



Inpakken

Universiteit Leiden

<http://www.Tiacs.nl/>

Open Dag Informatica
Hendrik Jan Hoogeboom
Leiden 18 november 11

programmeerlijn

Programmeermethoden

Algoritmiek

Datastructuren

Databases

Software
engineering

programmeerlijn

Programmeermethoden

Algoritmiek

Datastructuren

Databases

Software
engineering

Opgave: wrap 'em up

Christo heeft besloten een hele stad in te pakken; liefst met **zo weinig mogelijk** materiaal.

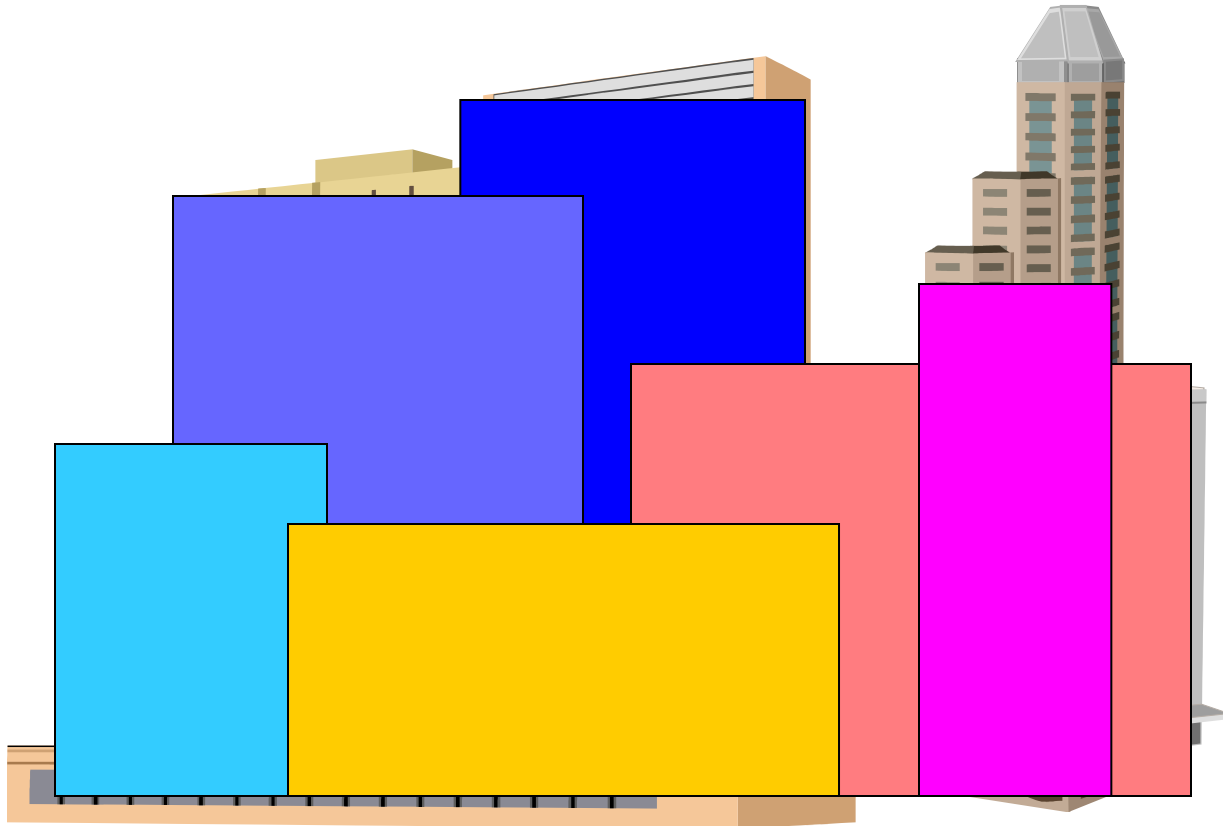
Schrijf een programma dat de **benodigde hoeveelheid** touw berekent voor **twee-dimensionale steden**. De onderkant wordt niet ingepakt.

Invoer. Op elke regel een gebouw, linkerkant, rechterkant en hoogte, elk tussen 0 en 10000.

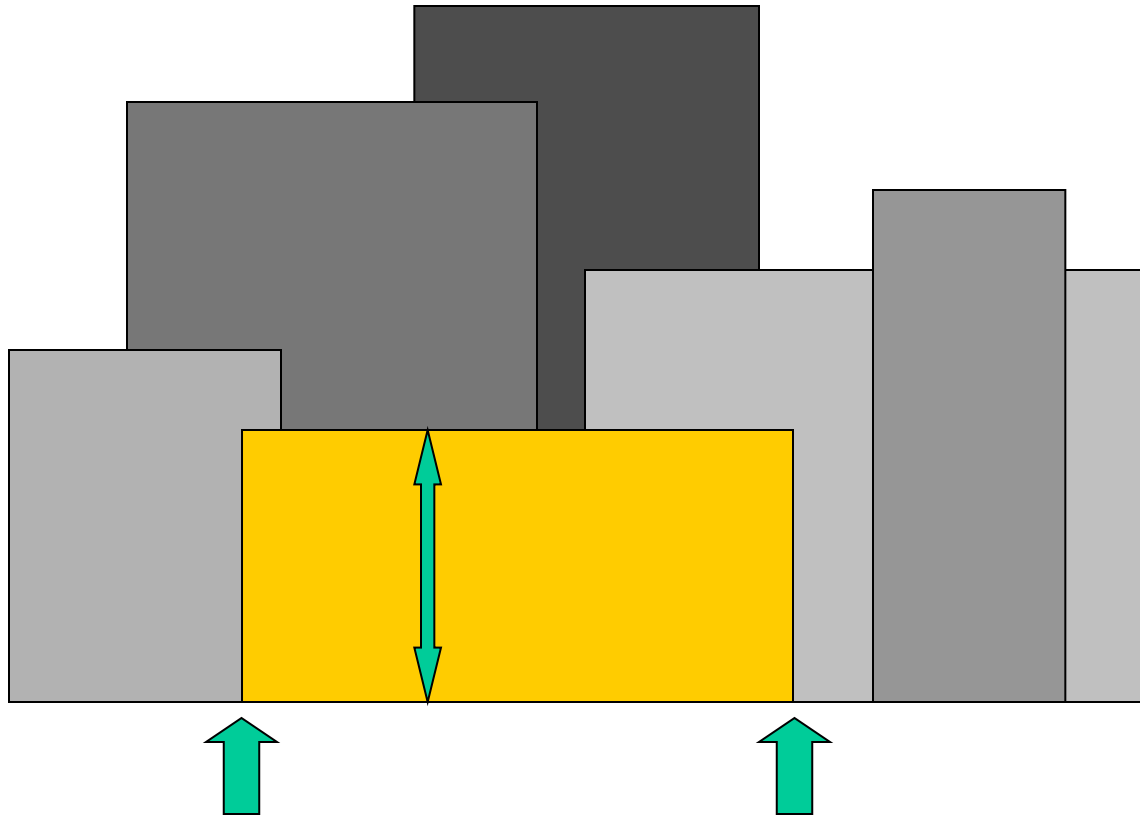
Uitvoer. Lengte in drie decimalen.



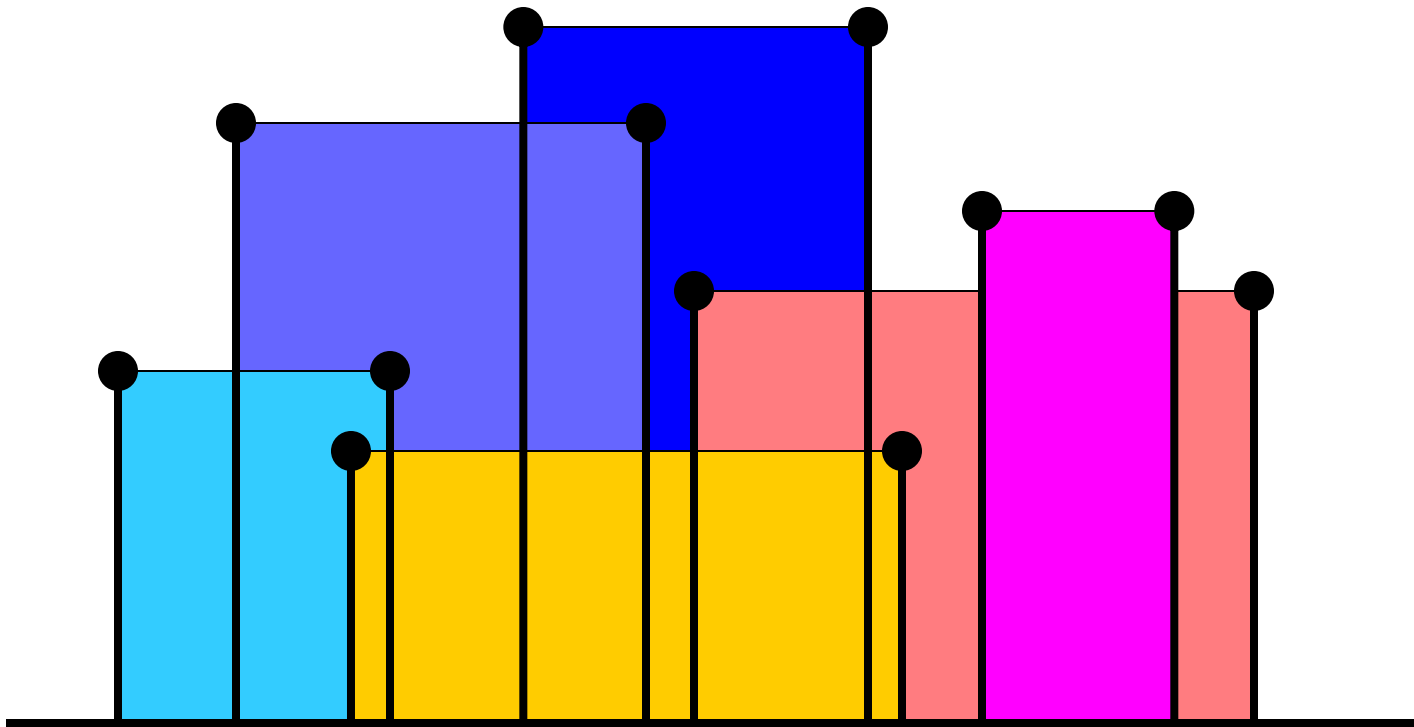
gegevens



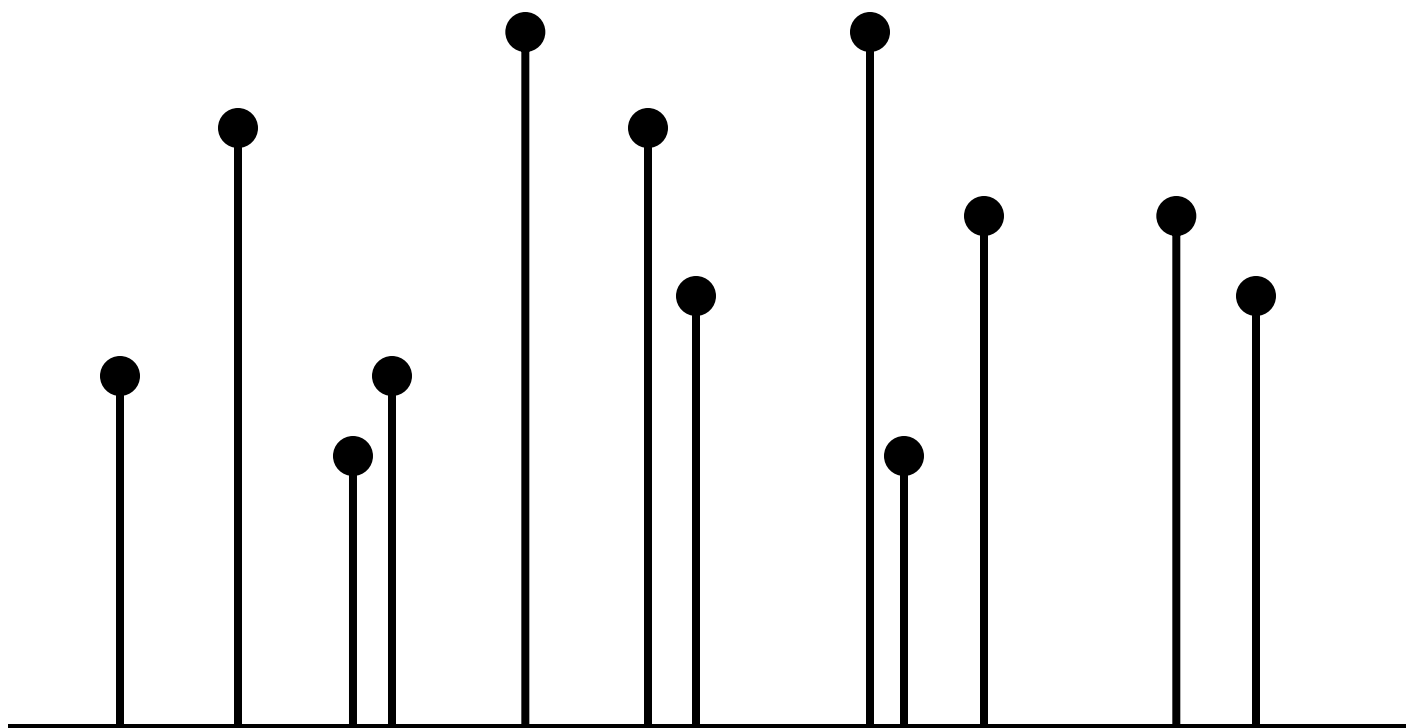
gegevens



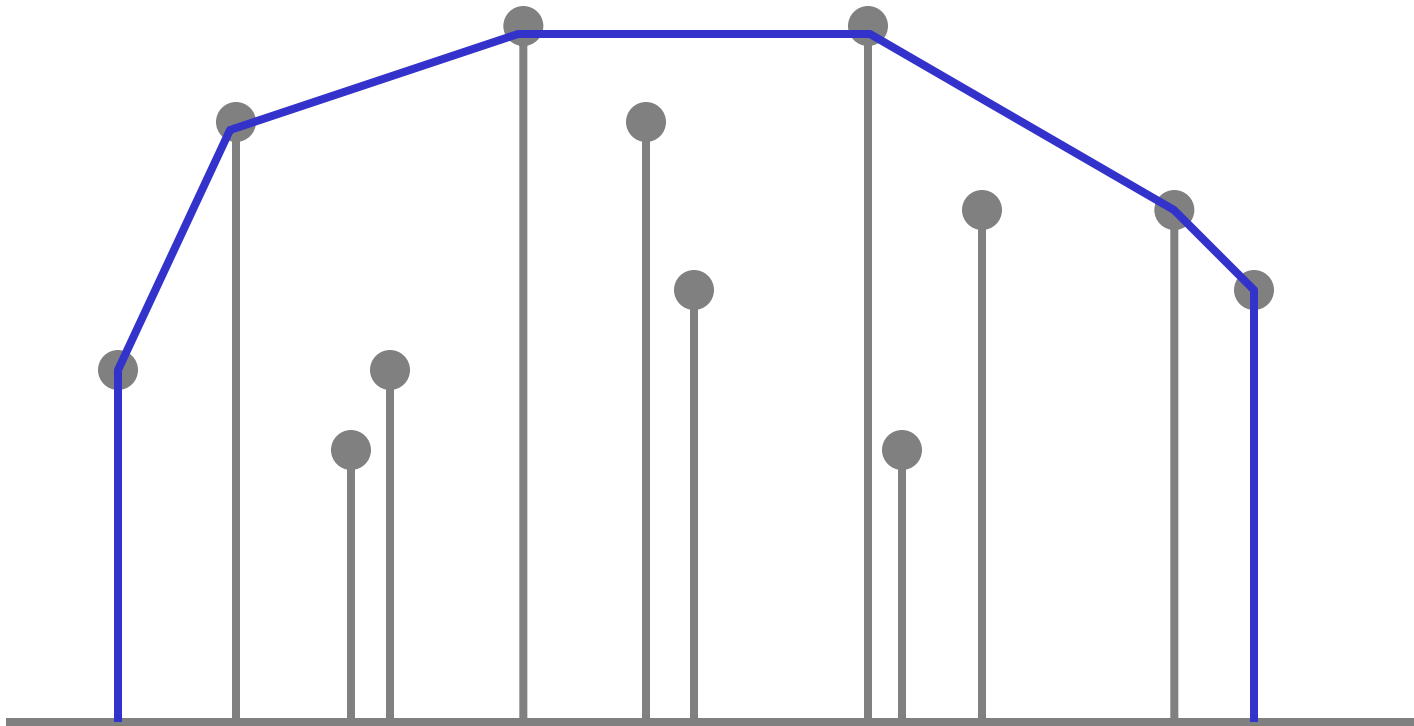
abstractie



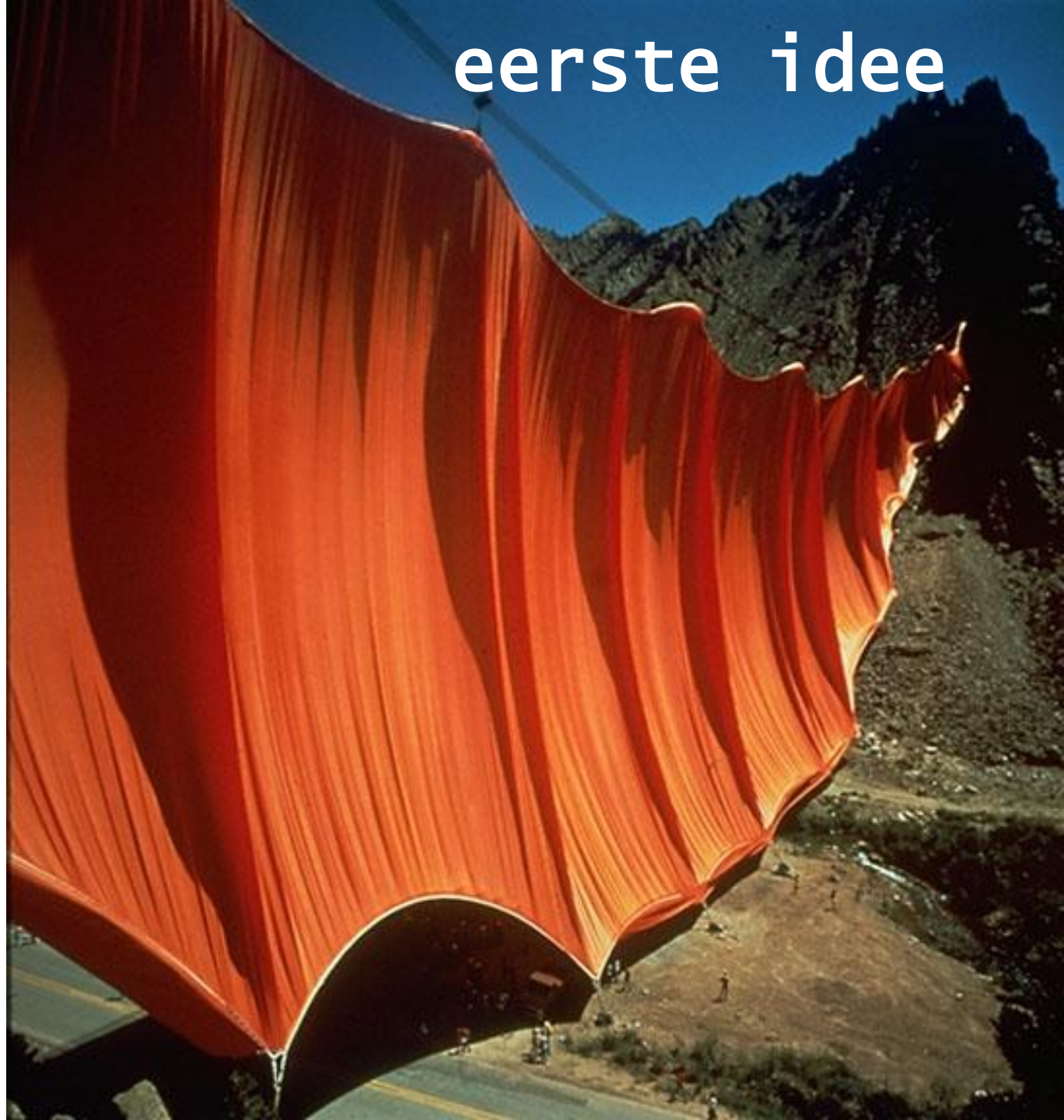
data



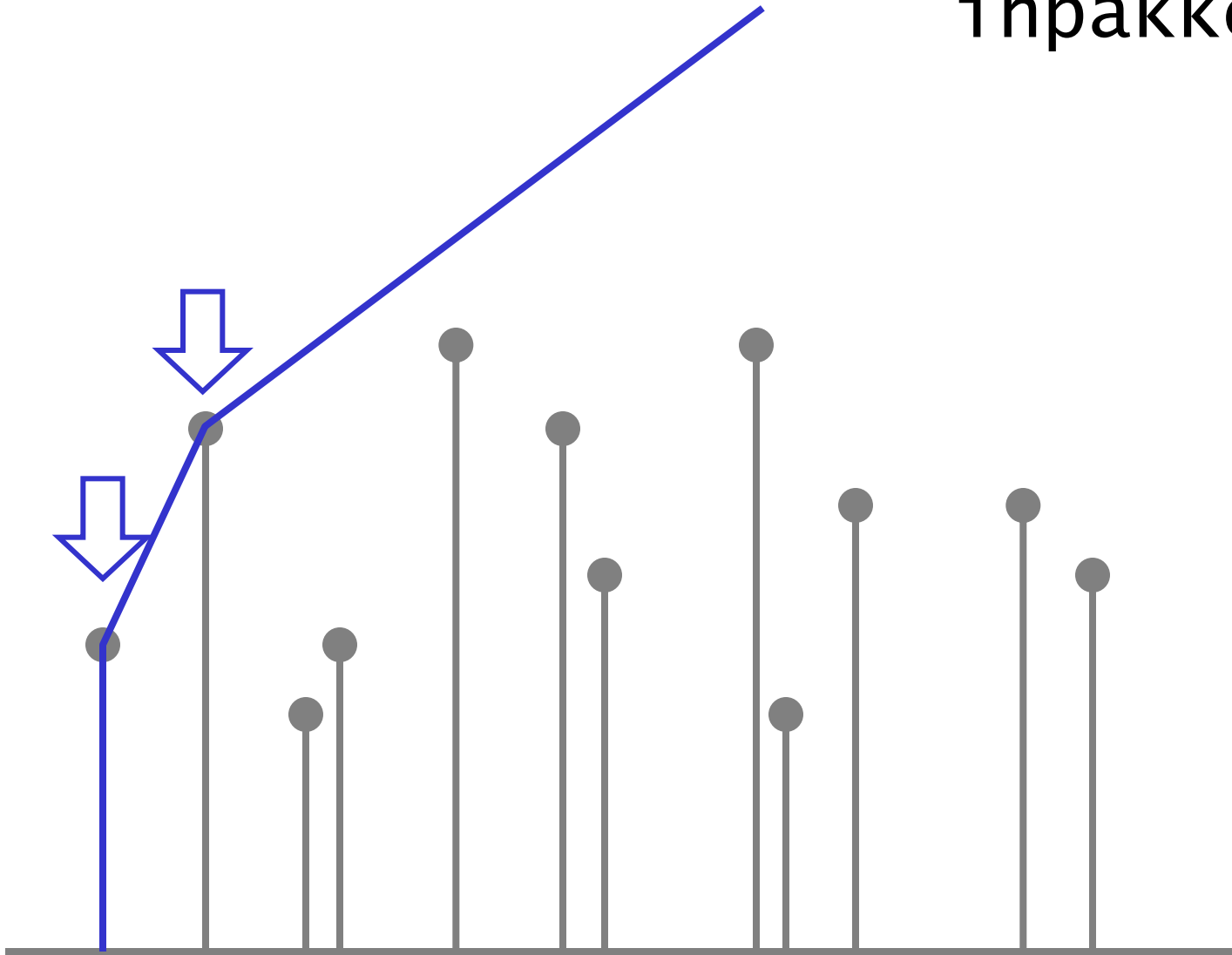
de oplossing



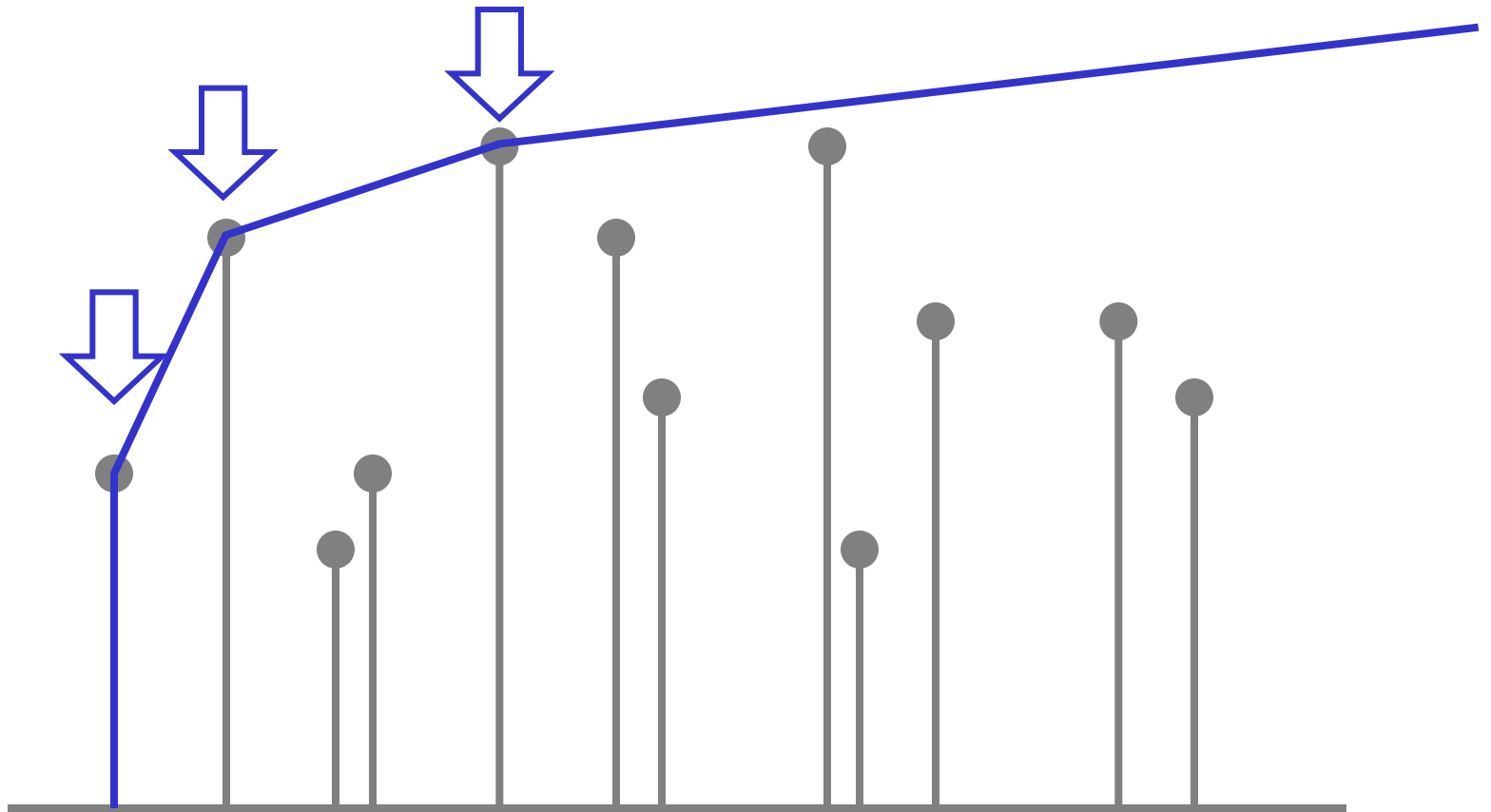
eerste idee



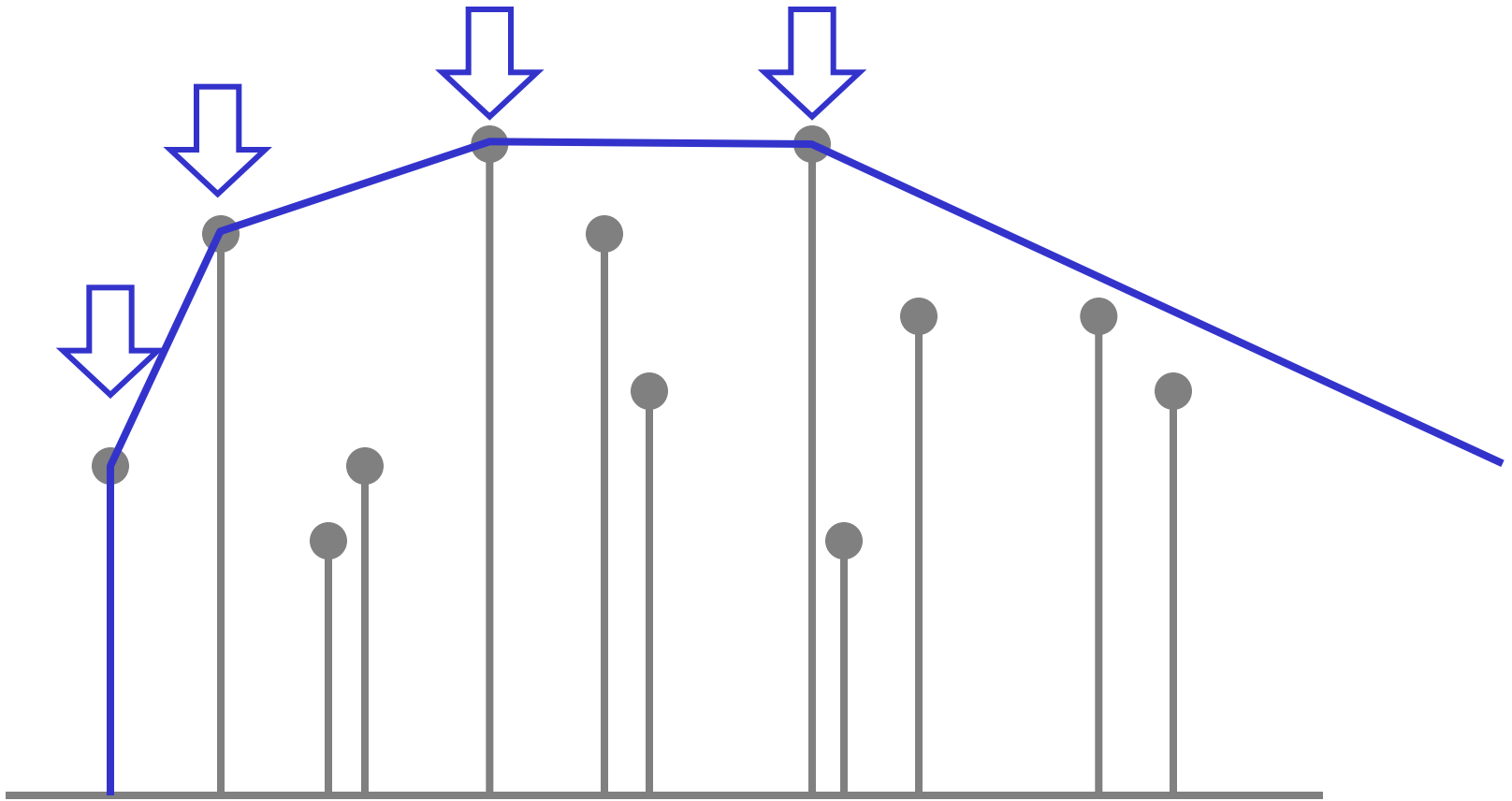
inpakken



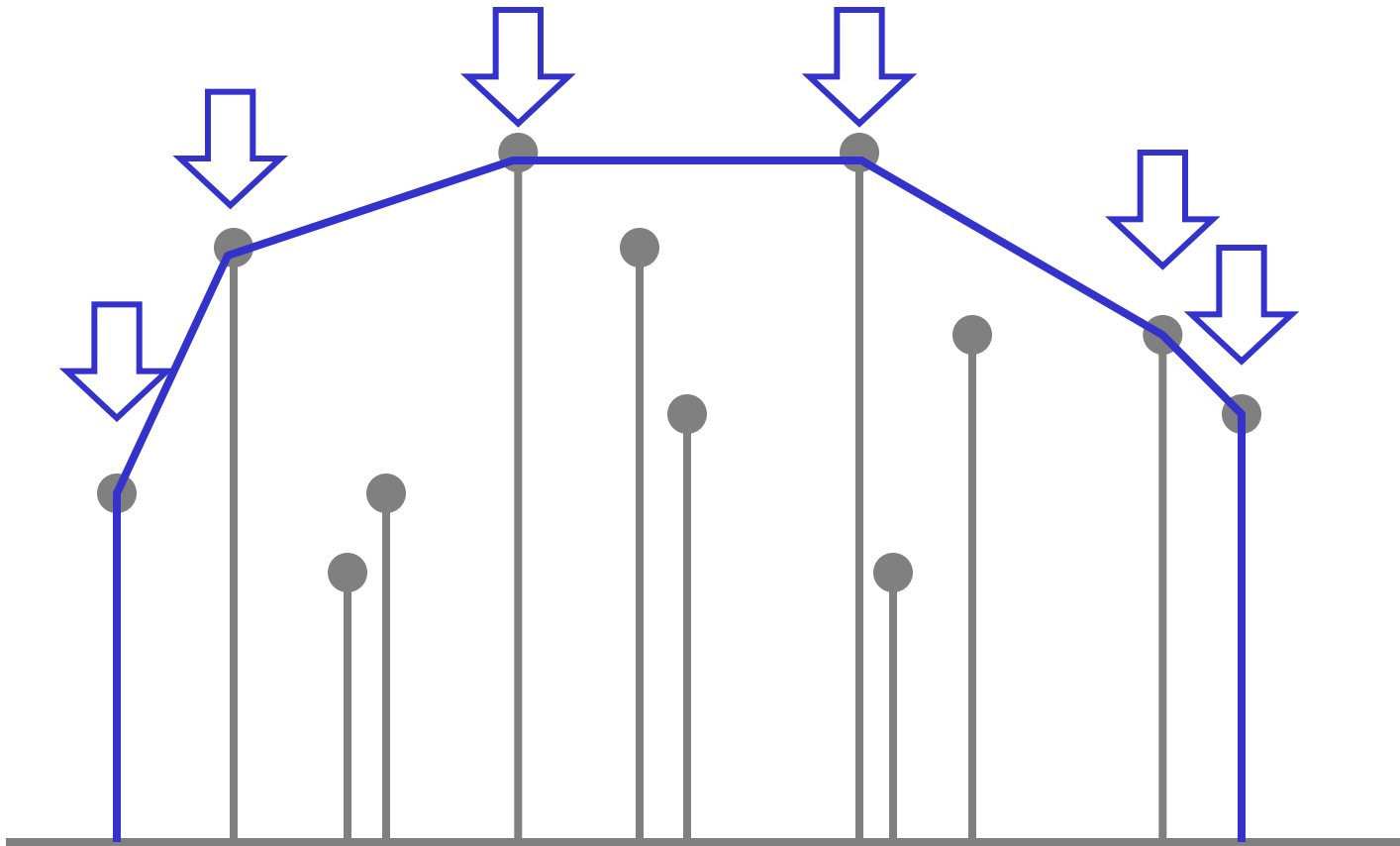
inpakken



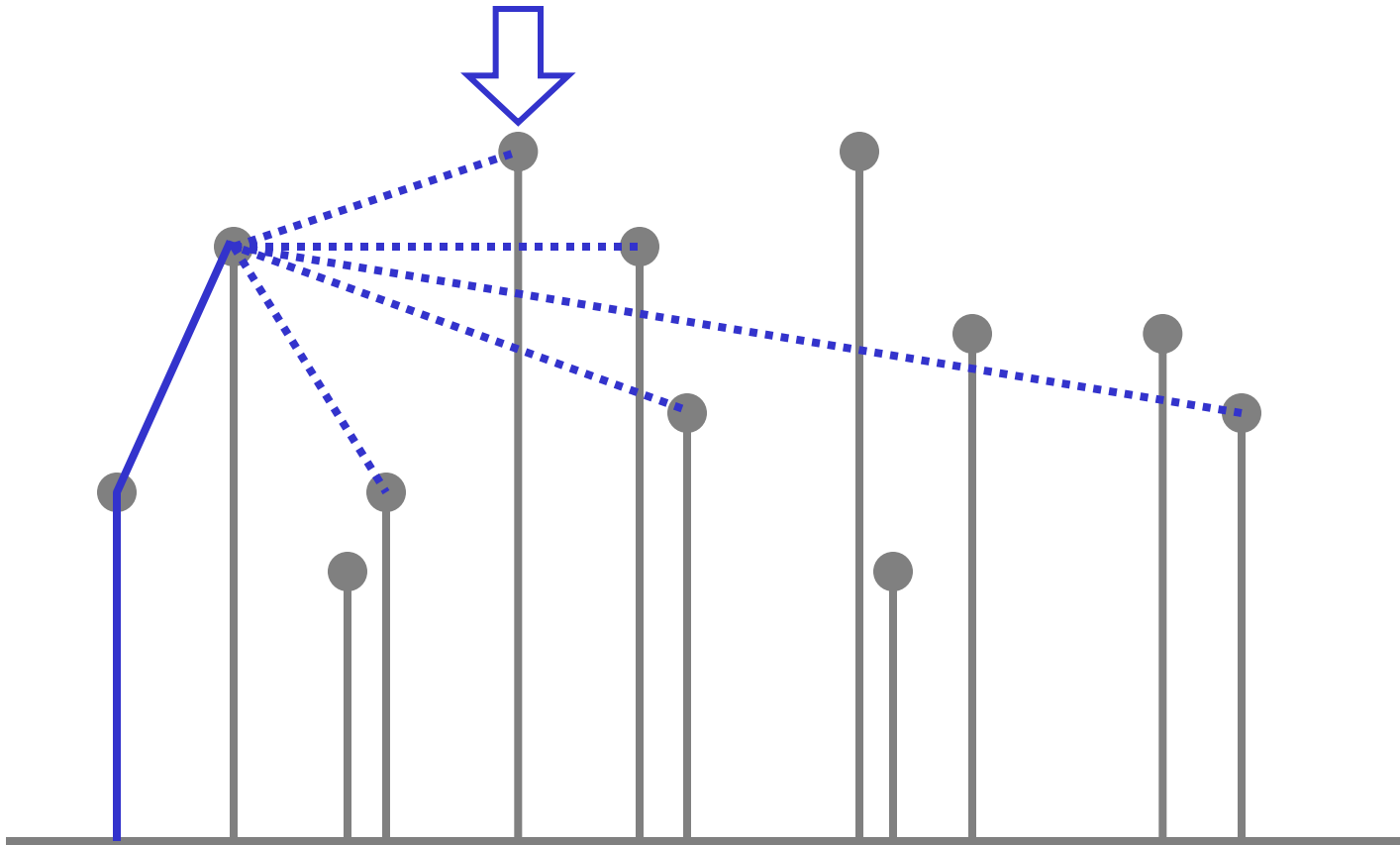
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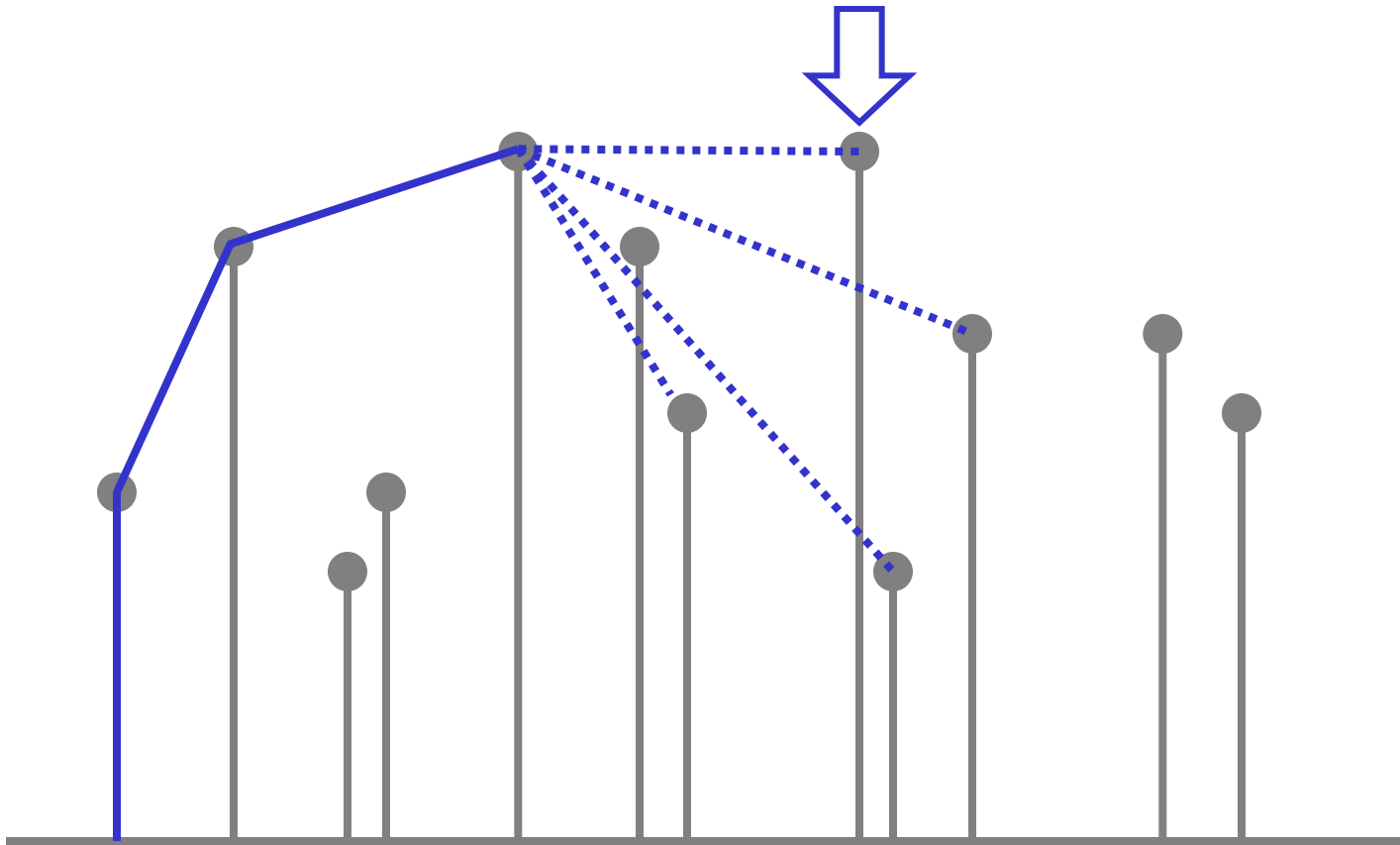
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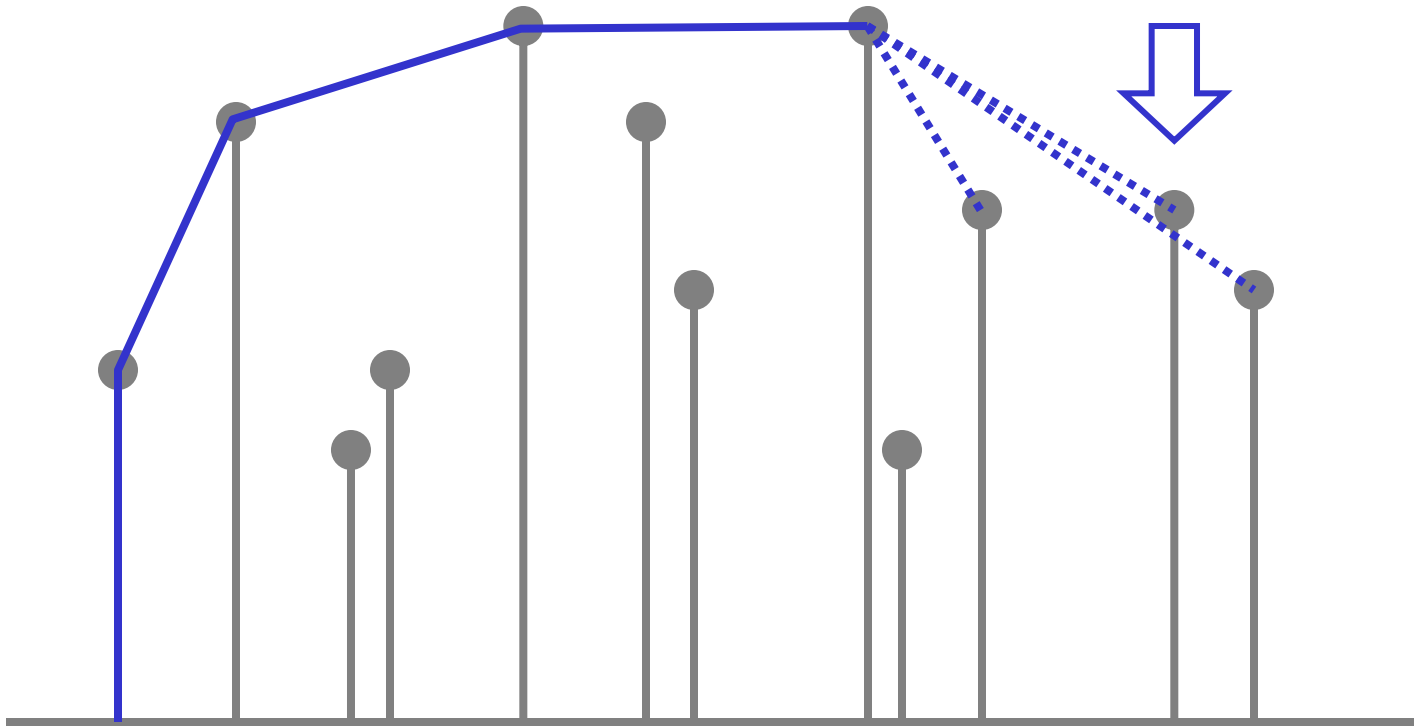
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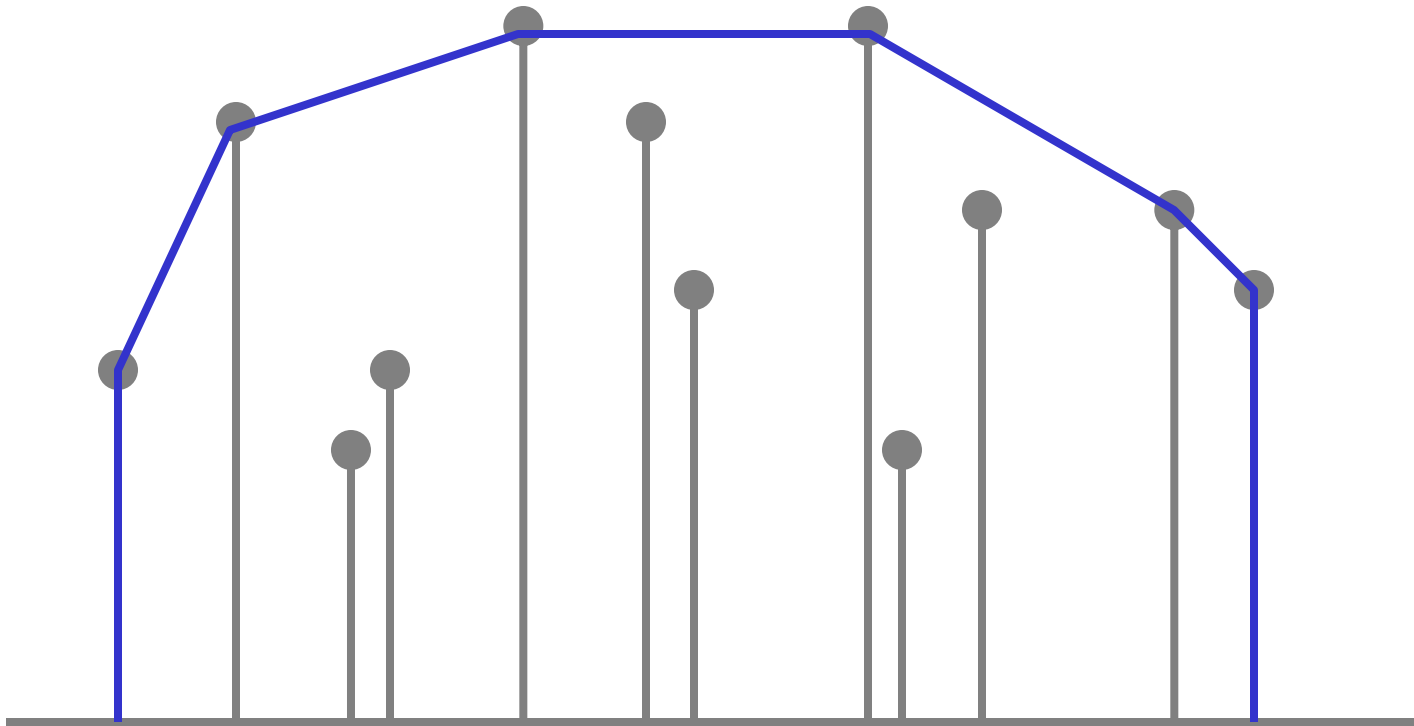
inpakken



inpakken



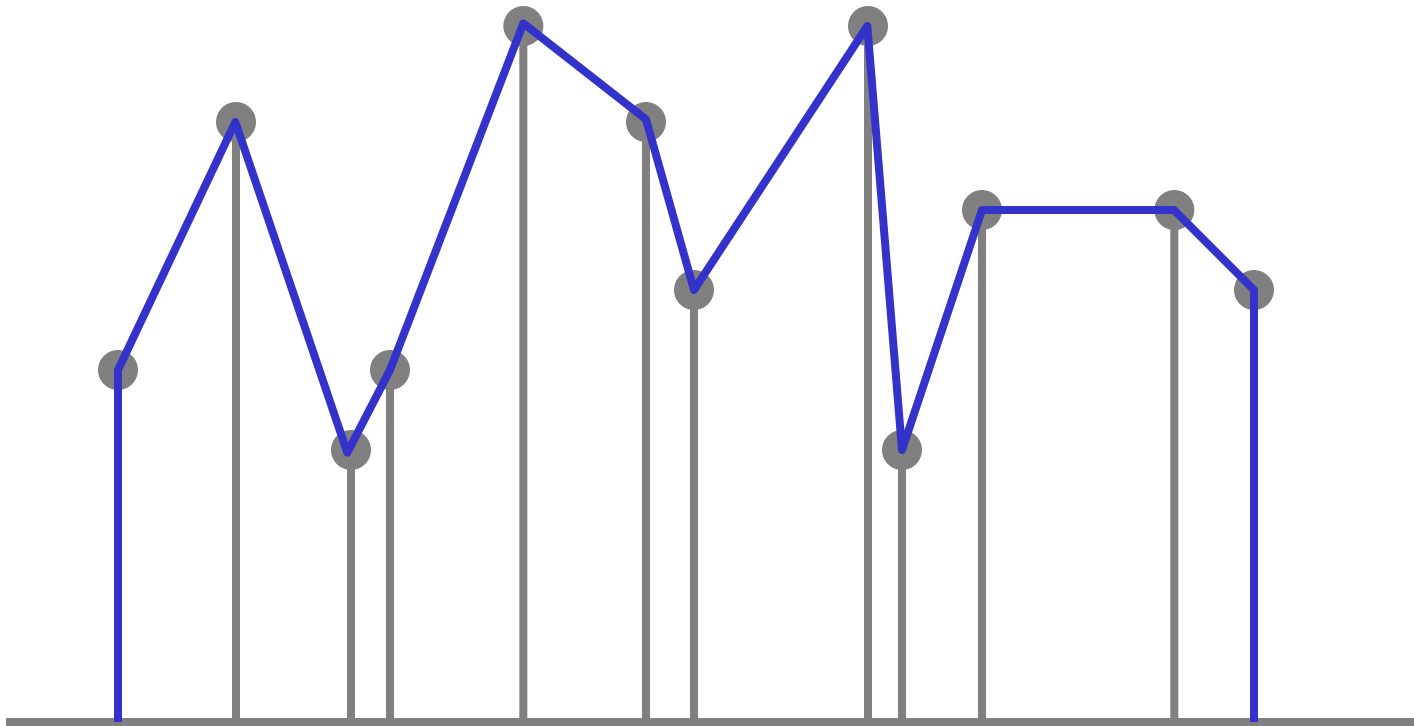
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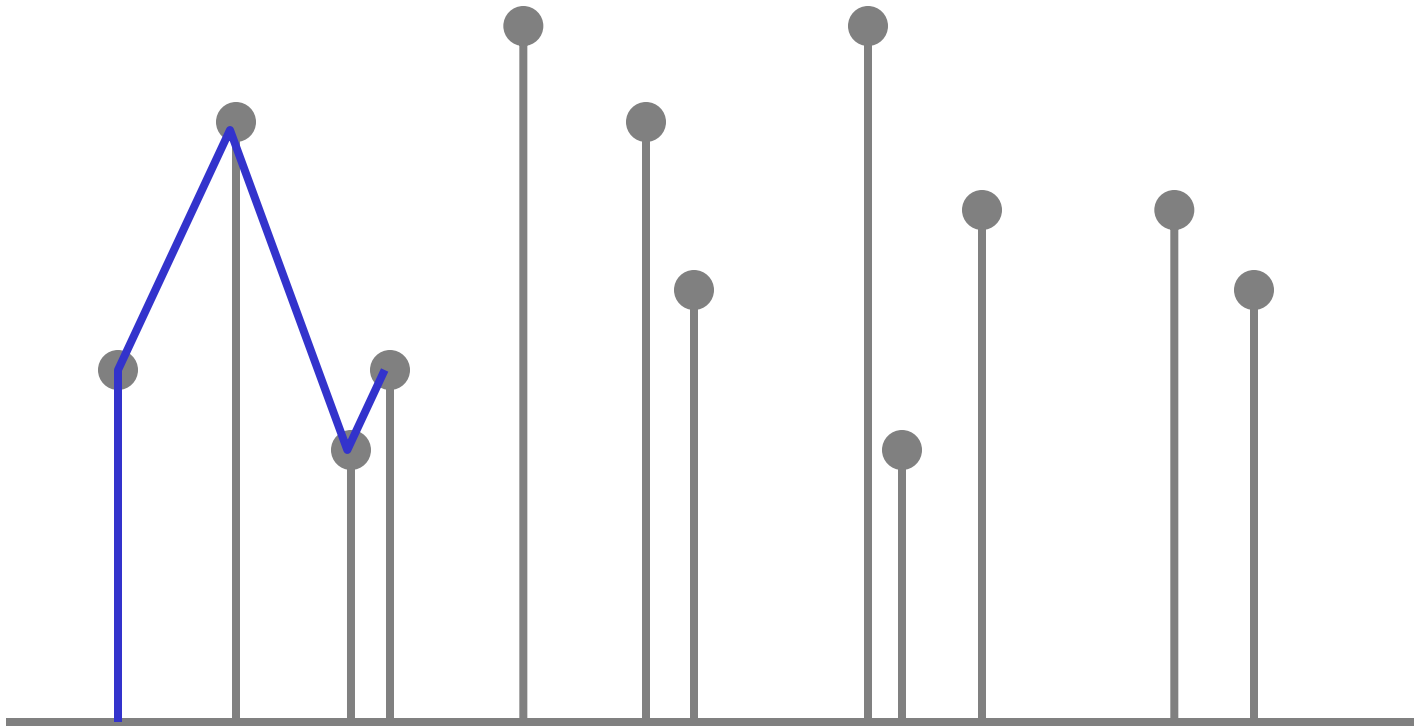
tweede idee



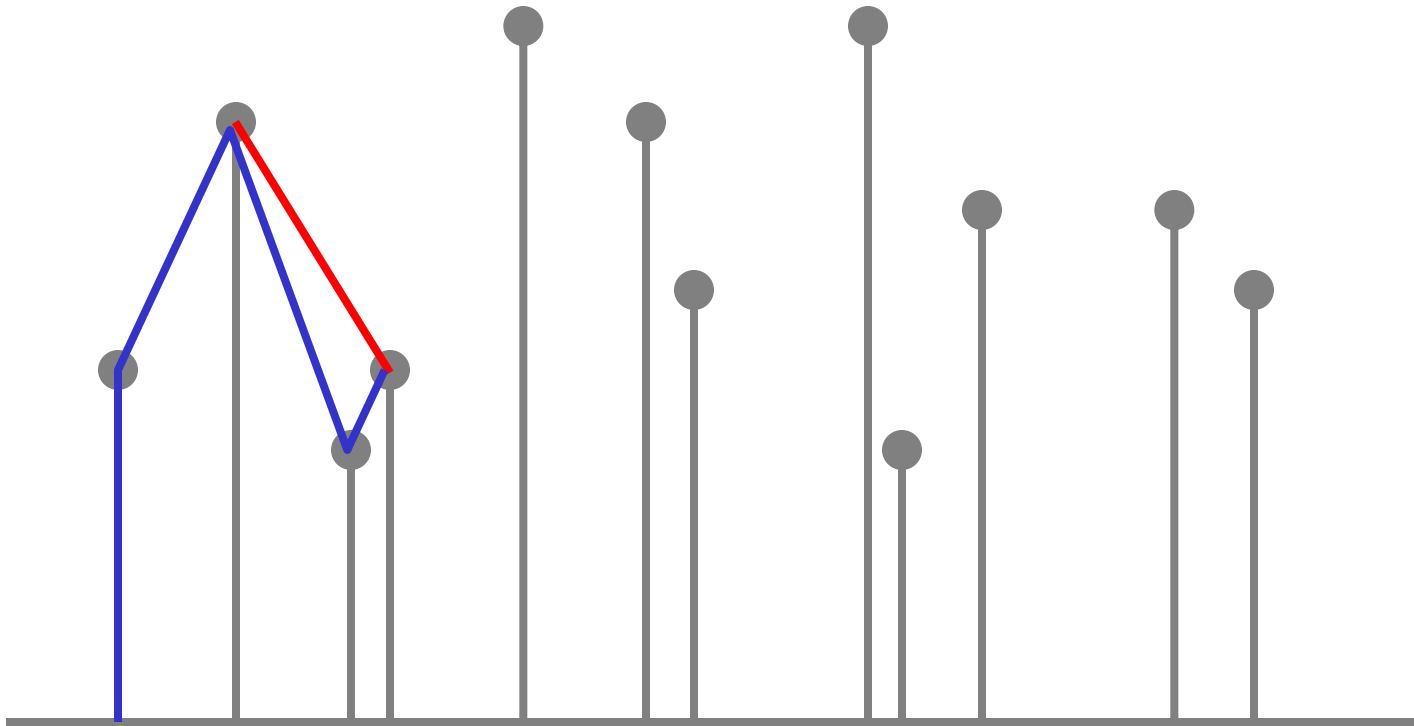
strak trekken



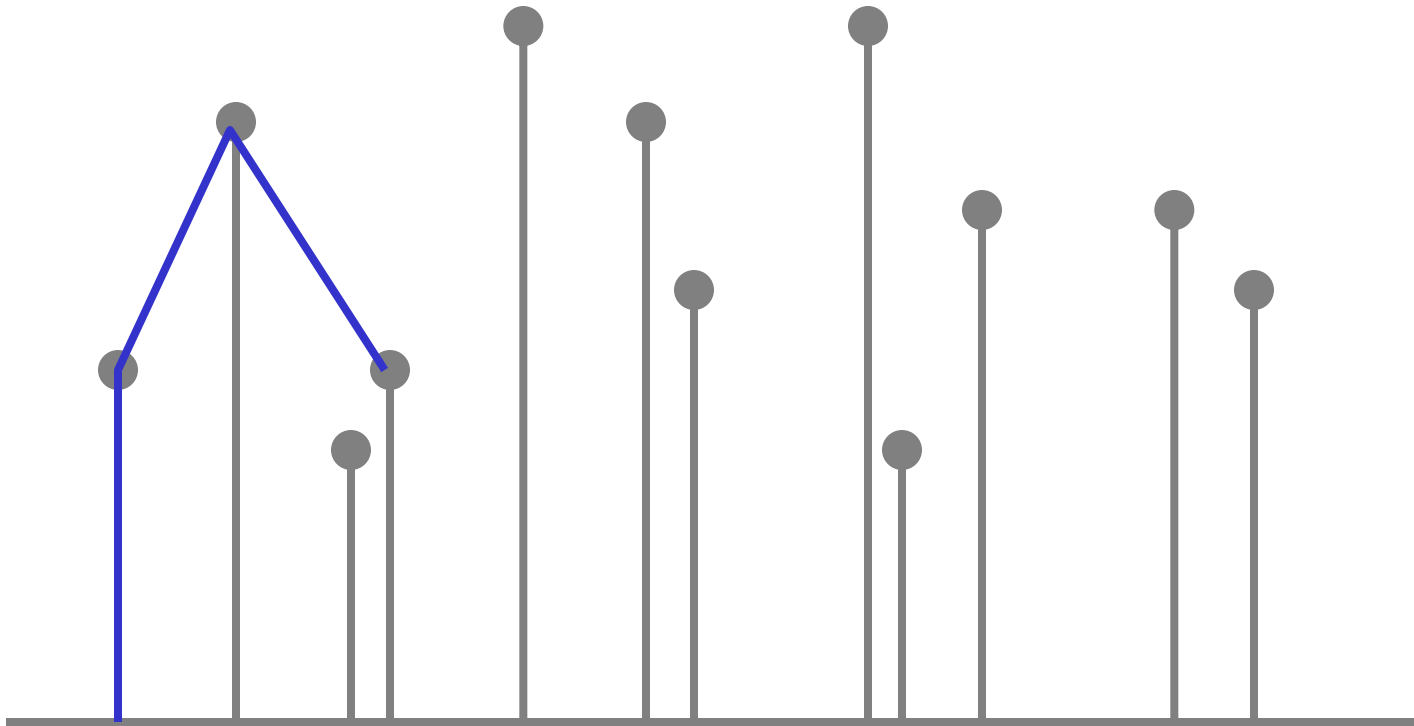
strak trekken



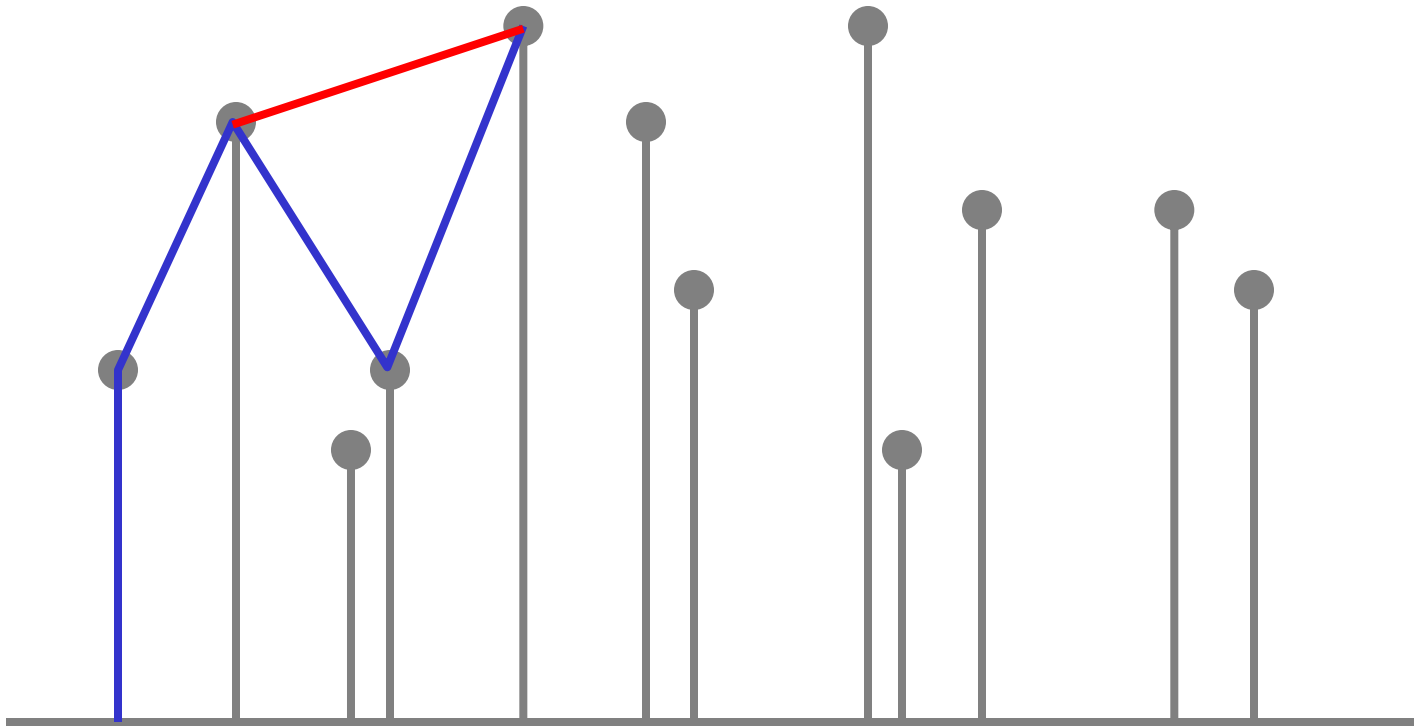
strak trekken



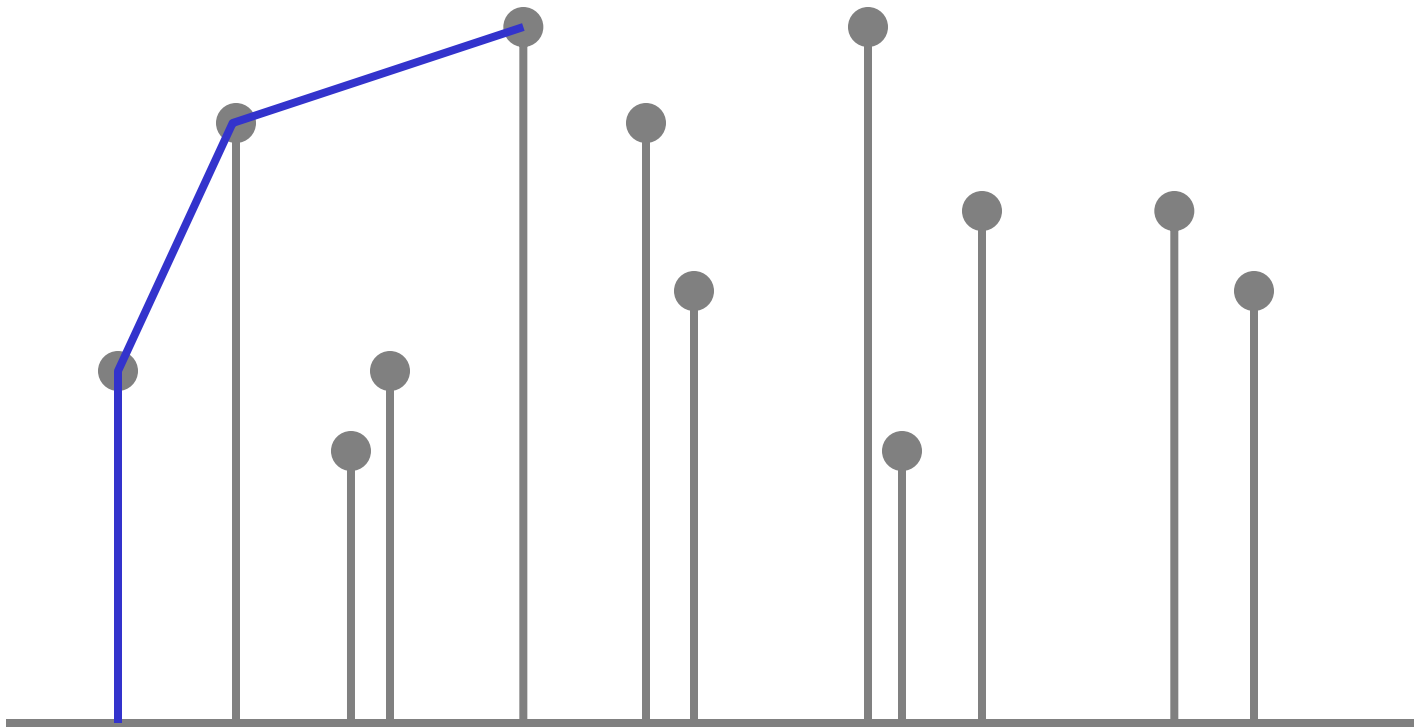
strak trekken



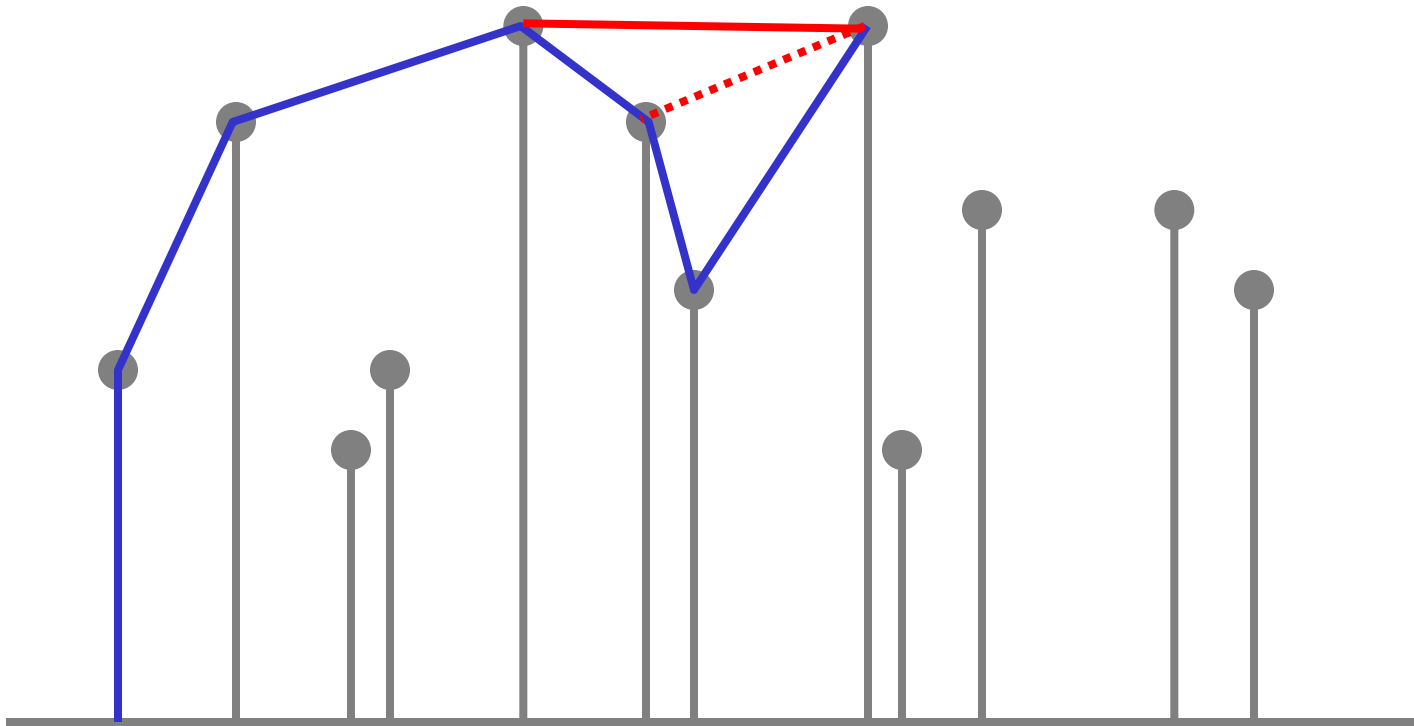
strak trekken



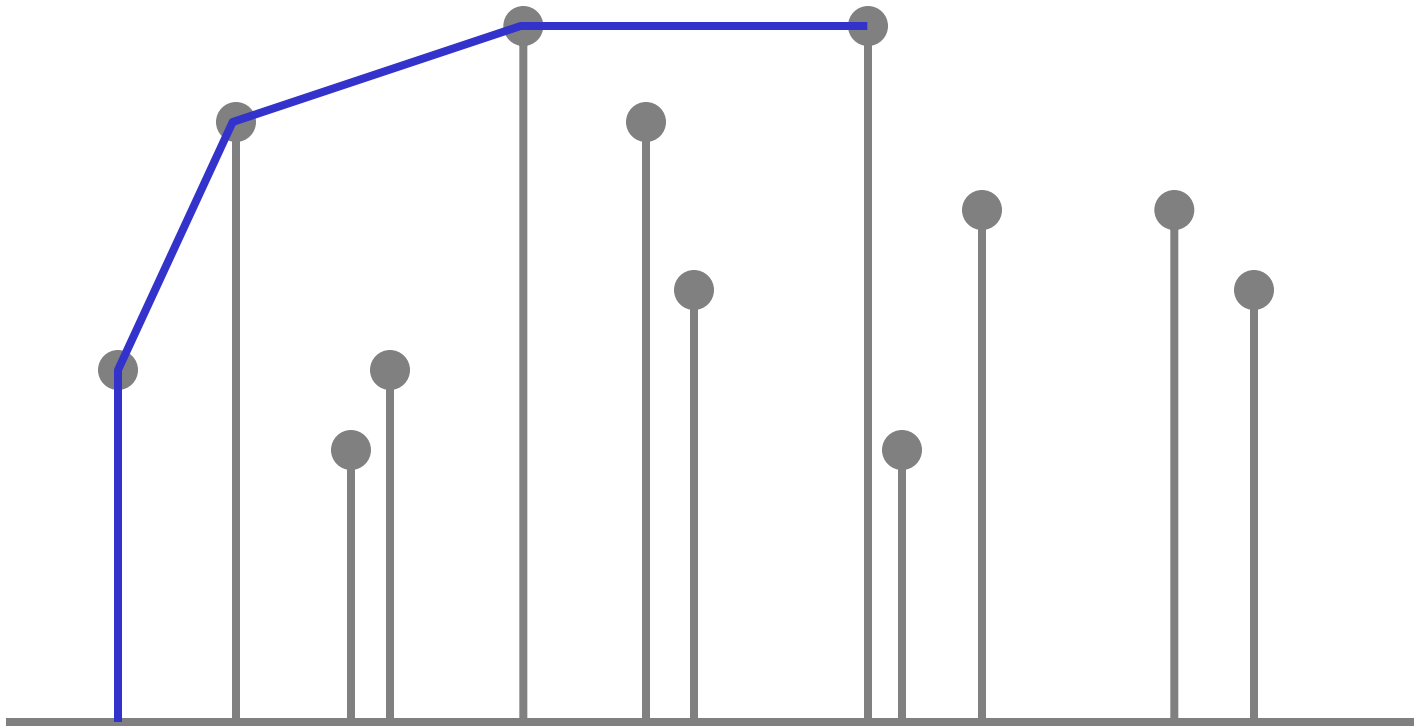
strak trekken



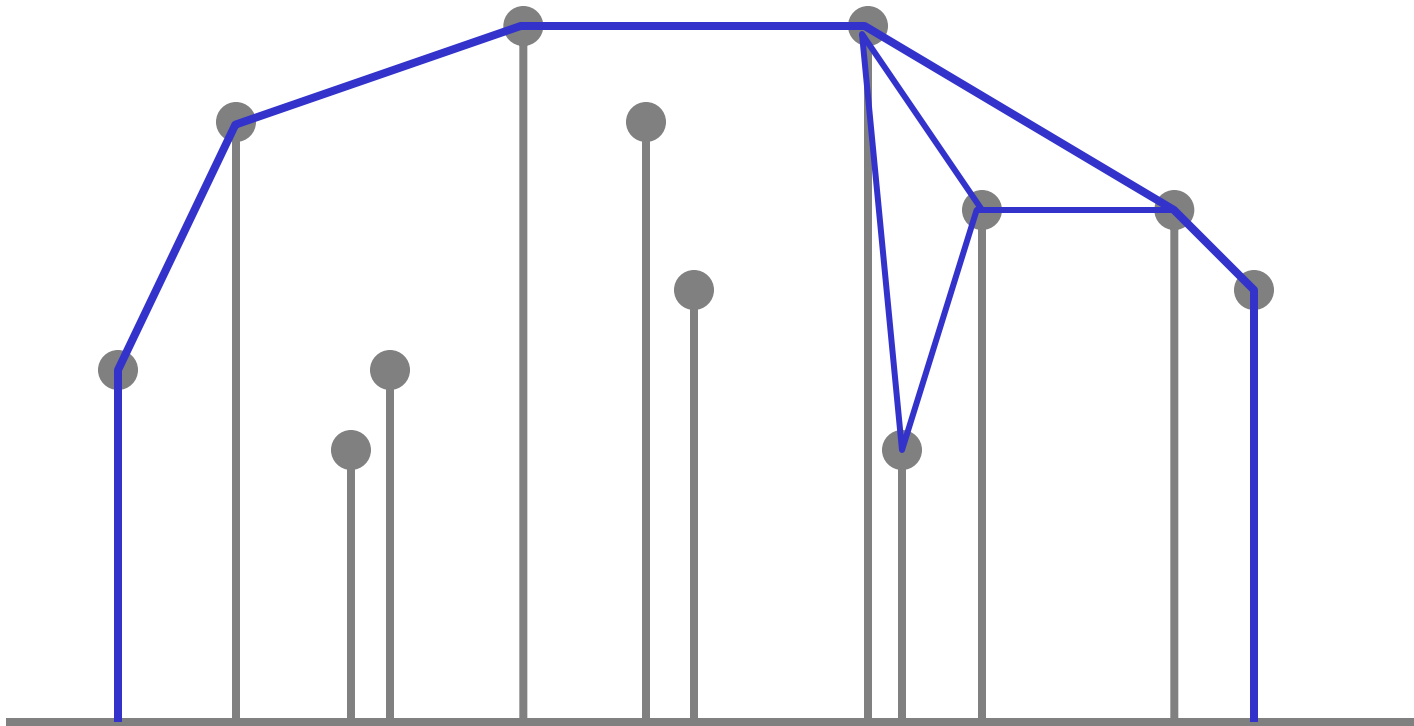
strak trekken



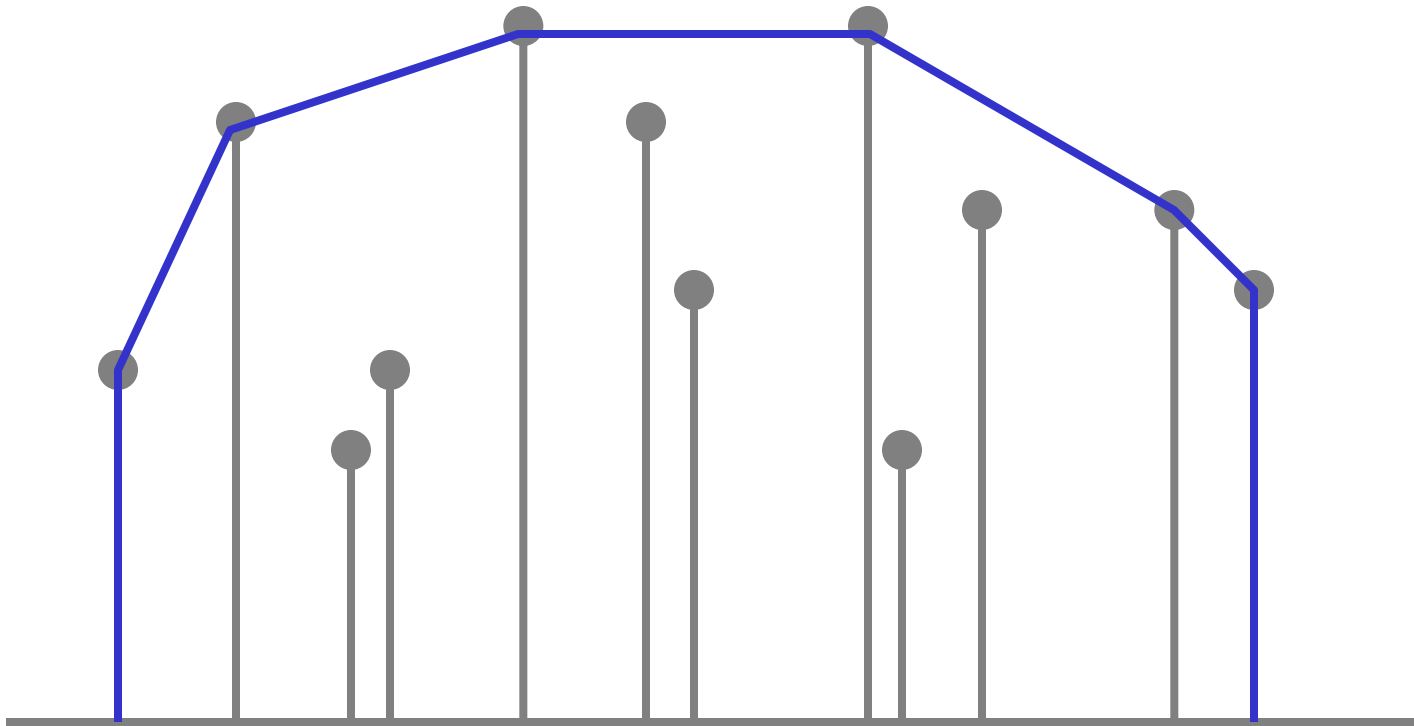
strak trekken



strak trekken



strak trekken



twee
manieren?

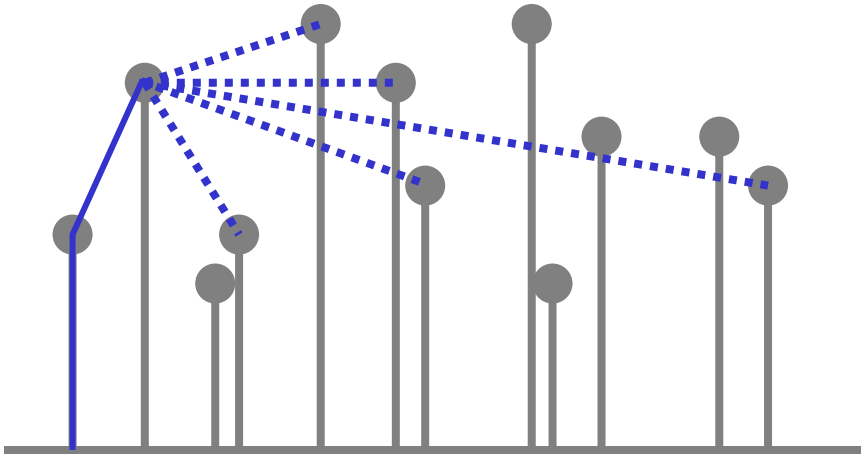


vergelijking

n punten

inpakken

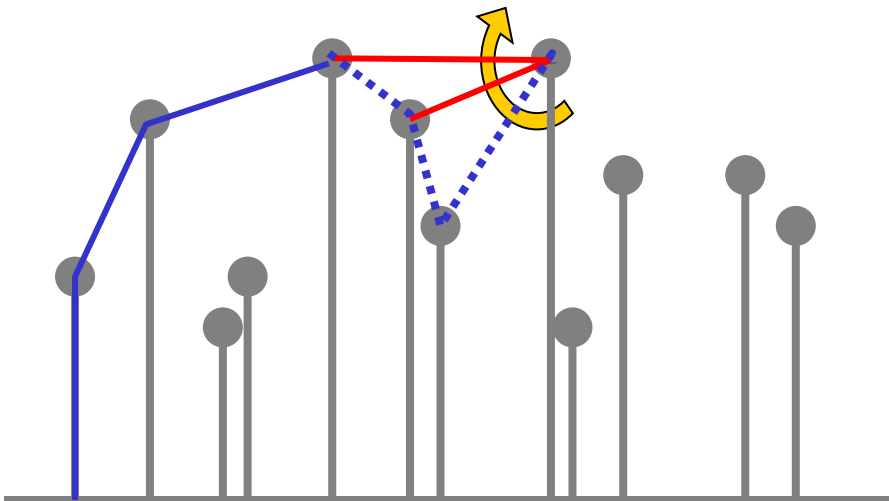
$$n+n-1+ \dots + 2+1 \\ \approx \frac{1}{2}n^2 \text{ stappen}$$



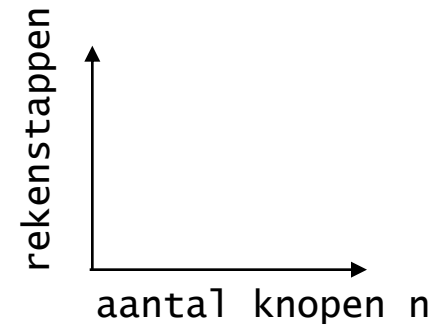
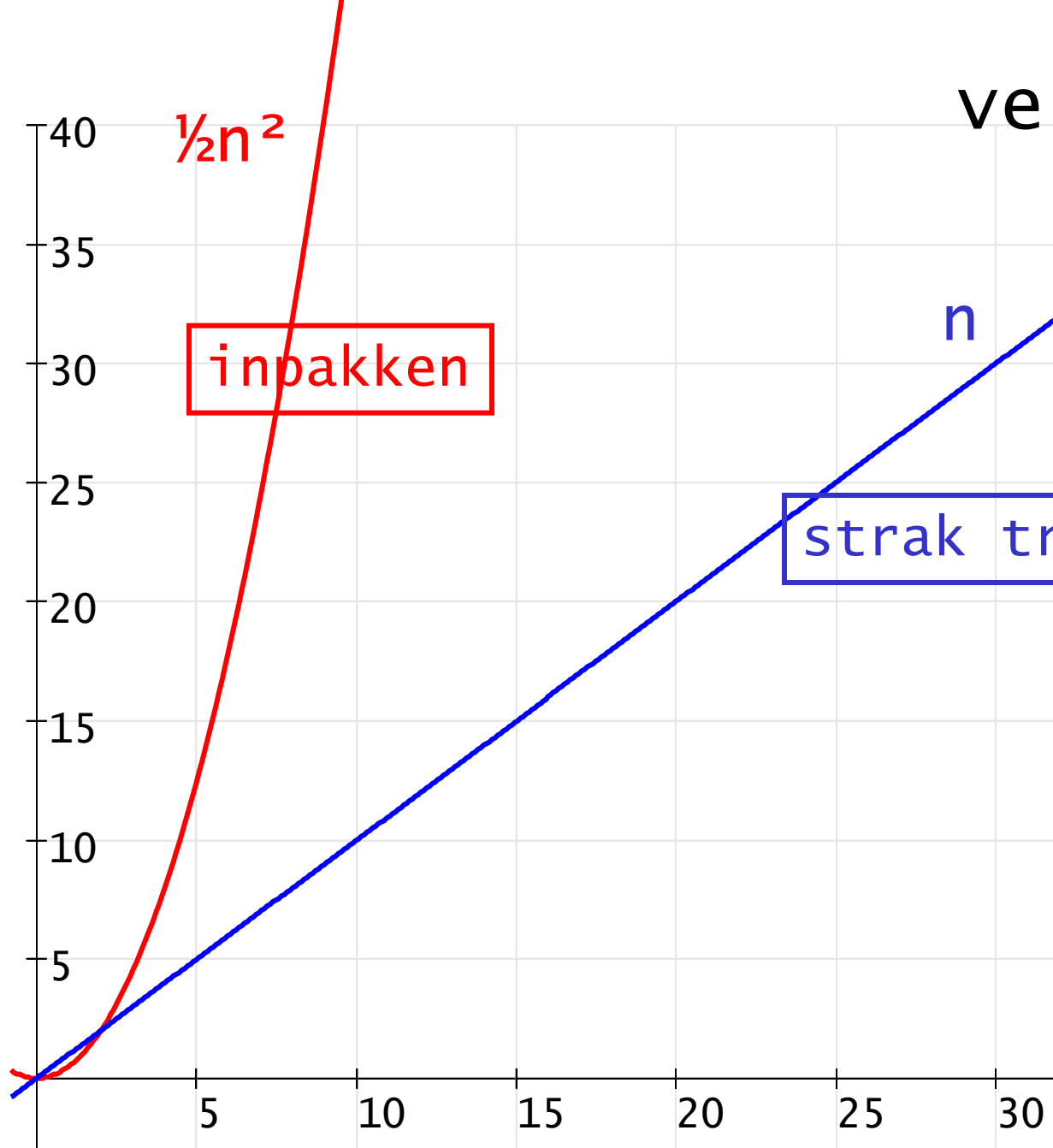
strak trekken

elke knoop max
één keer

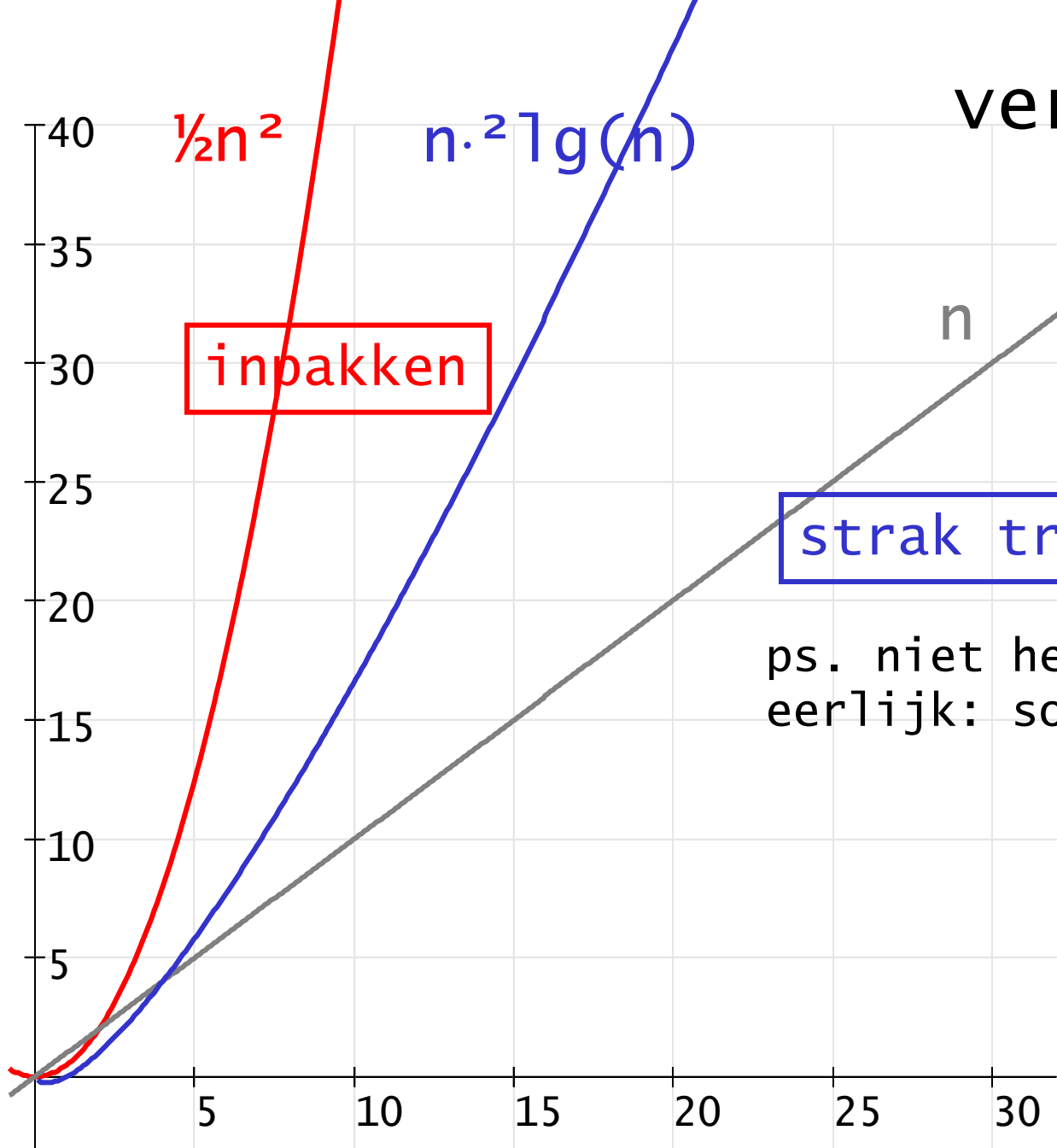
$$\approx n \text{ stappen}$$



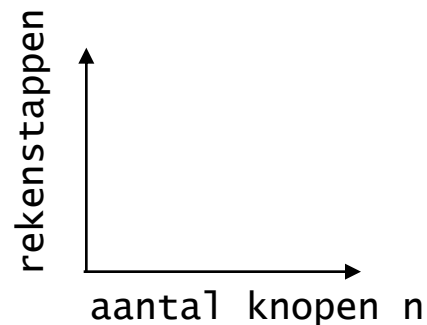
vergelijking



vergelijking

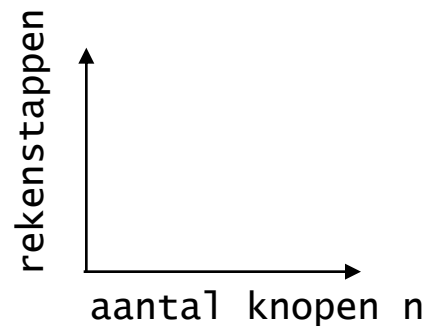
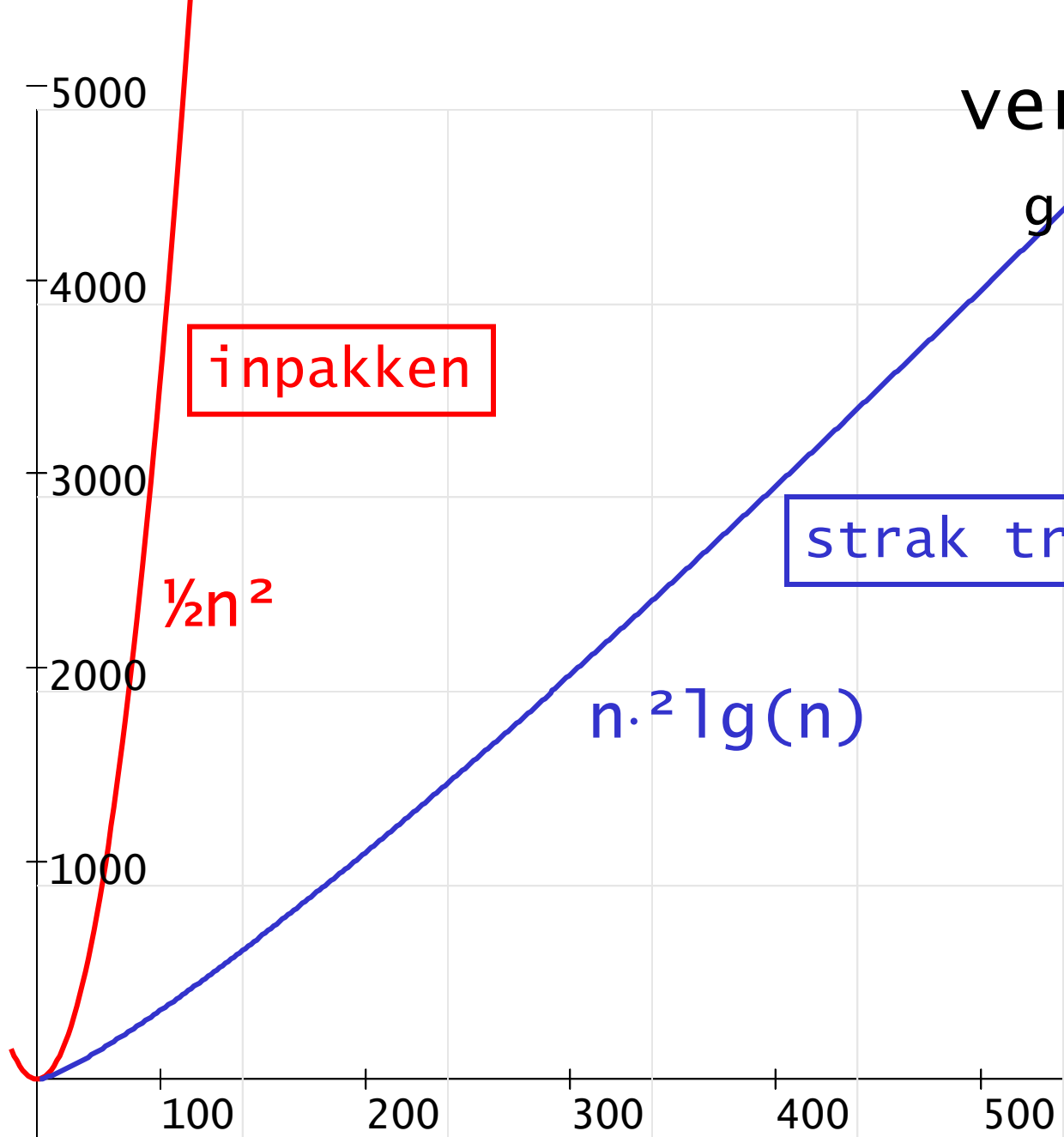


ps. niet helemaal eerlijk: sorteren



vergelijking

grotere schaal



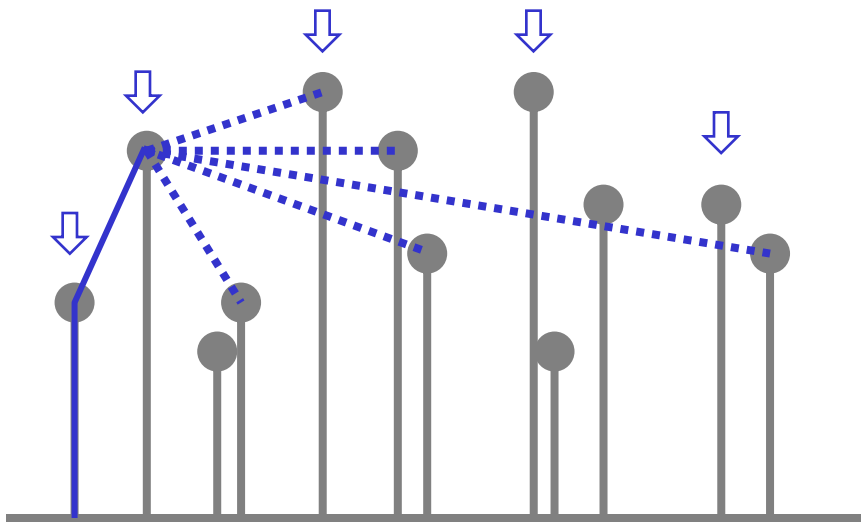


wetenschap?

toepassingen

- collision avoidance in robotics;
- determining whether a point lies amongst a set of other points;
- determining whether two sets of points 'overlap';
- finding the smallest rectangular box that will encompass a set of points; and
- finding a 'rough' description of the shape defined by a series of points.

opnieuw: vergelijking



n punten

inpakken

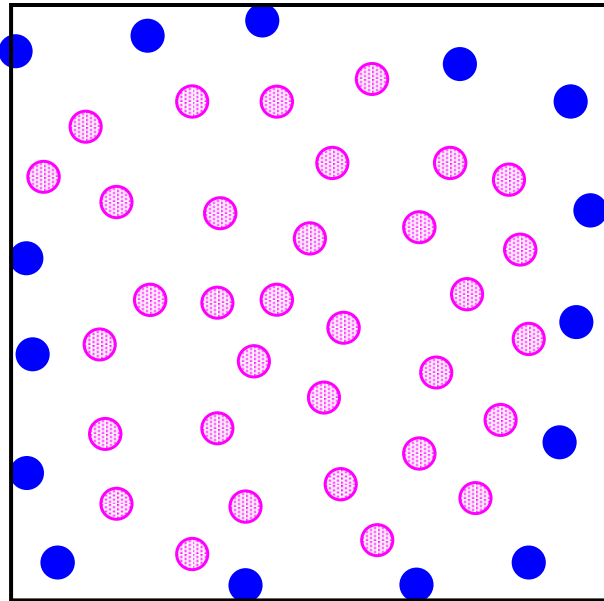
$$n+n-1+ \dots + 2+1$$
$$\approx \frac{1}{2}n^2 \text{ stappen}$$

niet elk punt inpakken !?

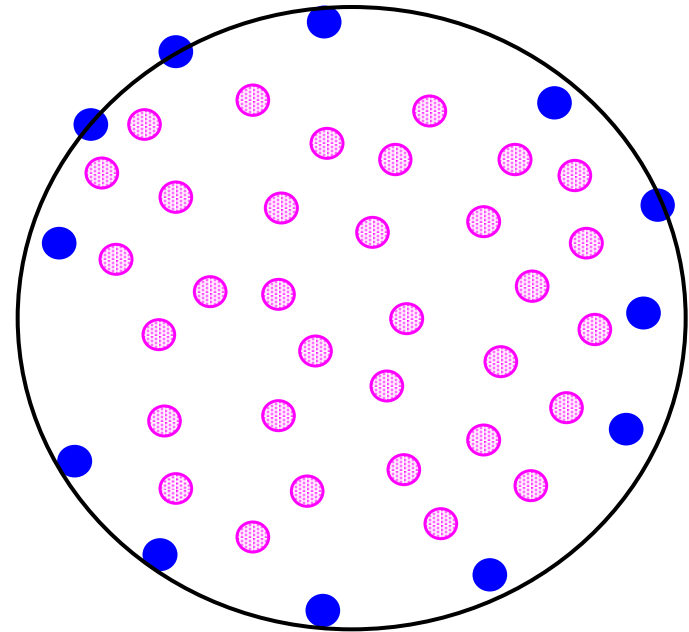
$\approx H \cdot n$ stappen
met H punten op hull

hoeveel is H ?

$\approx H \cdot n$ stappen

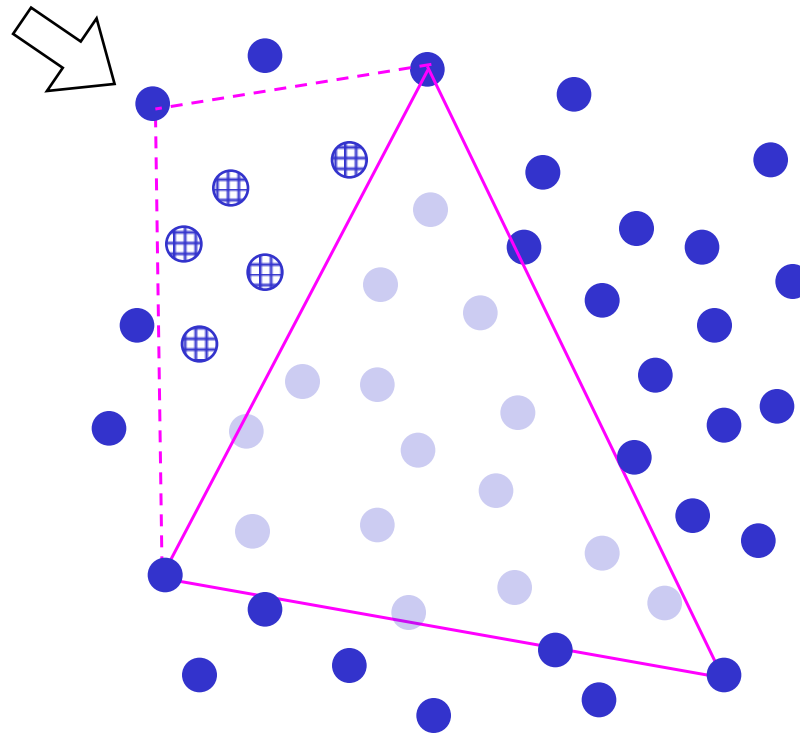


$H \approx \log n$



$H \approx n^{1/3}$

quick hull



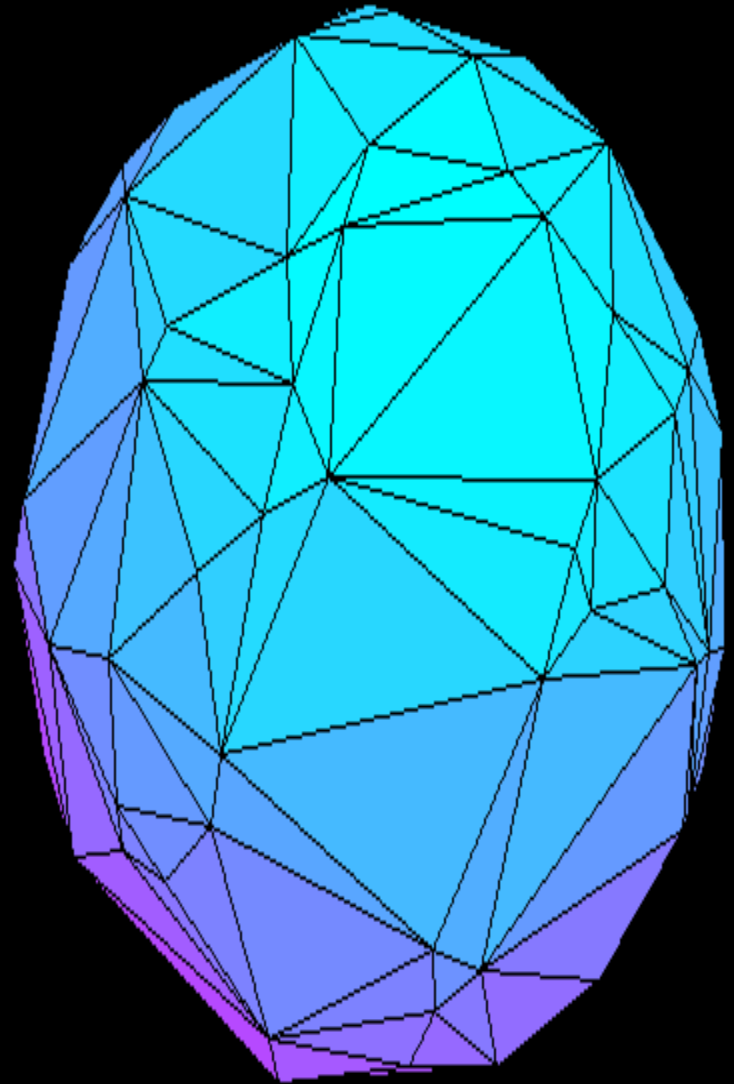
niet gegarandeerd snel

convex hull algoritmes

- *Jarvis' march*
‘inpakken’
- *Graham's scan*
‘strak trekken’
- *Quick hull*
heuristieken

toepassingen

- robotics
- beeldinformatica





The Gates (project for South End, Bronx, New York City) Central Park South, 5th Ave, Central Park West, Cathedral Pkwy, West 110th St.

bedankt ...
en tot ziens



<http://www.liacs.nl/>

Photo's Wolfgang Volz
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