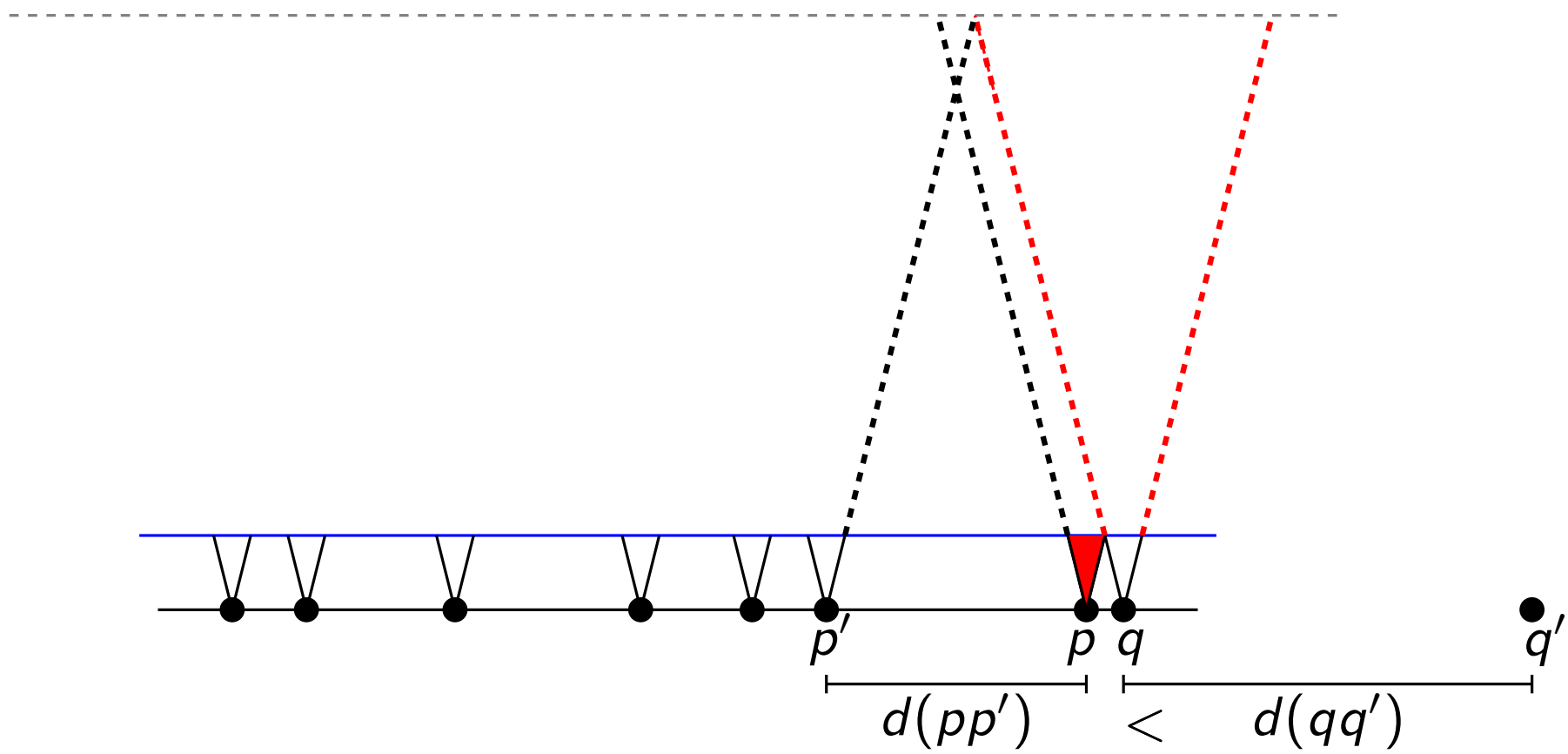
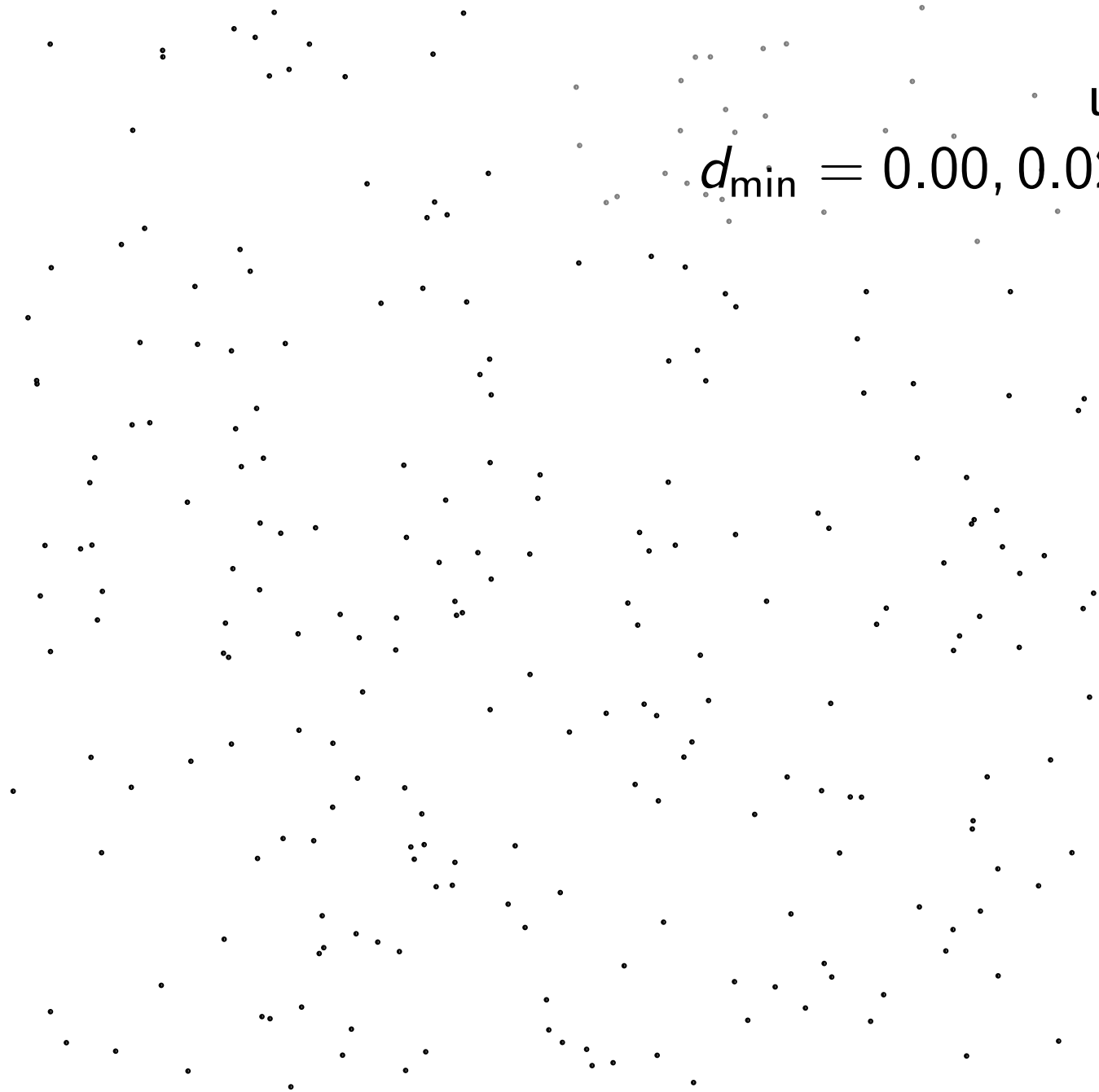


means: Delaunay triangulation

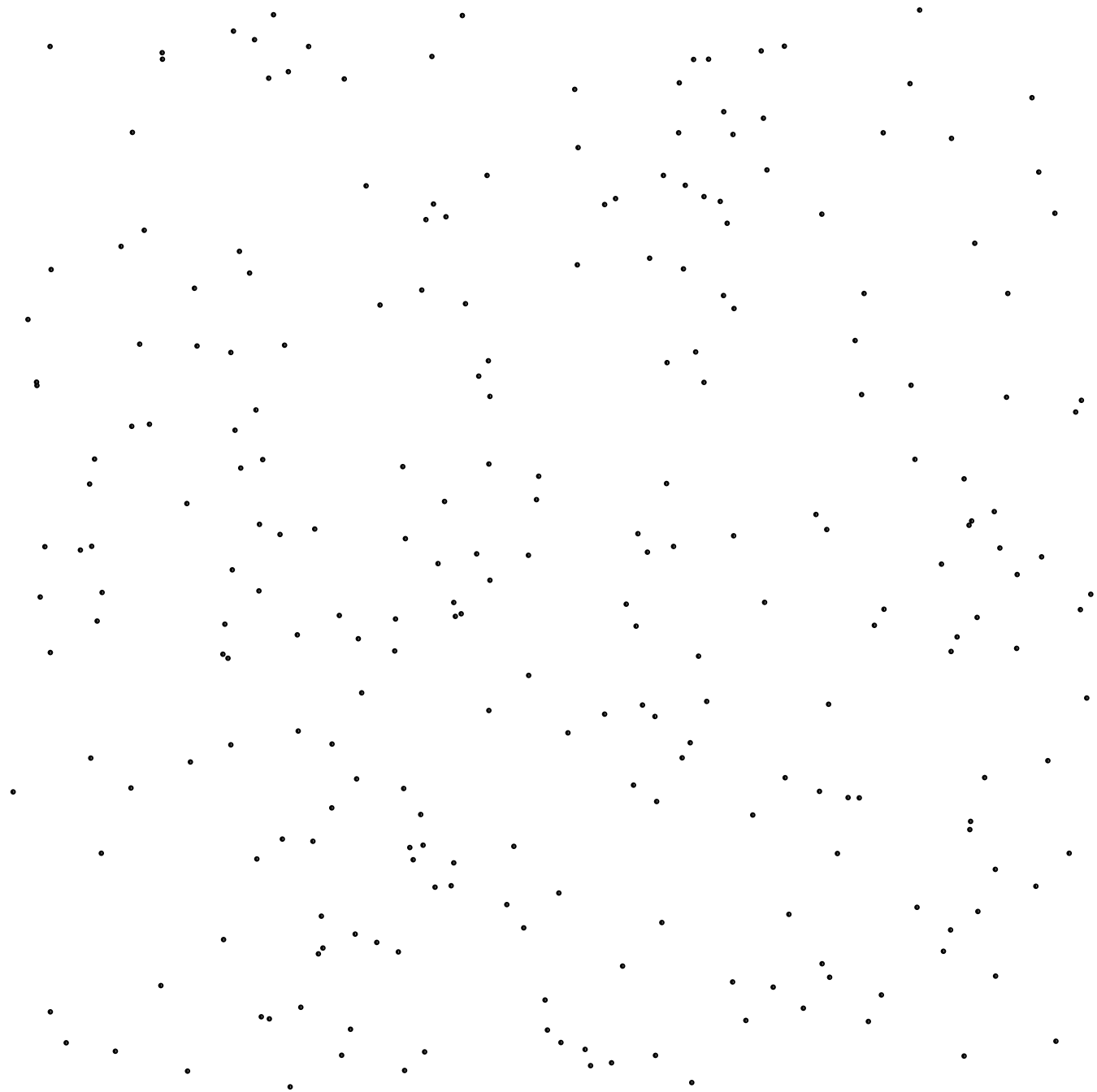
$\Rightarrow$ stop p

Example

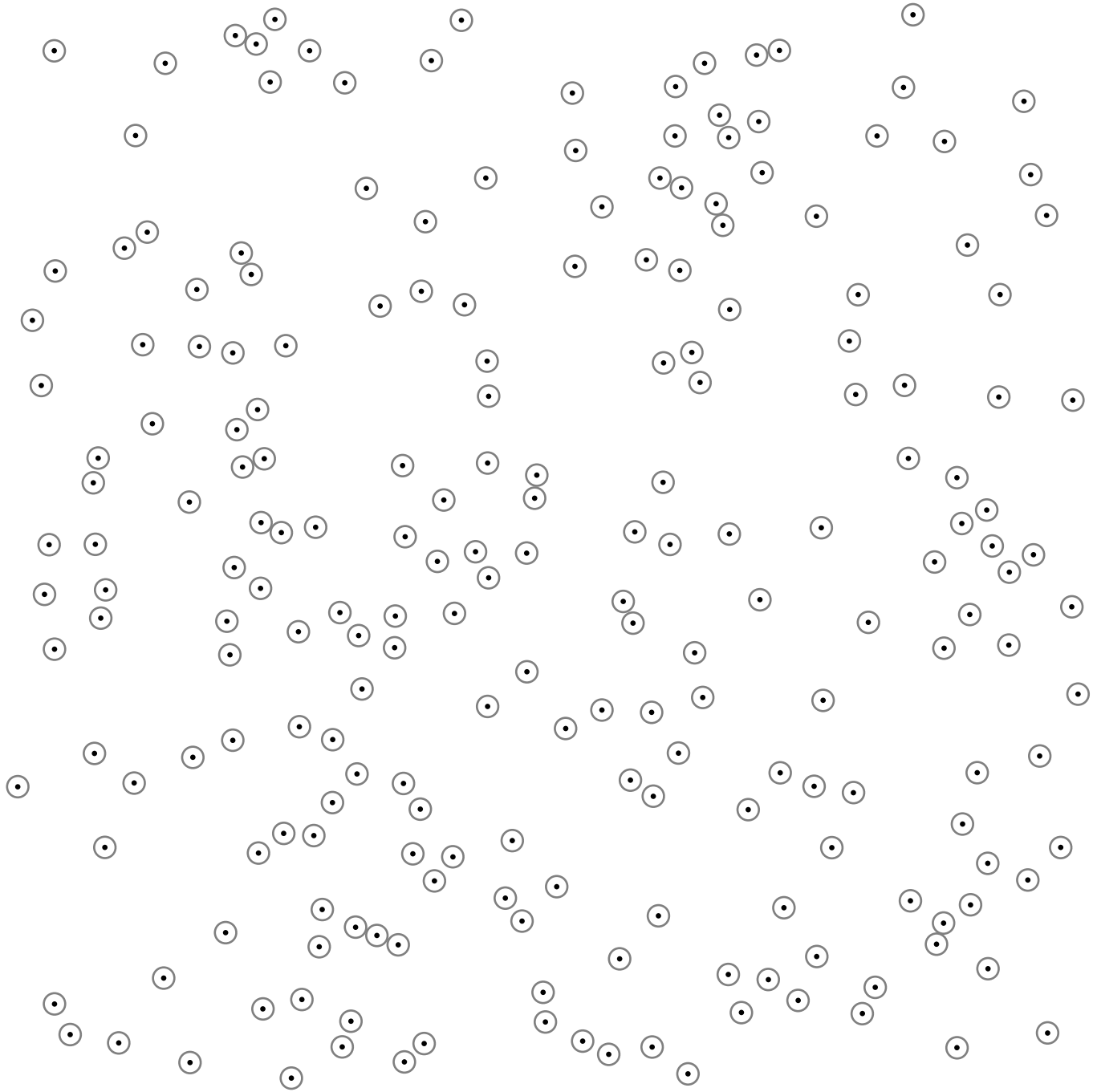


249 points
unit square
$d_{\text{min}} = 0.00, 0.02, \ldots, 0.40$

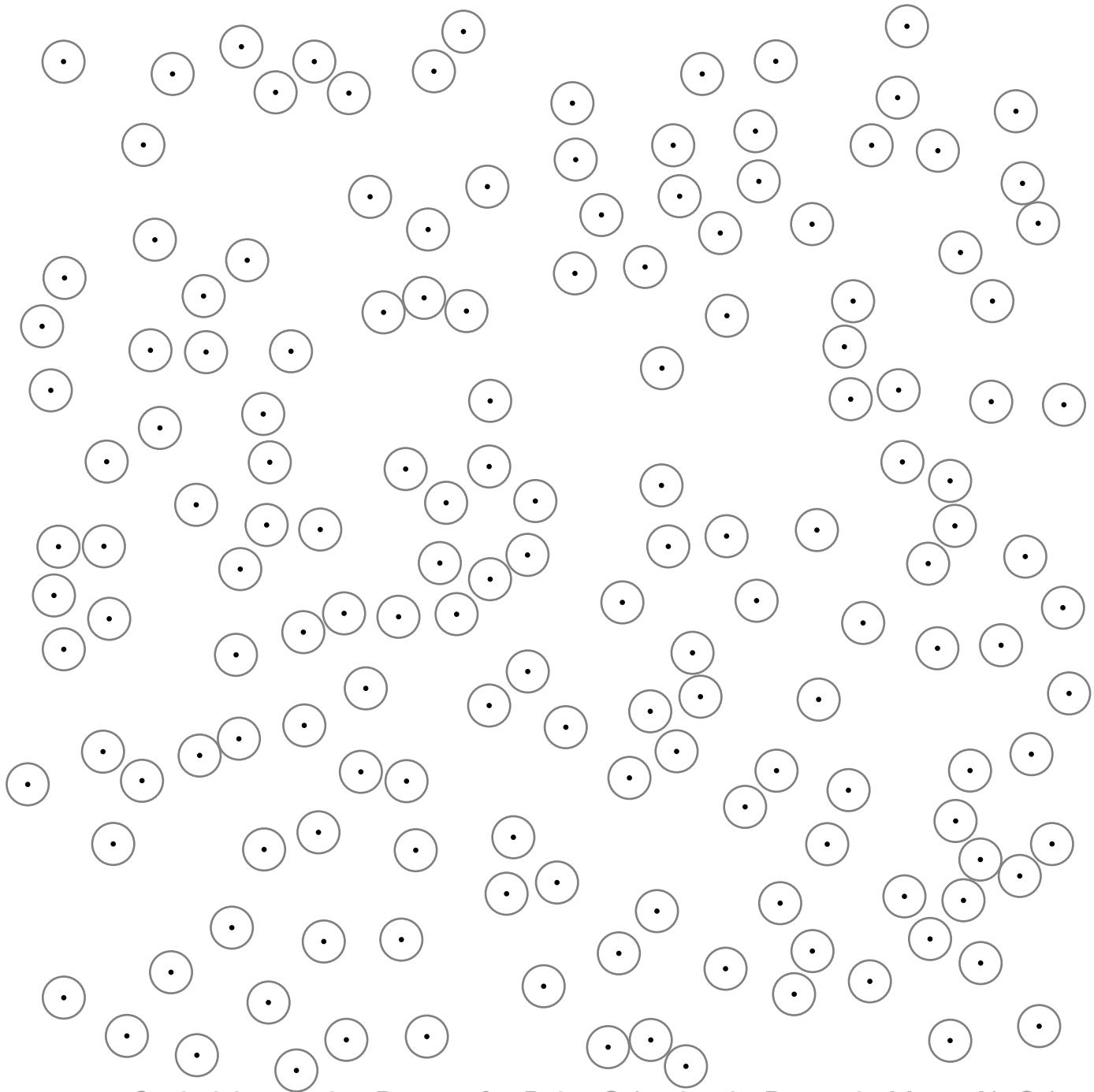
Example



Example



Example



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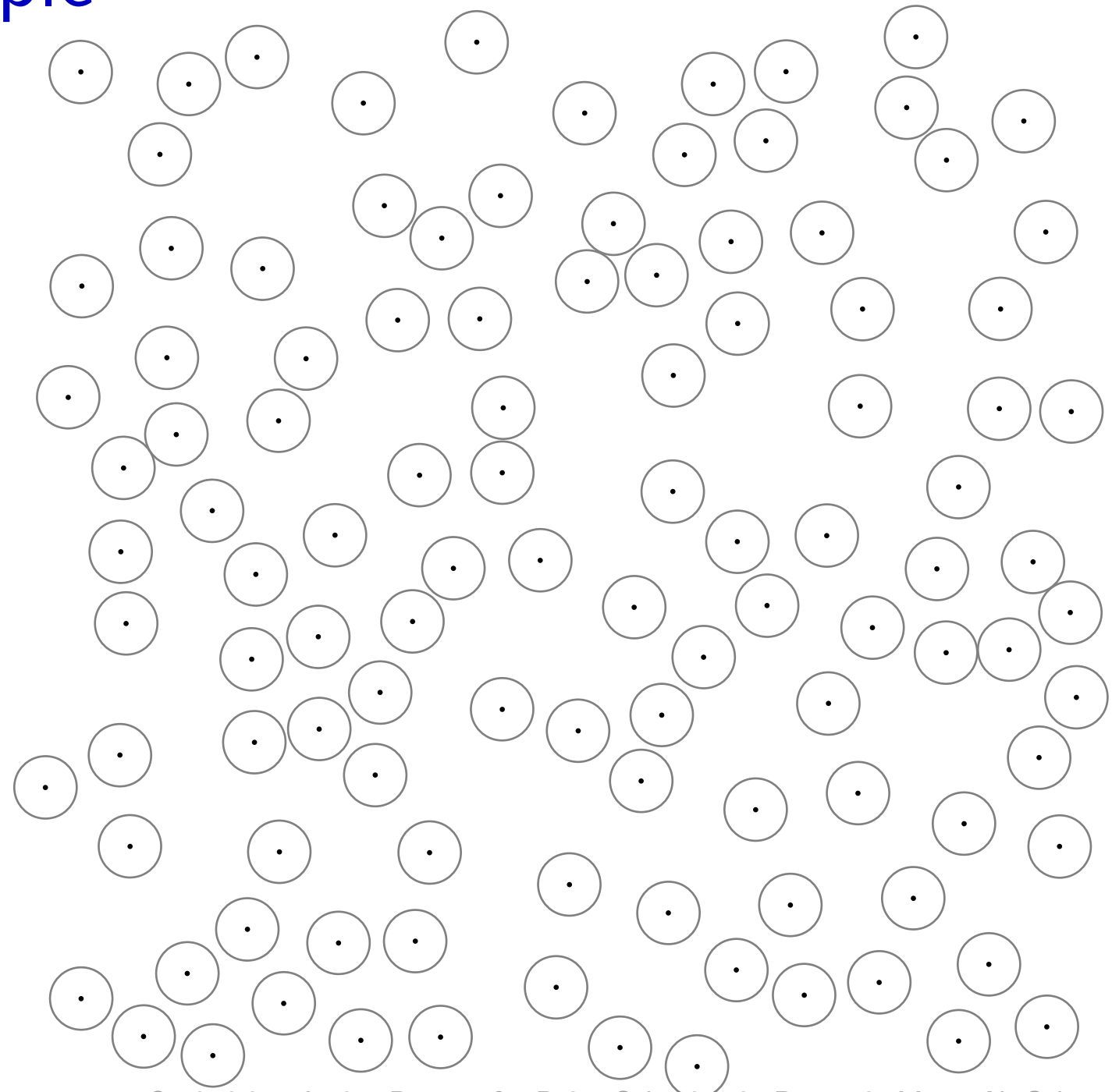

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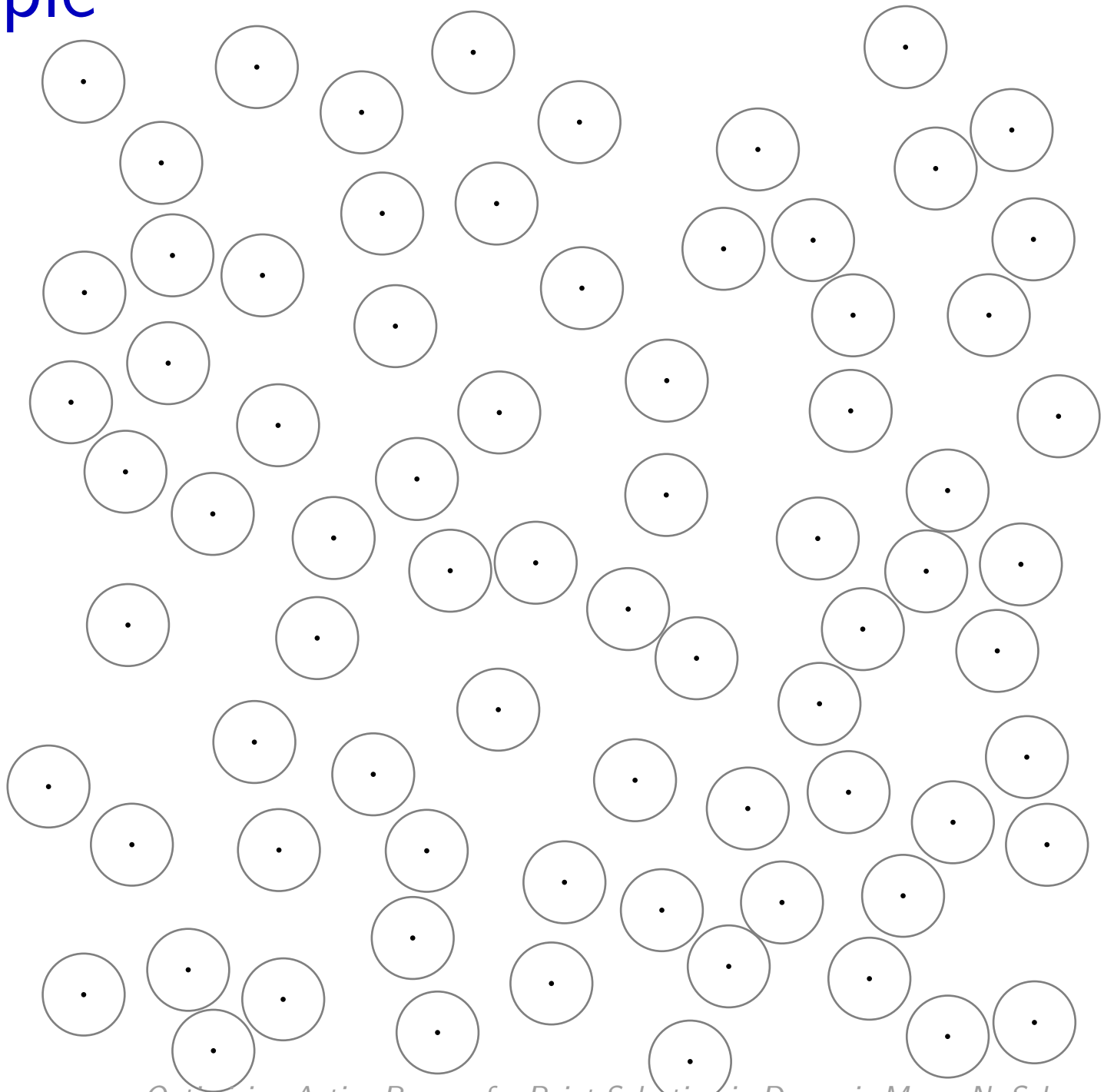
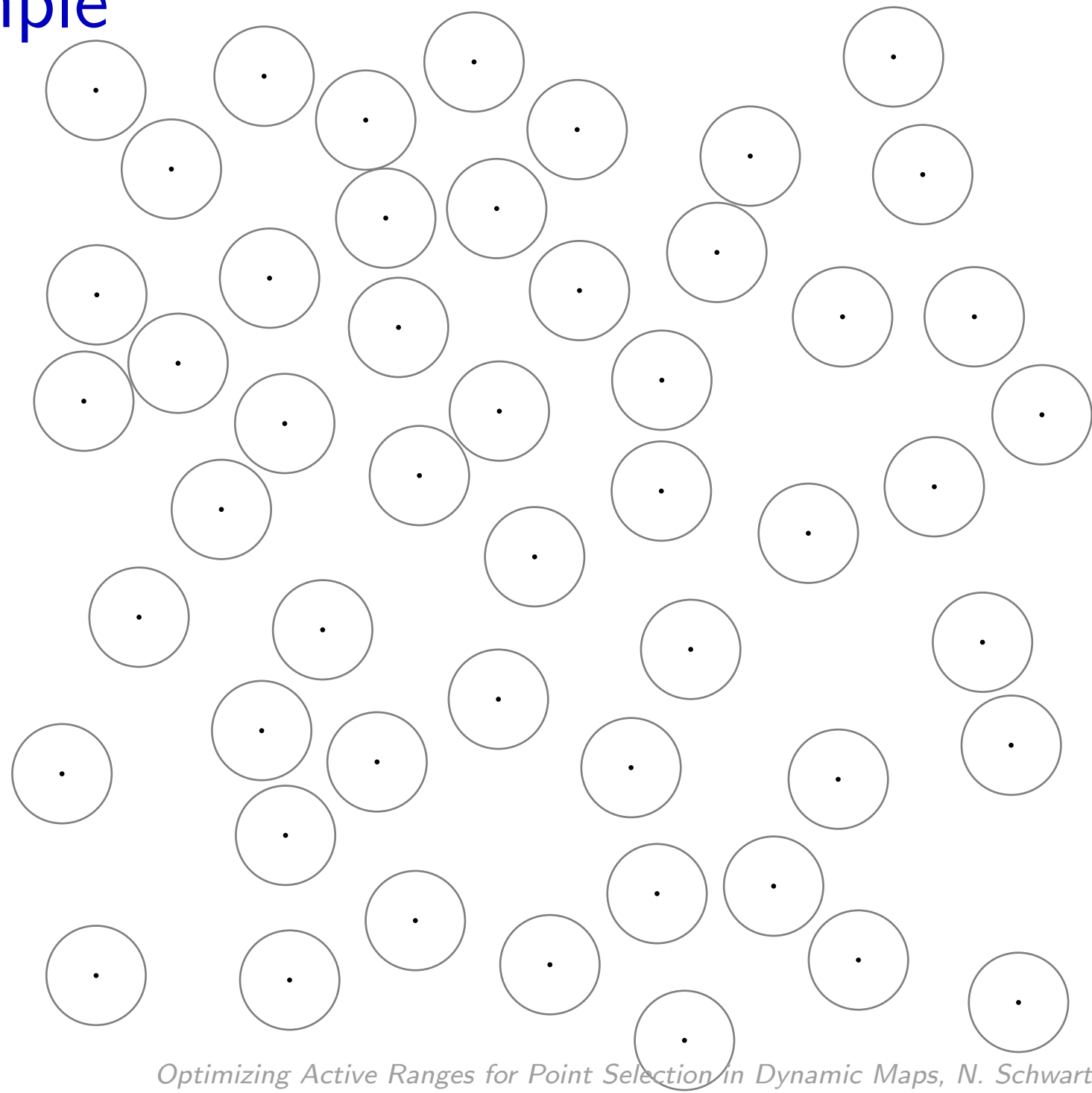


Example



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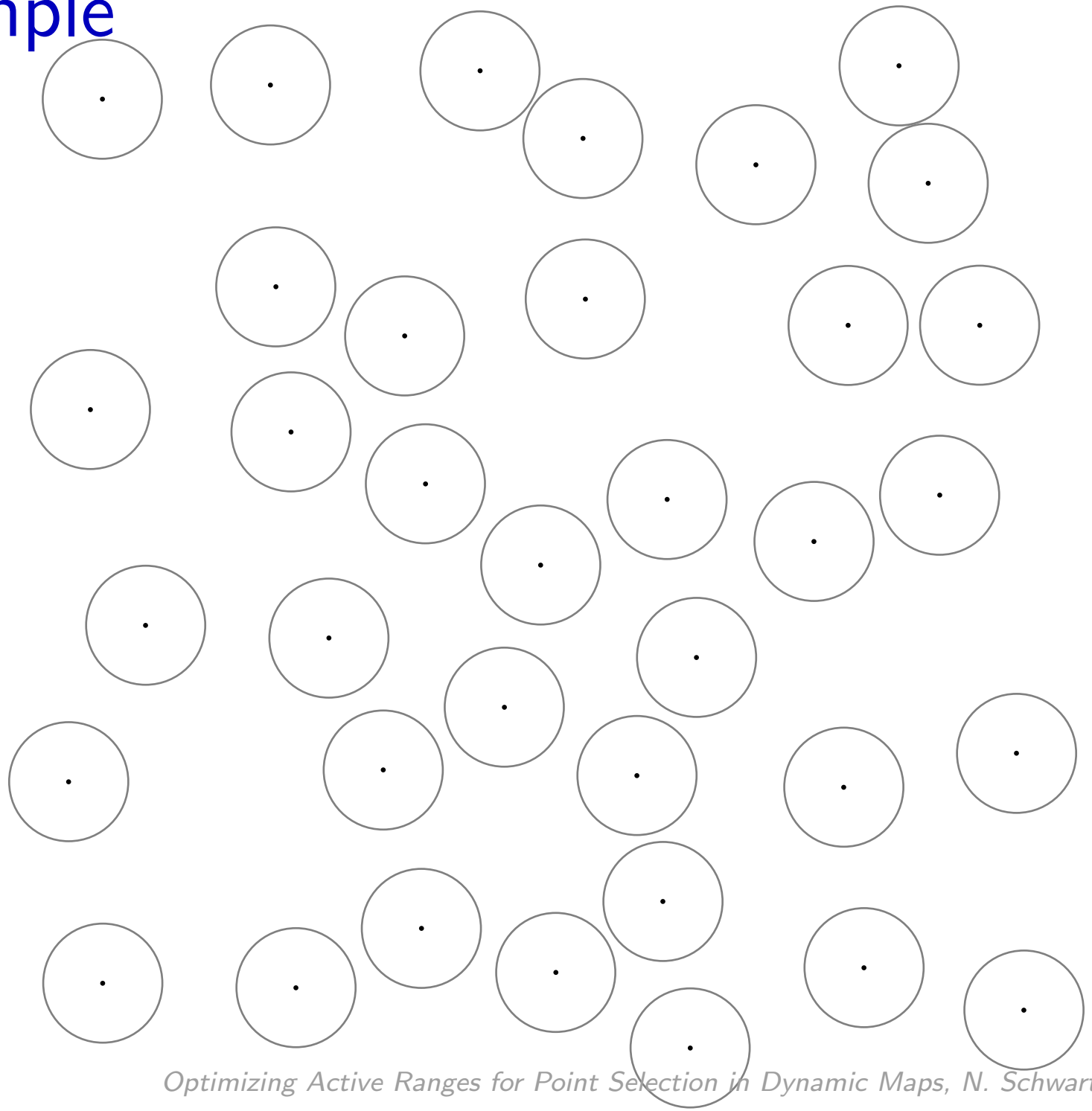

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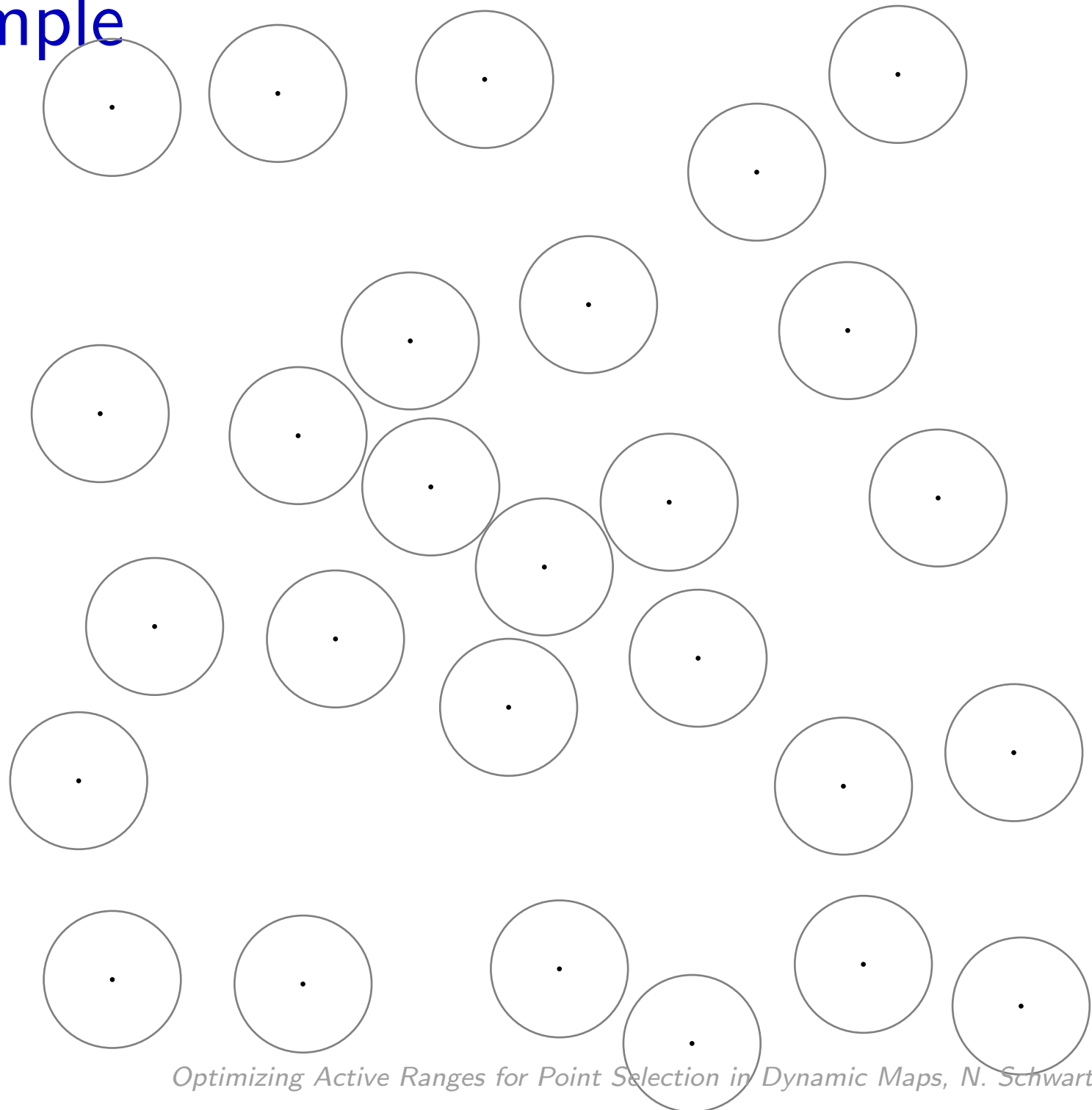

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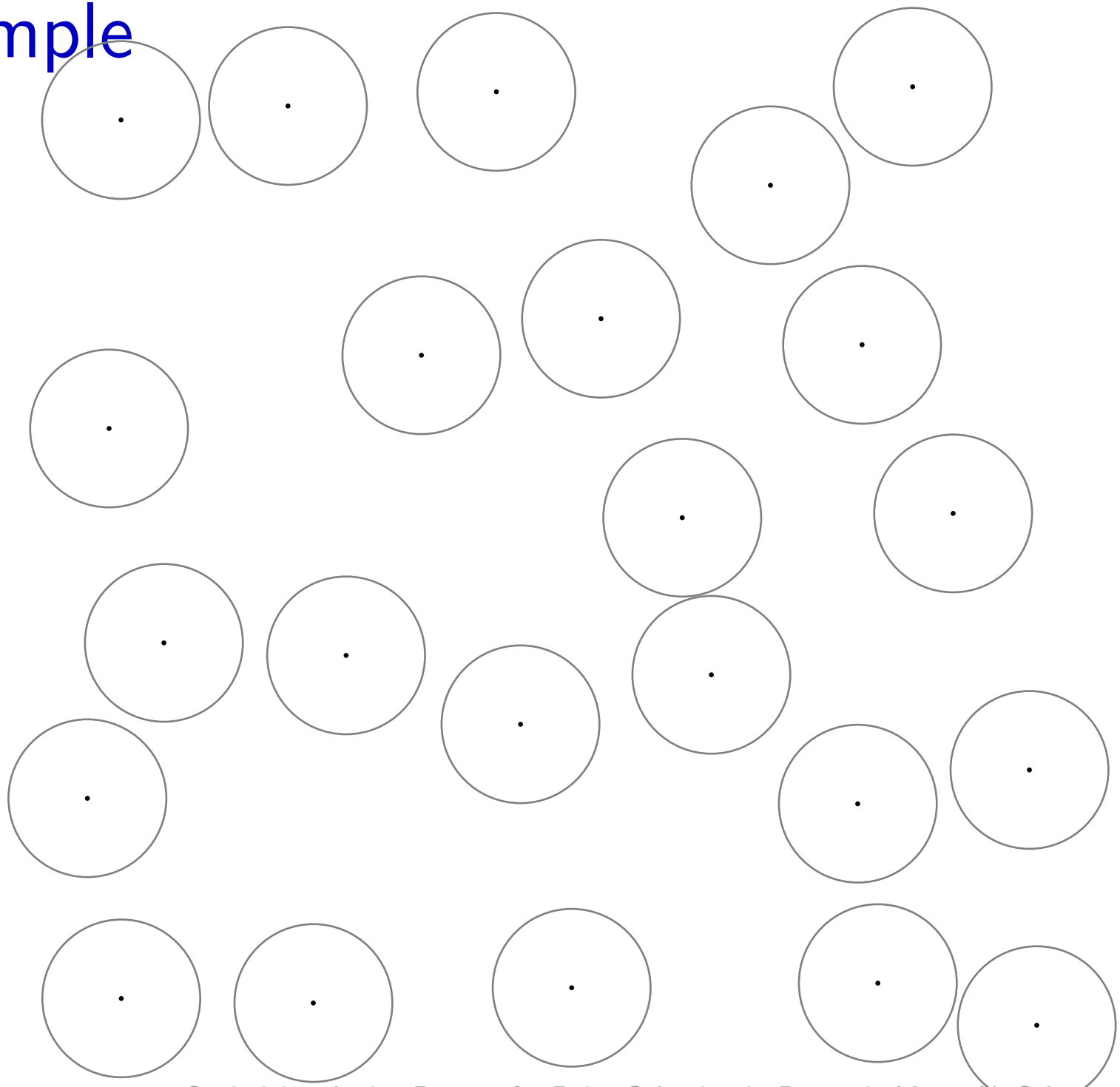

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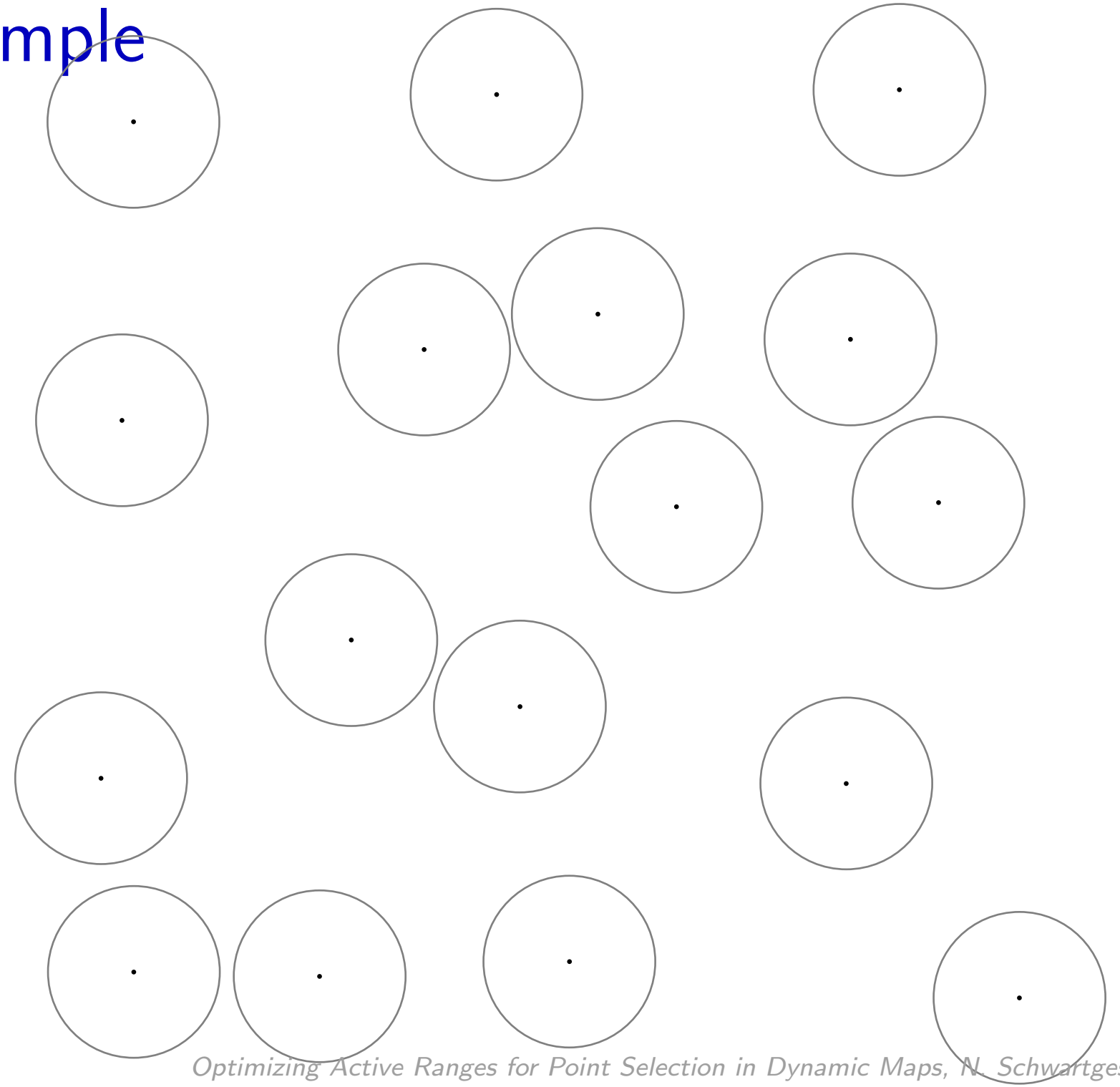

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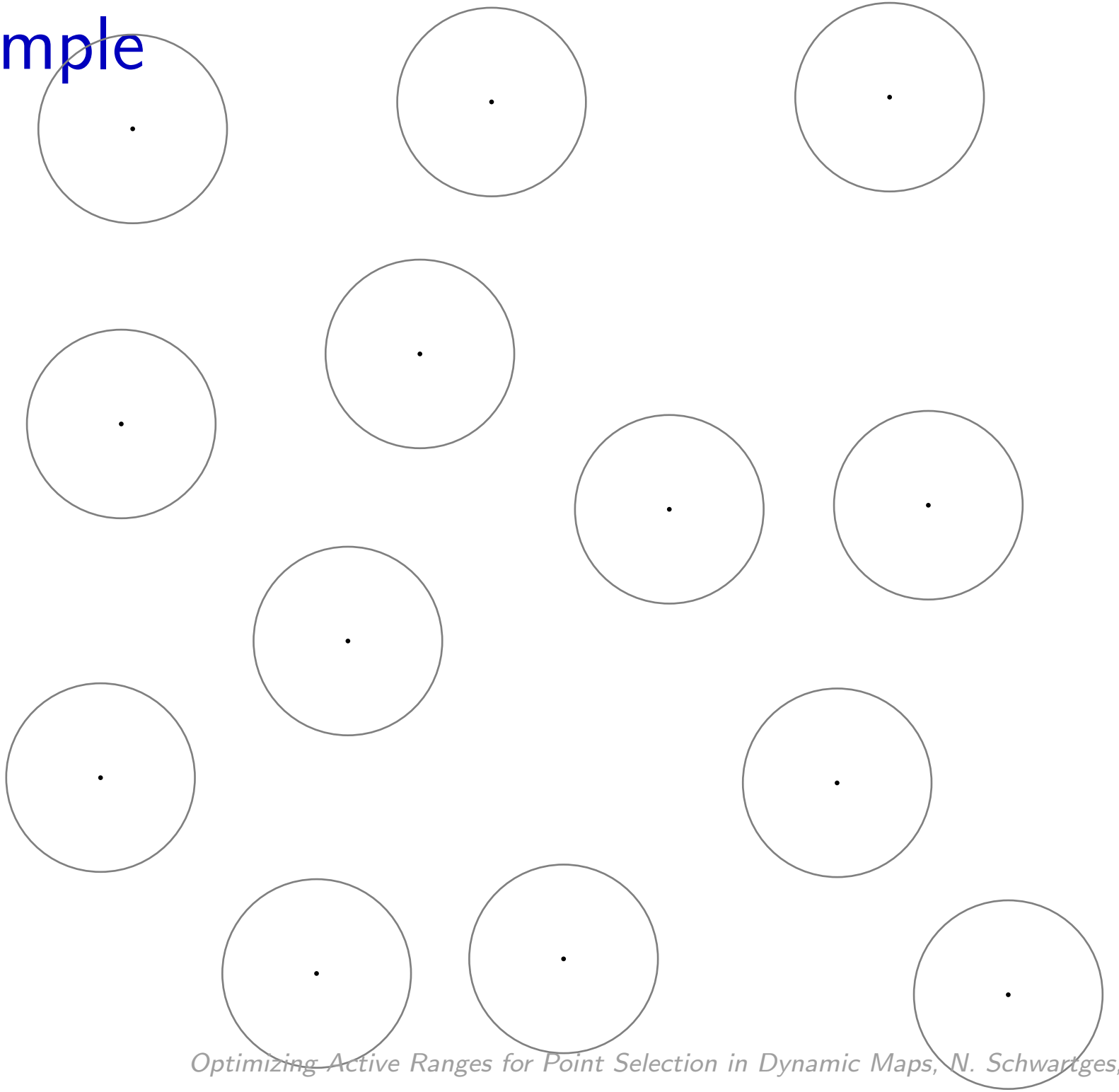

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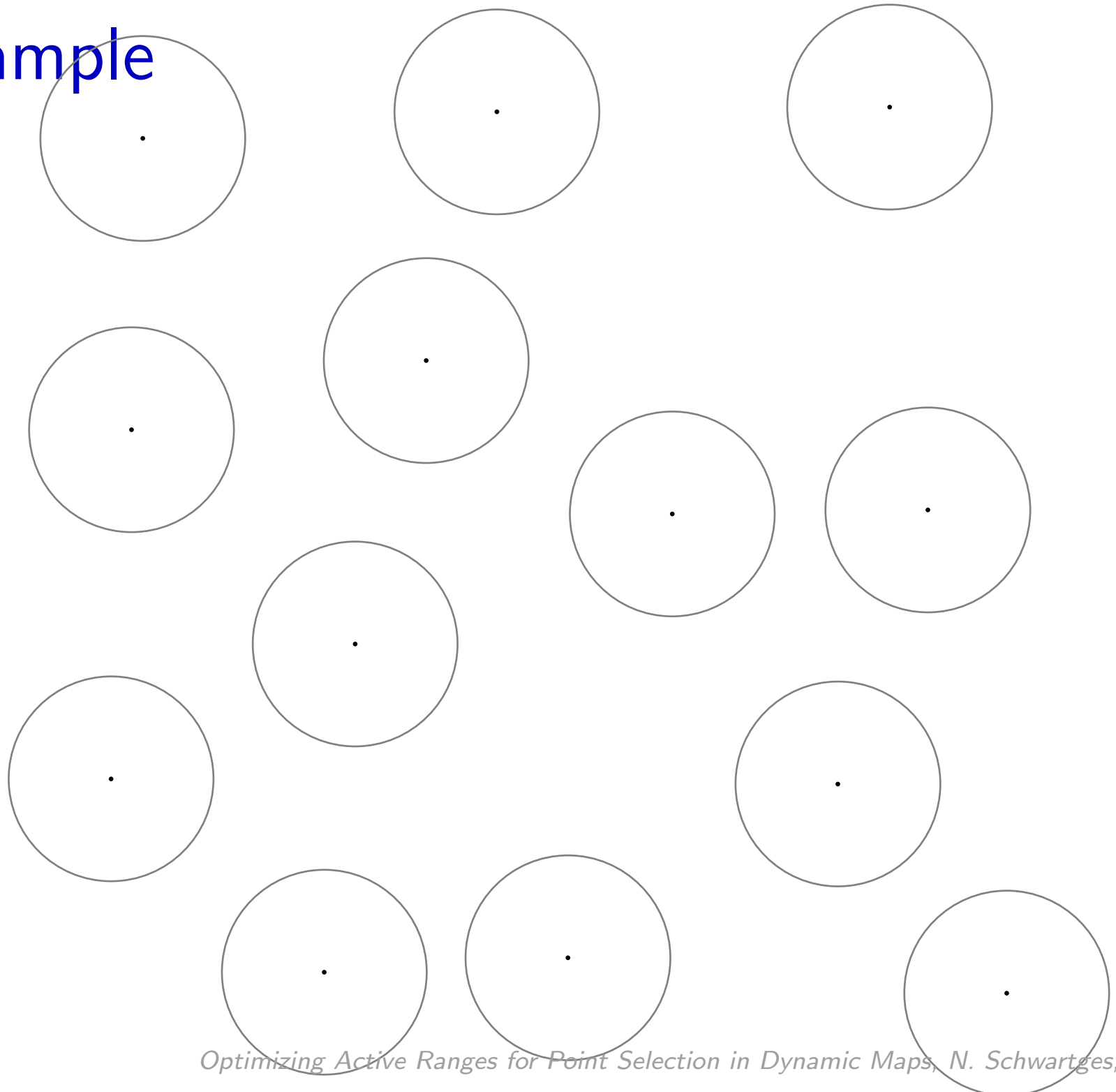

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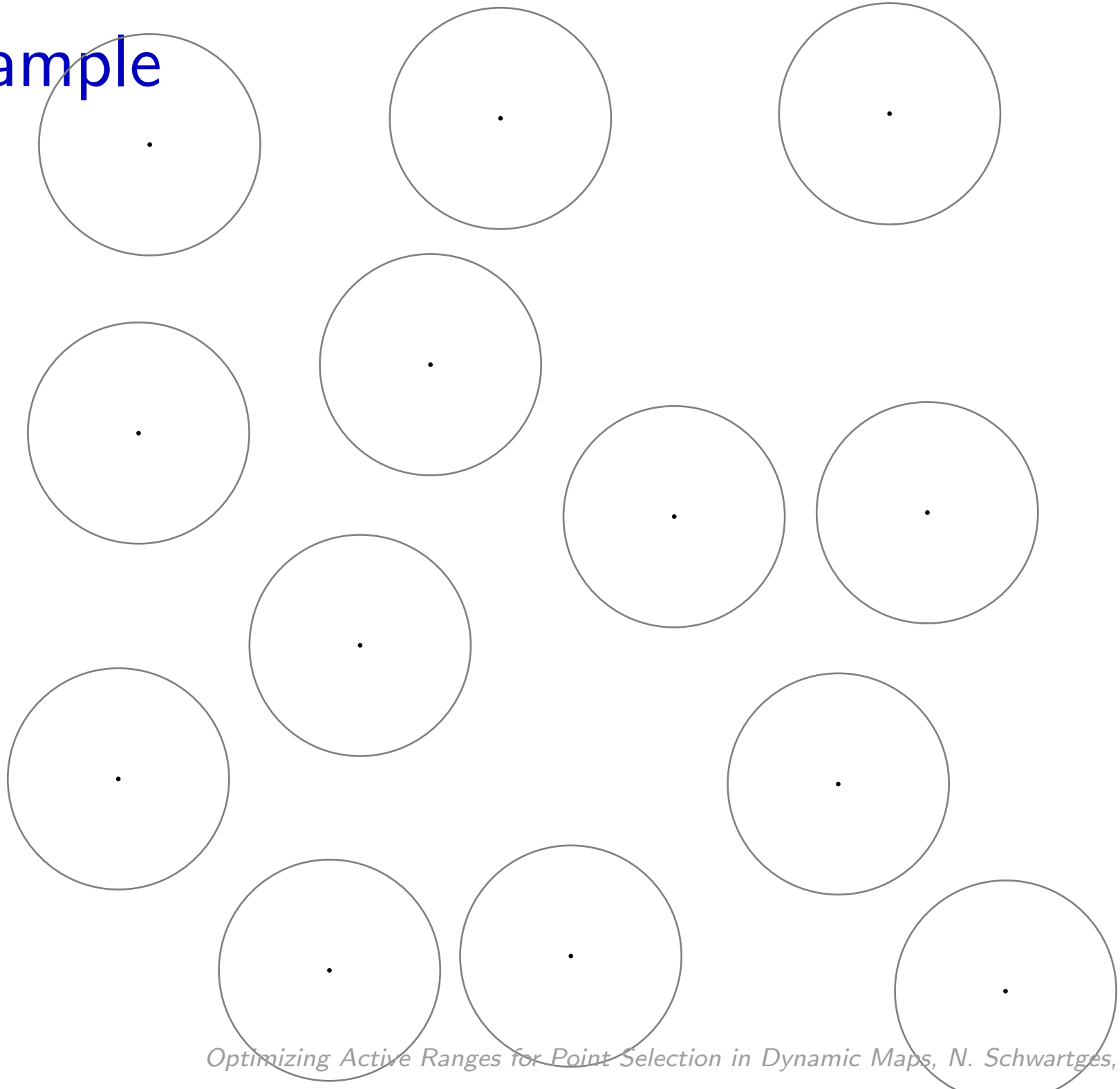

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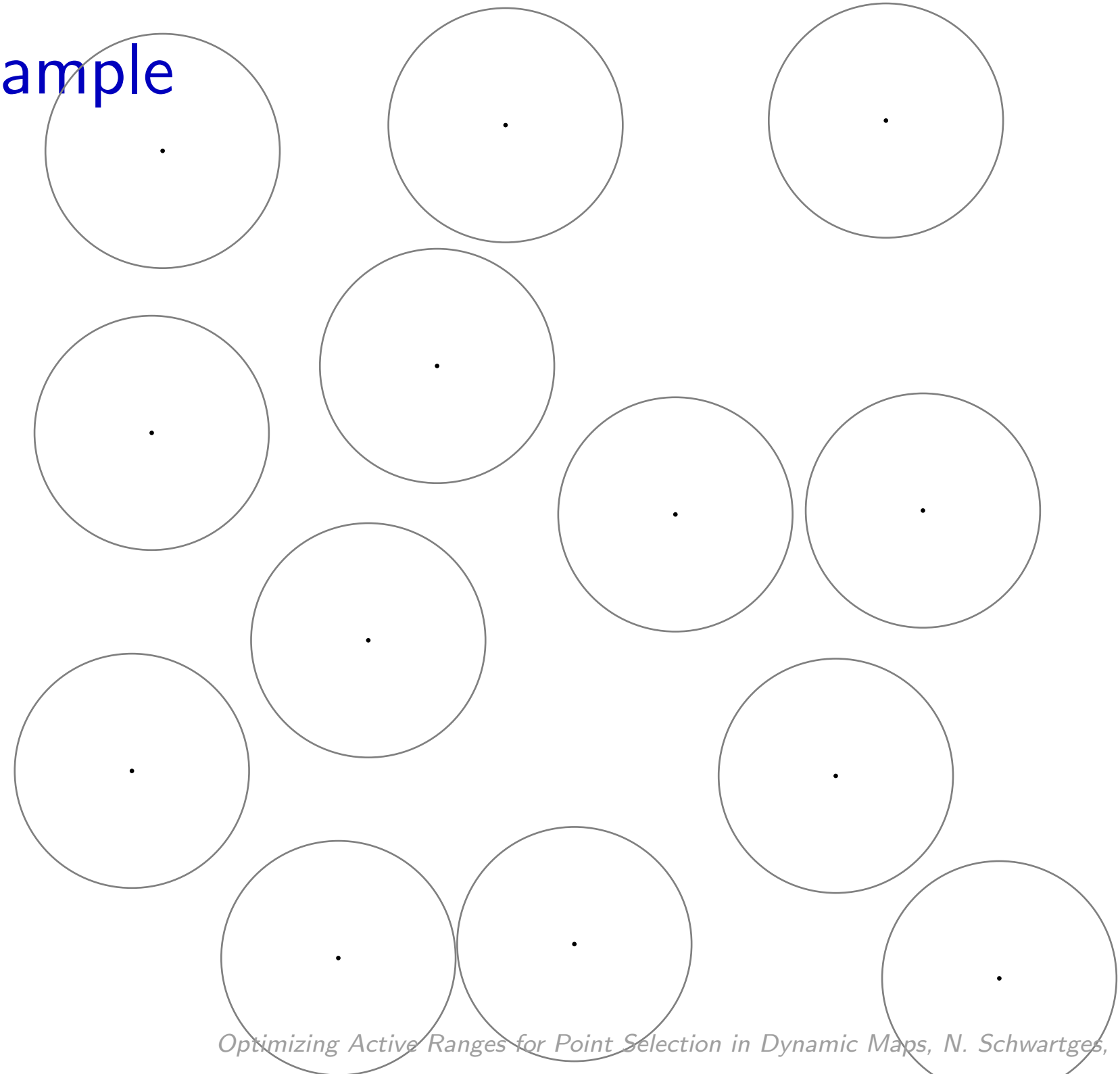

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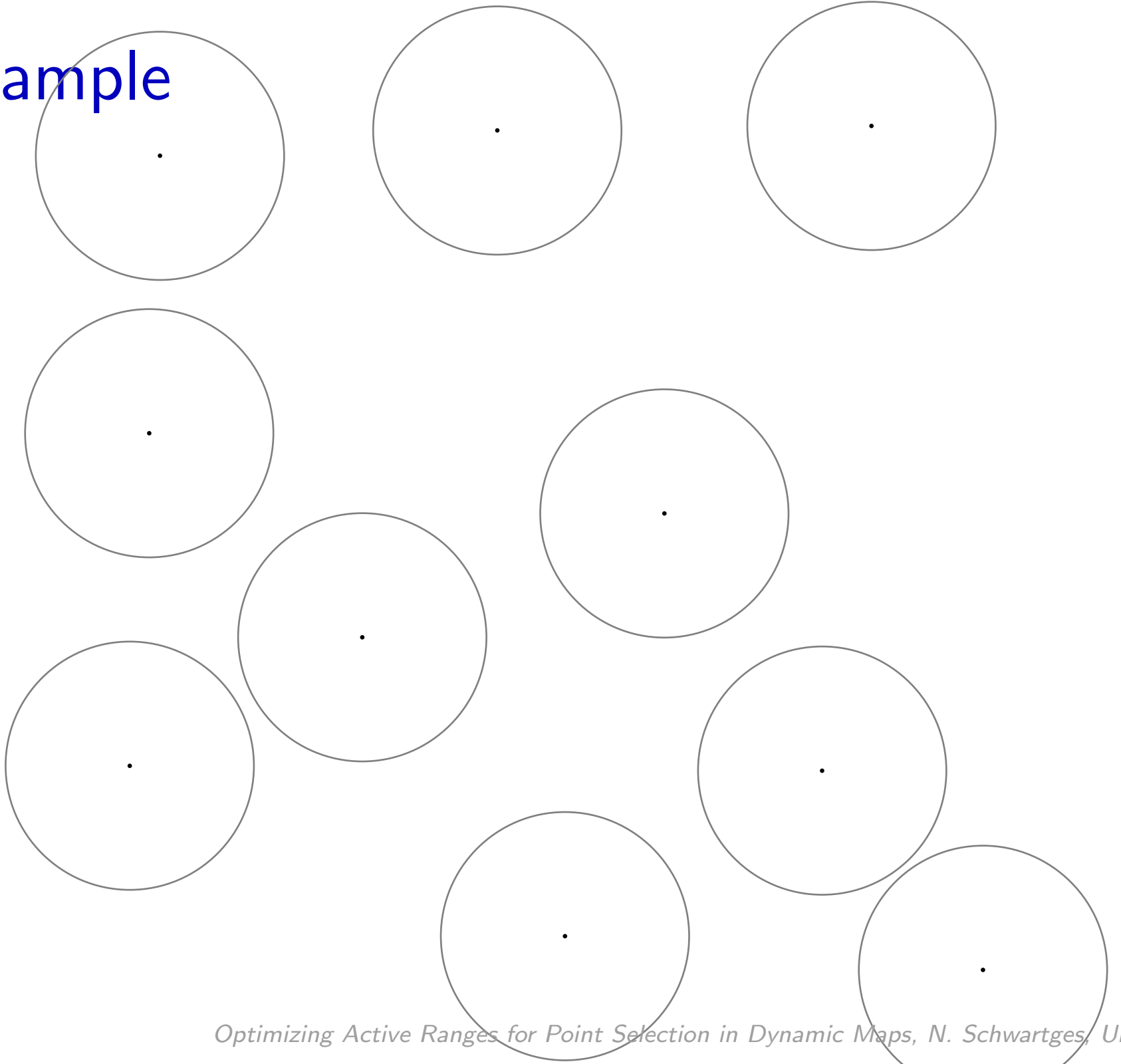

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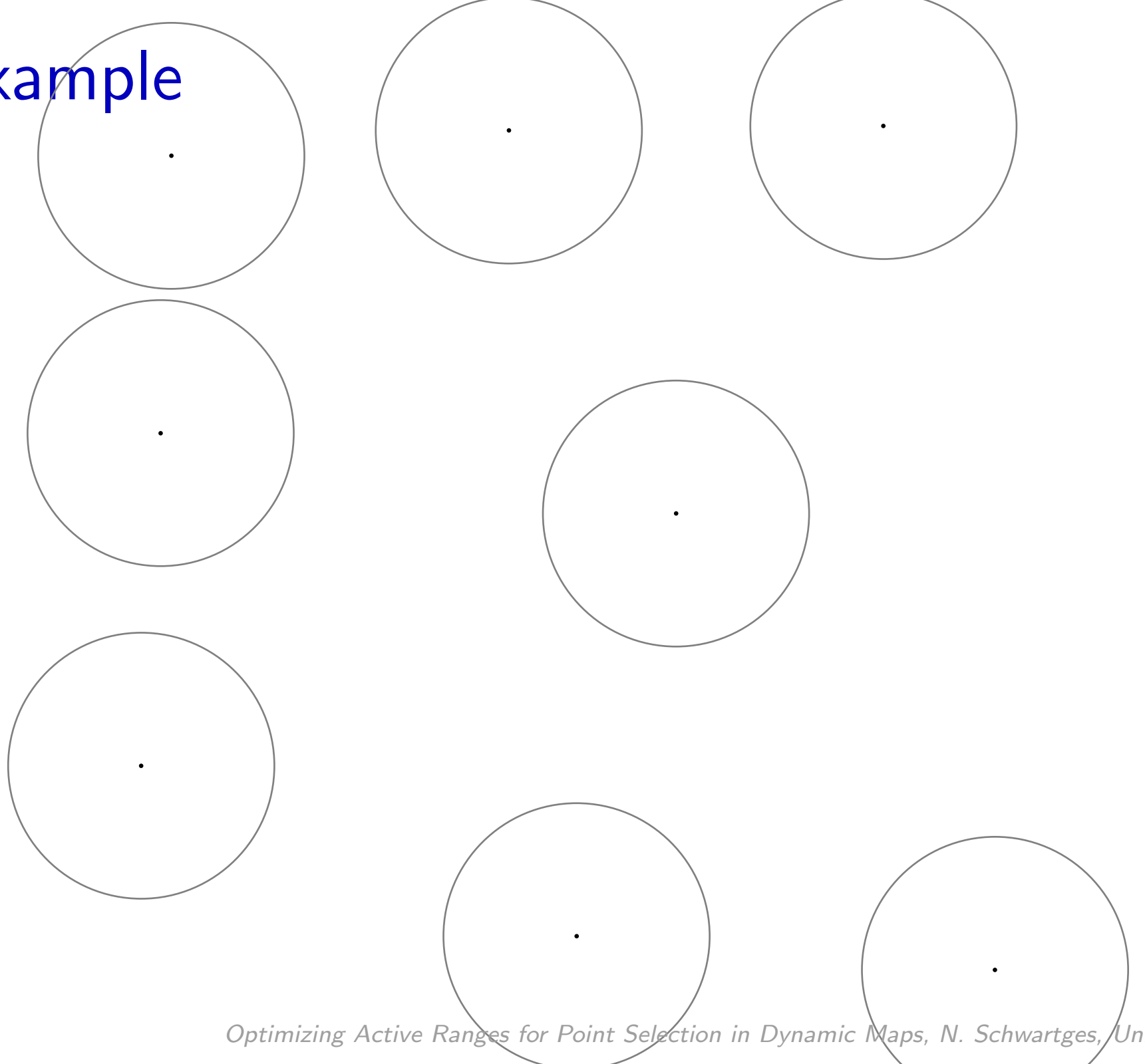

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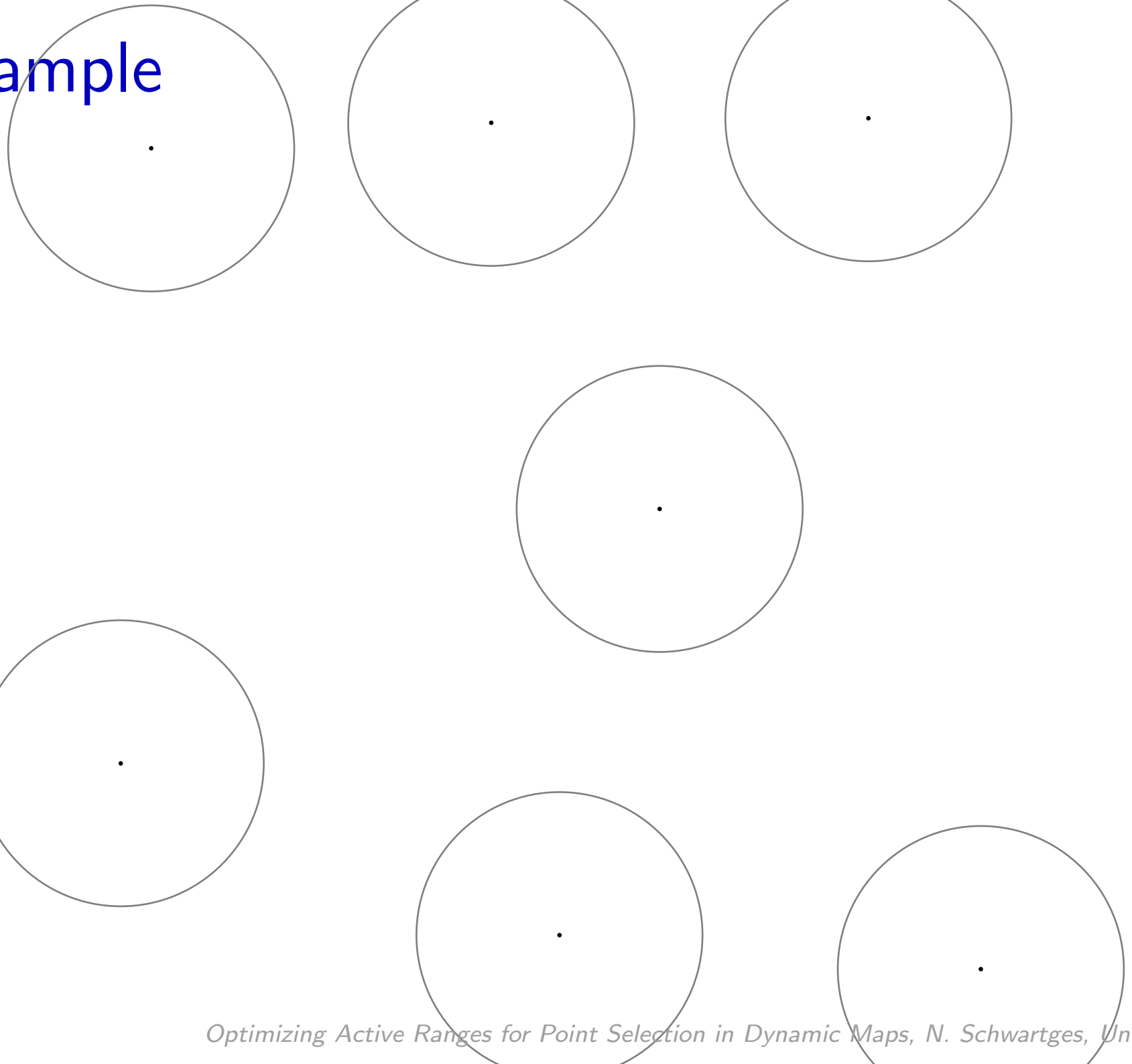

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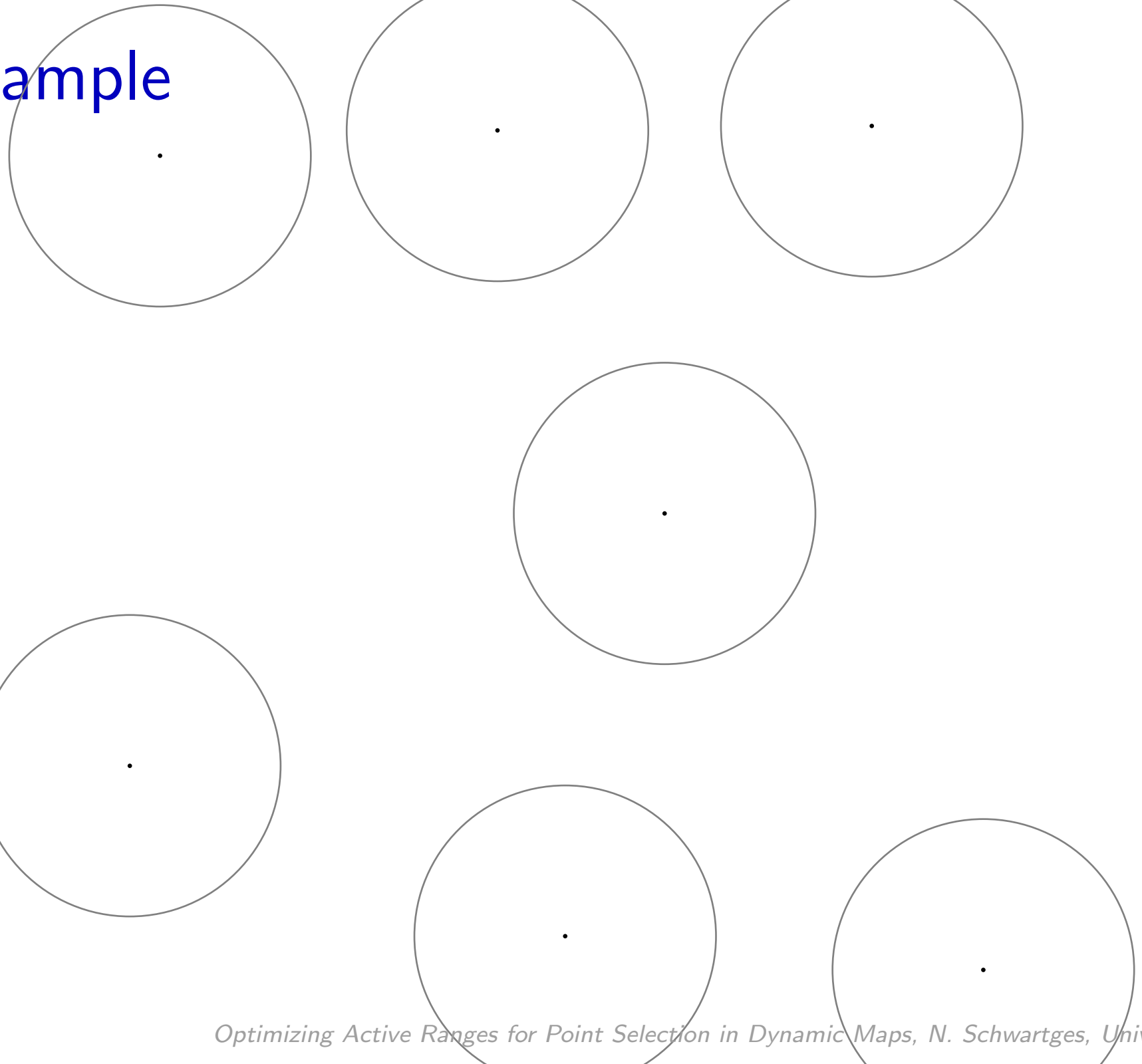

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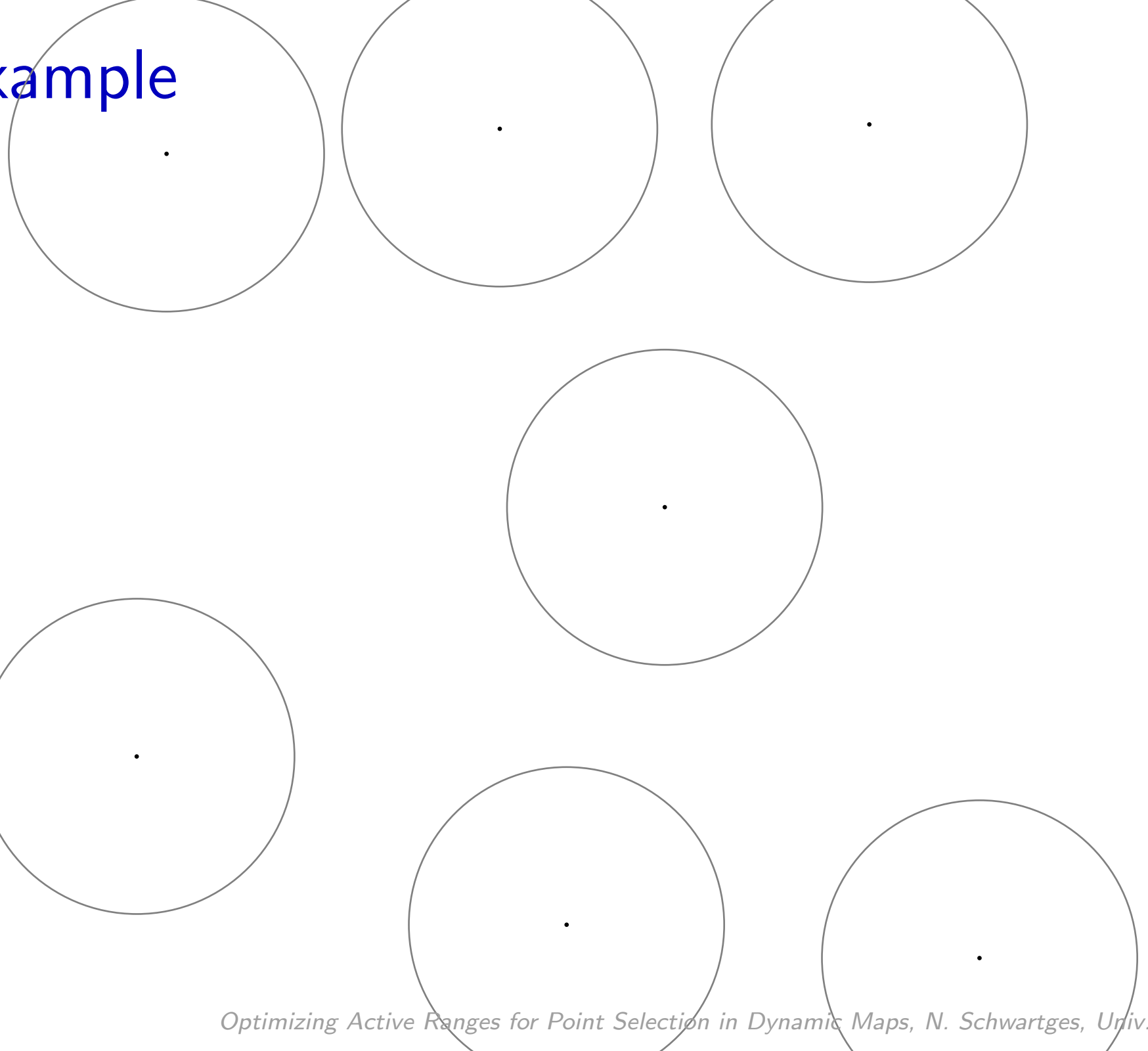

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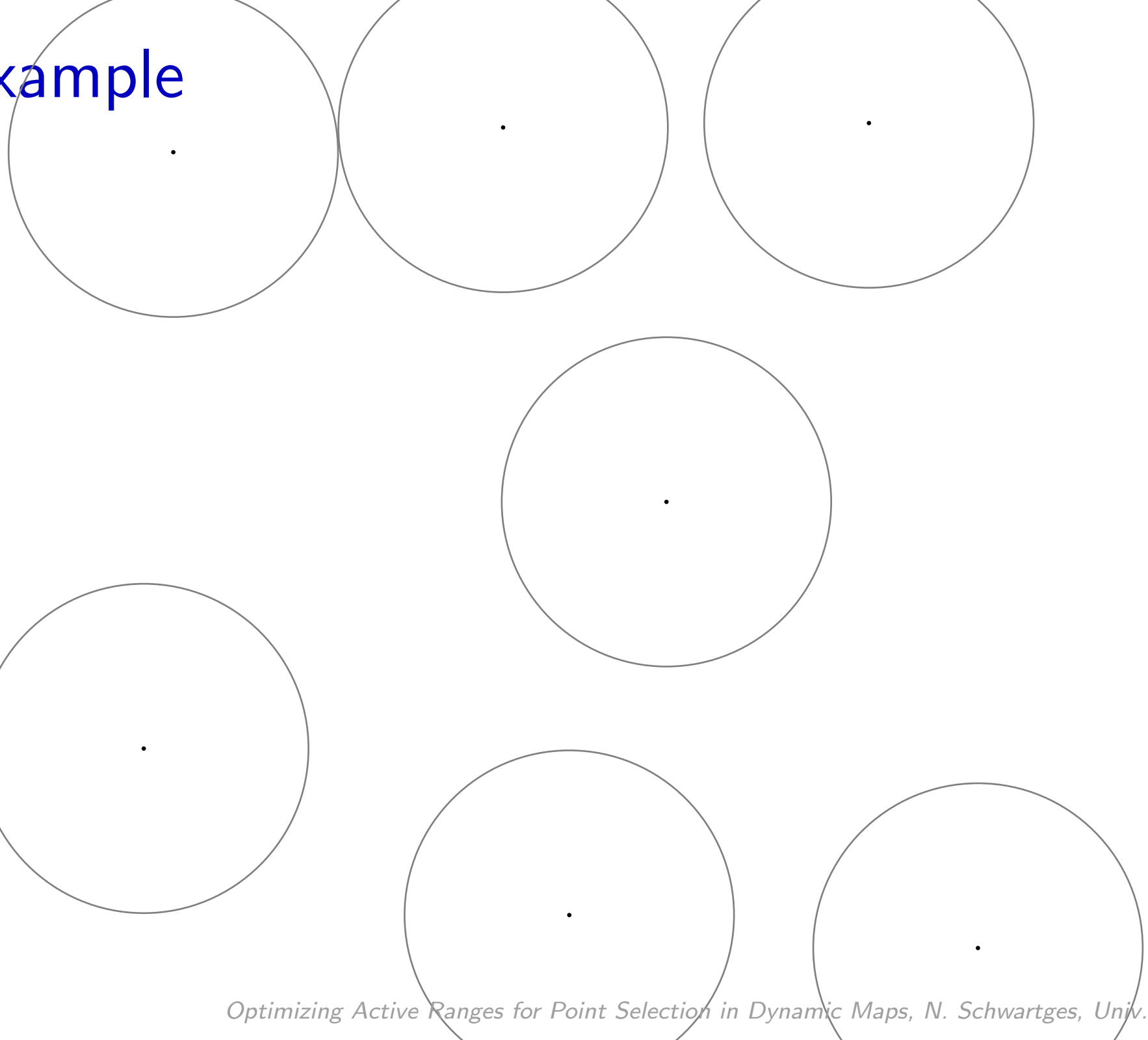

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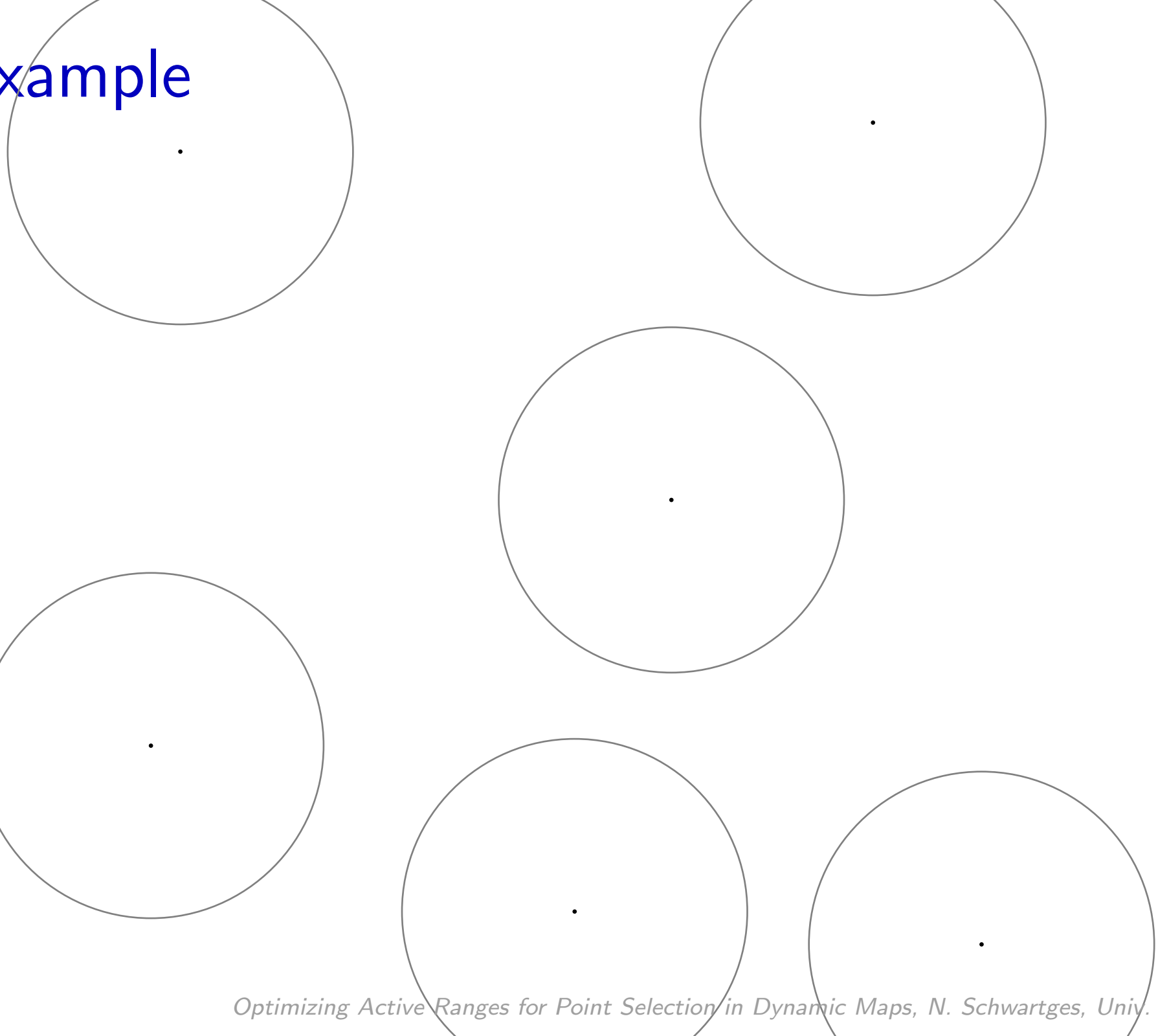
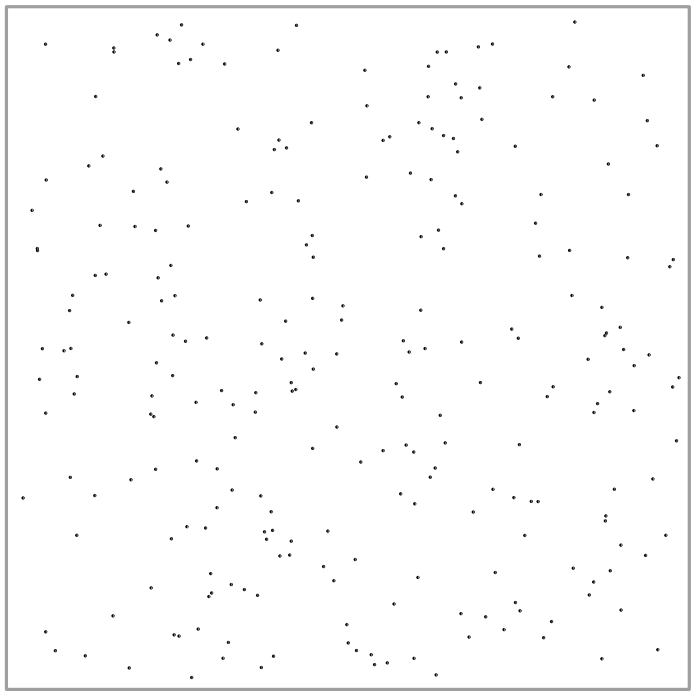


Experiments



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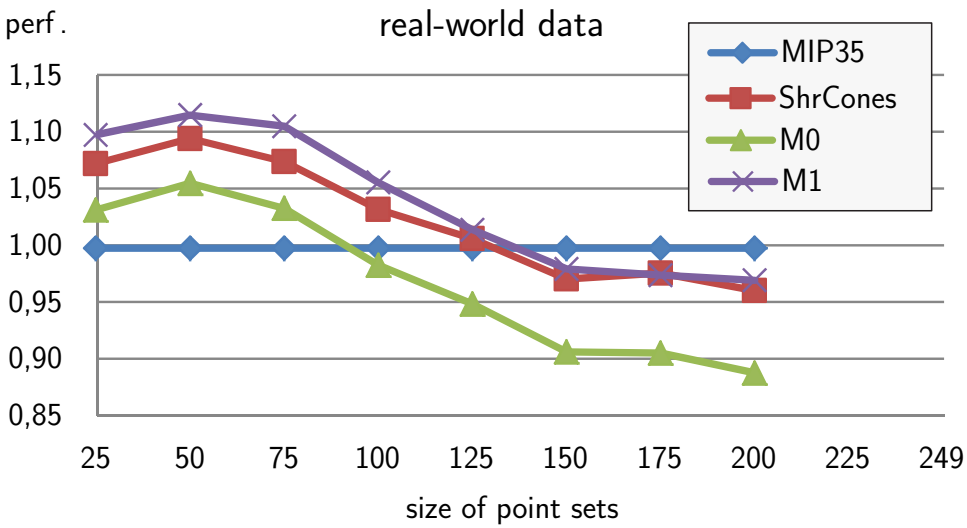

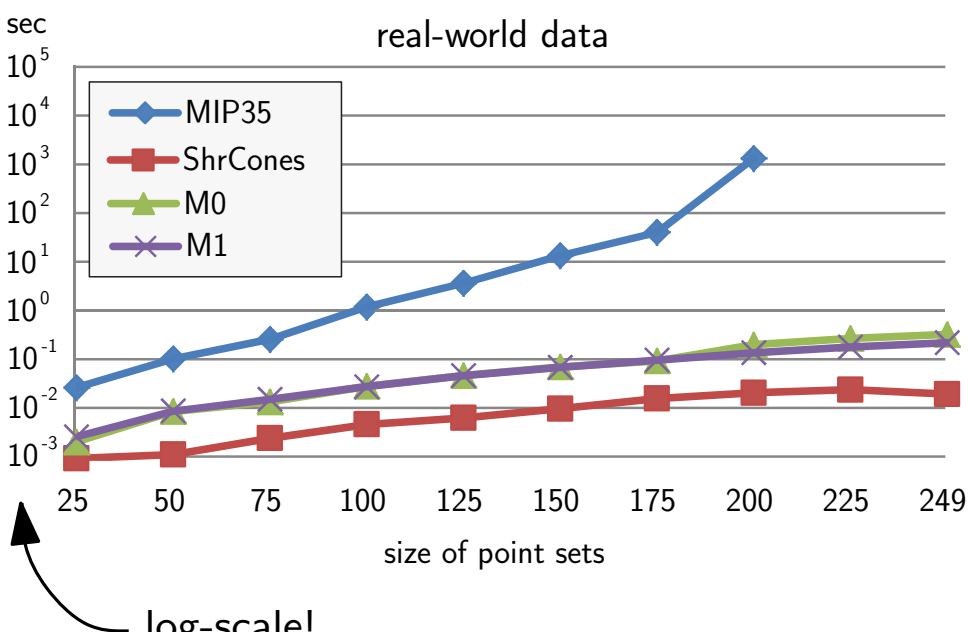

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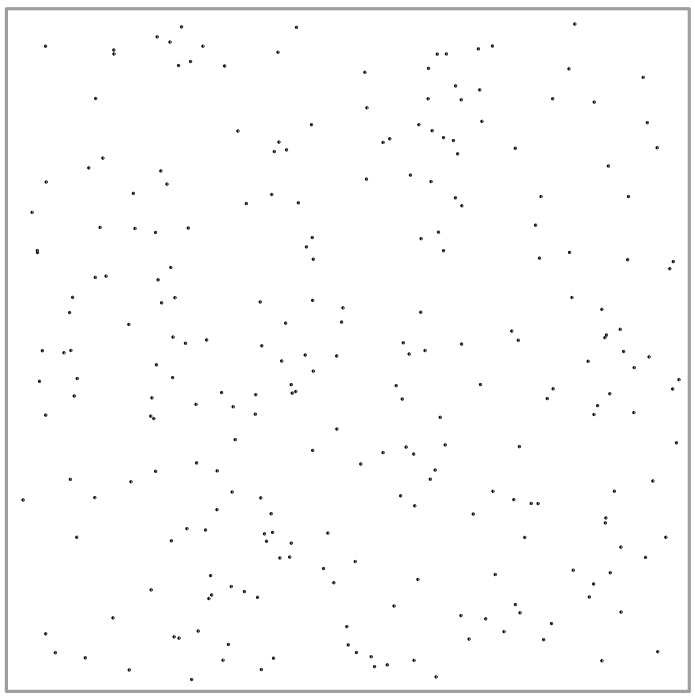

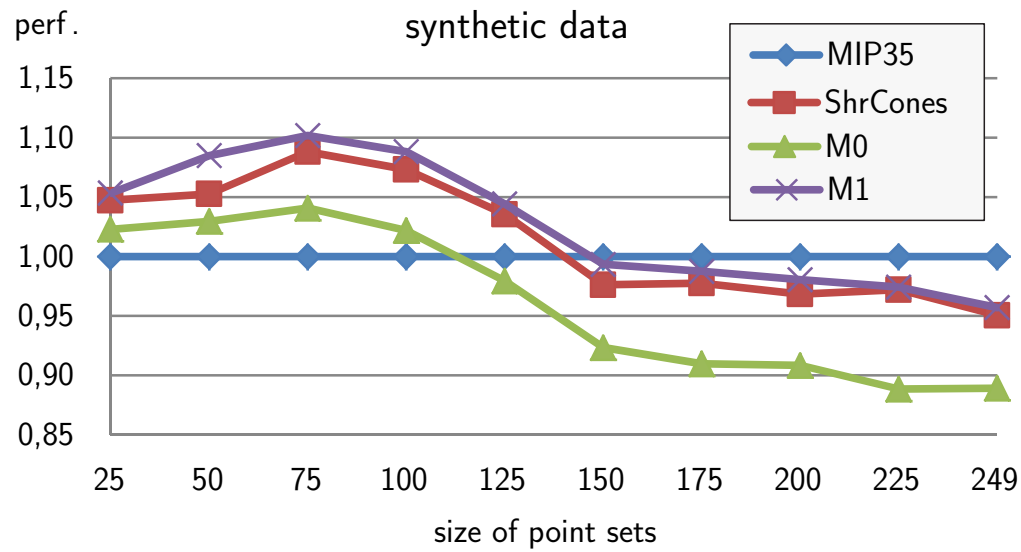

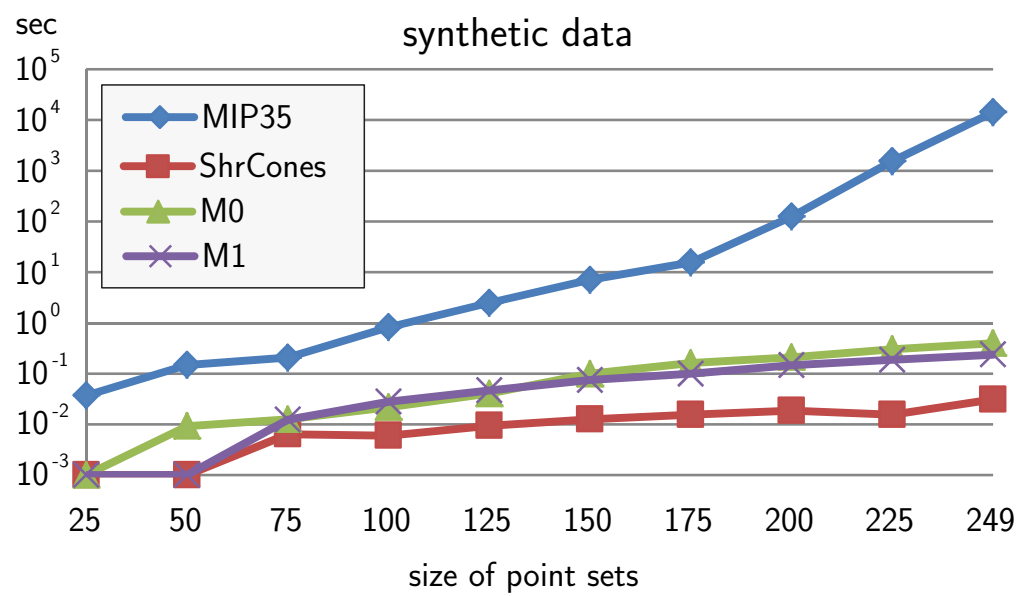

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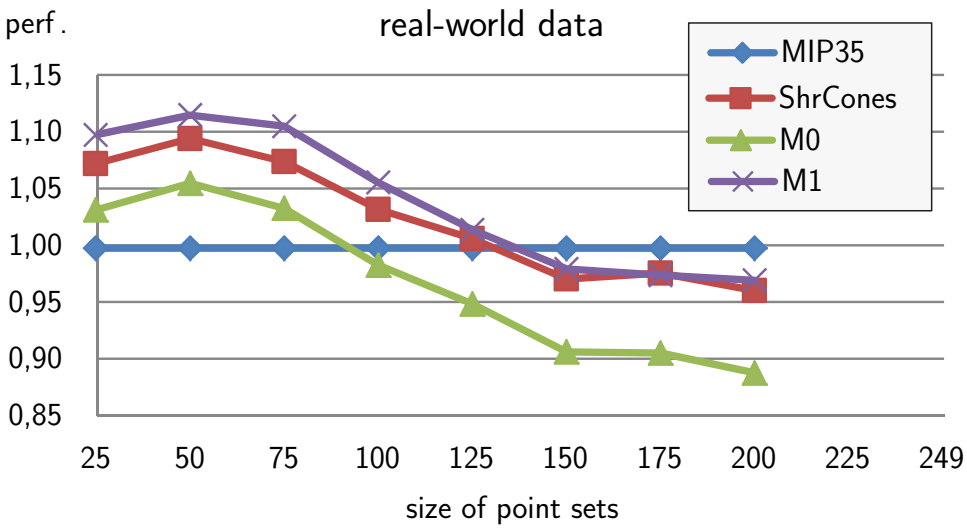

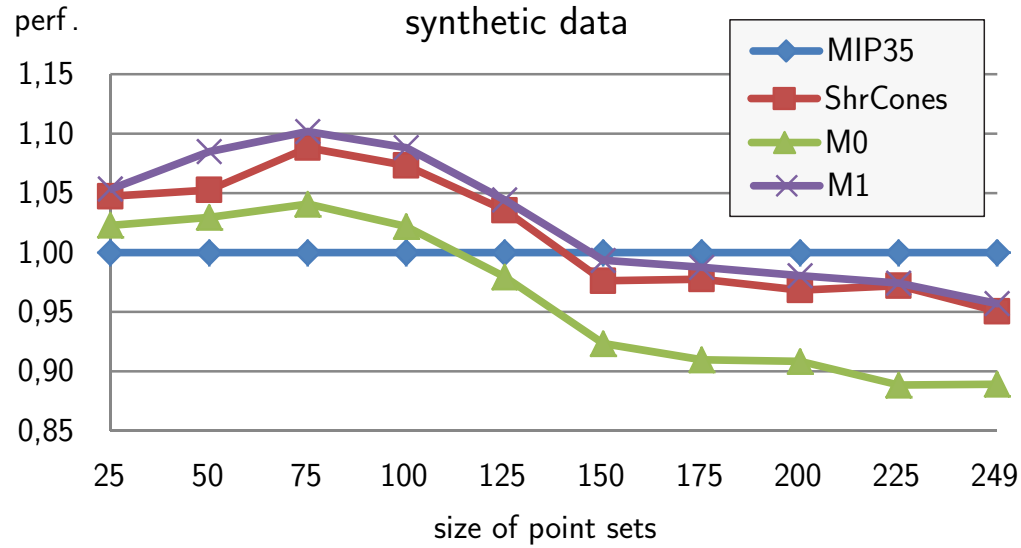

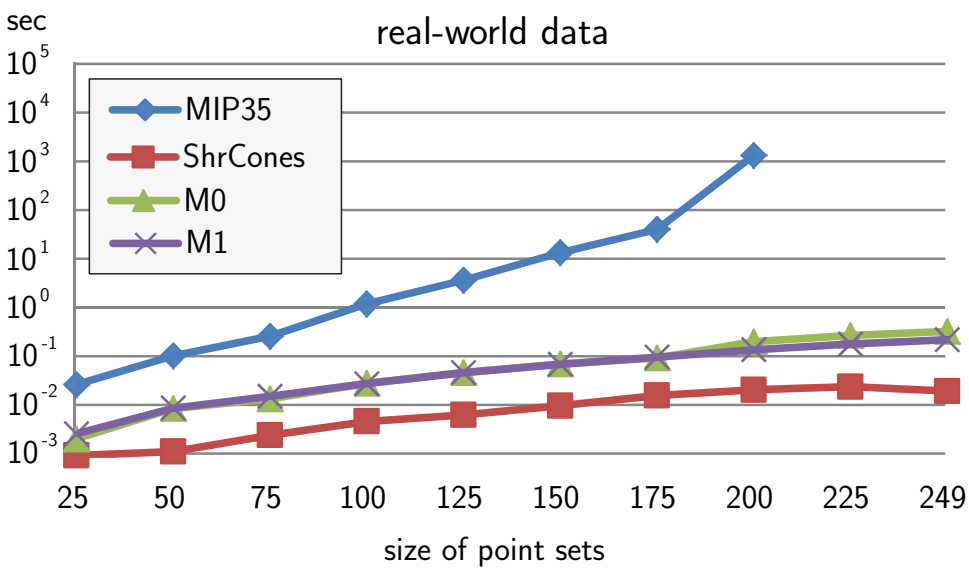

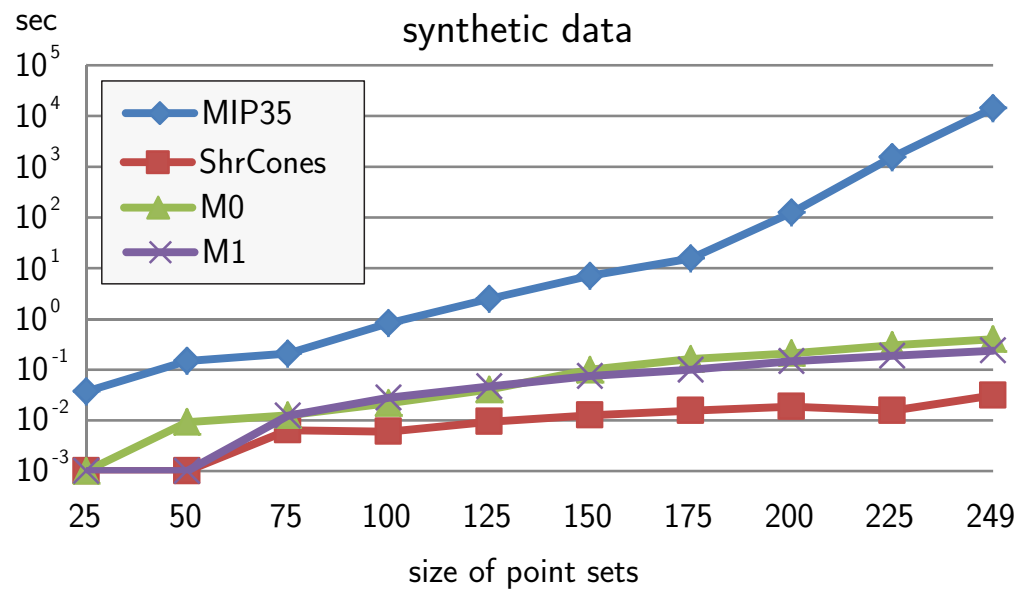

Summary & Conclusion

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- Growing Cones Heuristic
  - M0
  - M1

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Thank you!