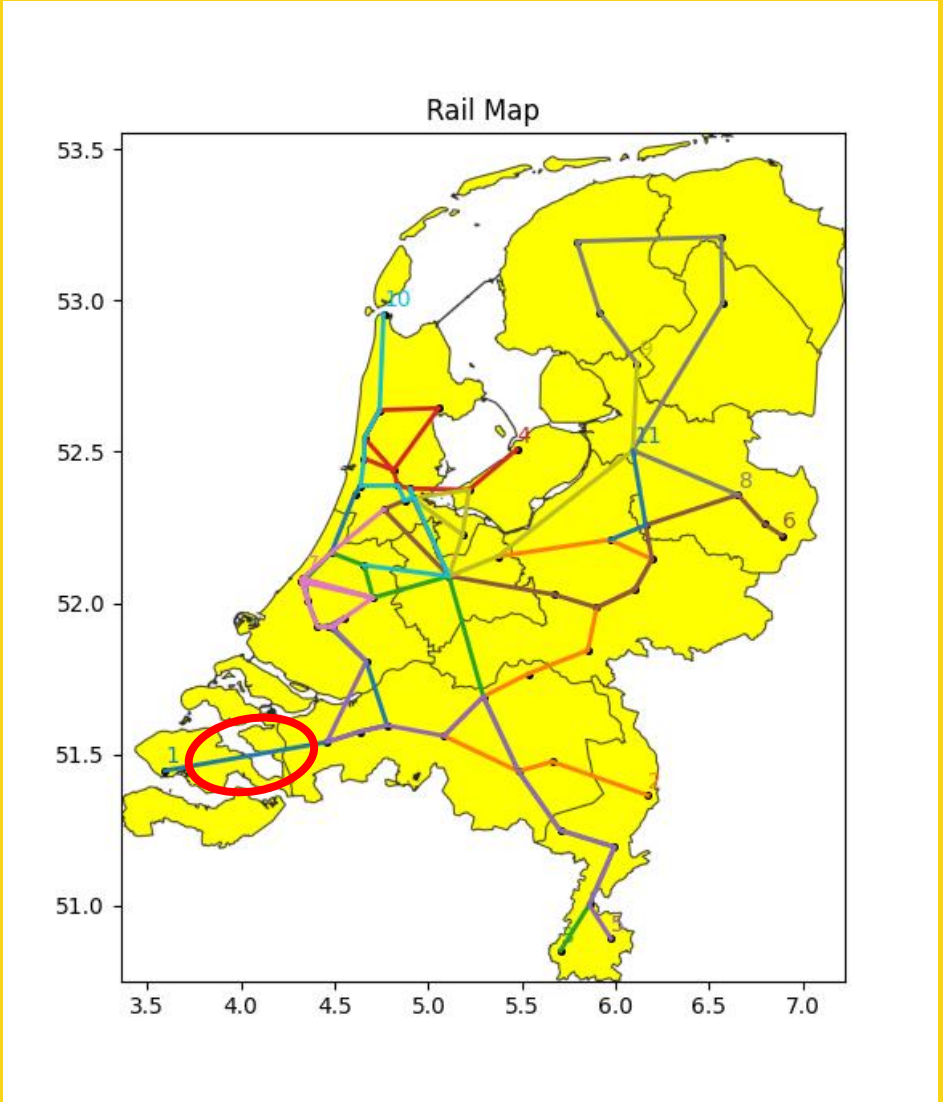
Railgorithms

Sjoerd Dronkers, Jochem van Gaalen & Liam Adam

Wat houdt onze case in?

- Traject
- Tijdsspanne
- Lijnvoering
- Gedekte verbinding
- Totaal aantal gereden verbindingen



Optimalisatieprobleem

$$k = 10000 * p - (T * 100 + Min)$$

$k =$ score

$p = \frac{\text{gedekte verbindingen}}{\text{totale verbindingen}}$

$T =$ trajecten

$Min =$ totale duur van alle trajecten in minuten

Maximaal haalbare score: 7549

Optimalisatieprobleem

- $r = 61$ (stations)
- $n = \frac{89\ verbindingen * 2}{61\ stations} = 2{,}92$

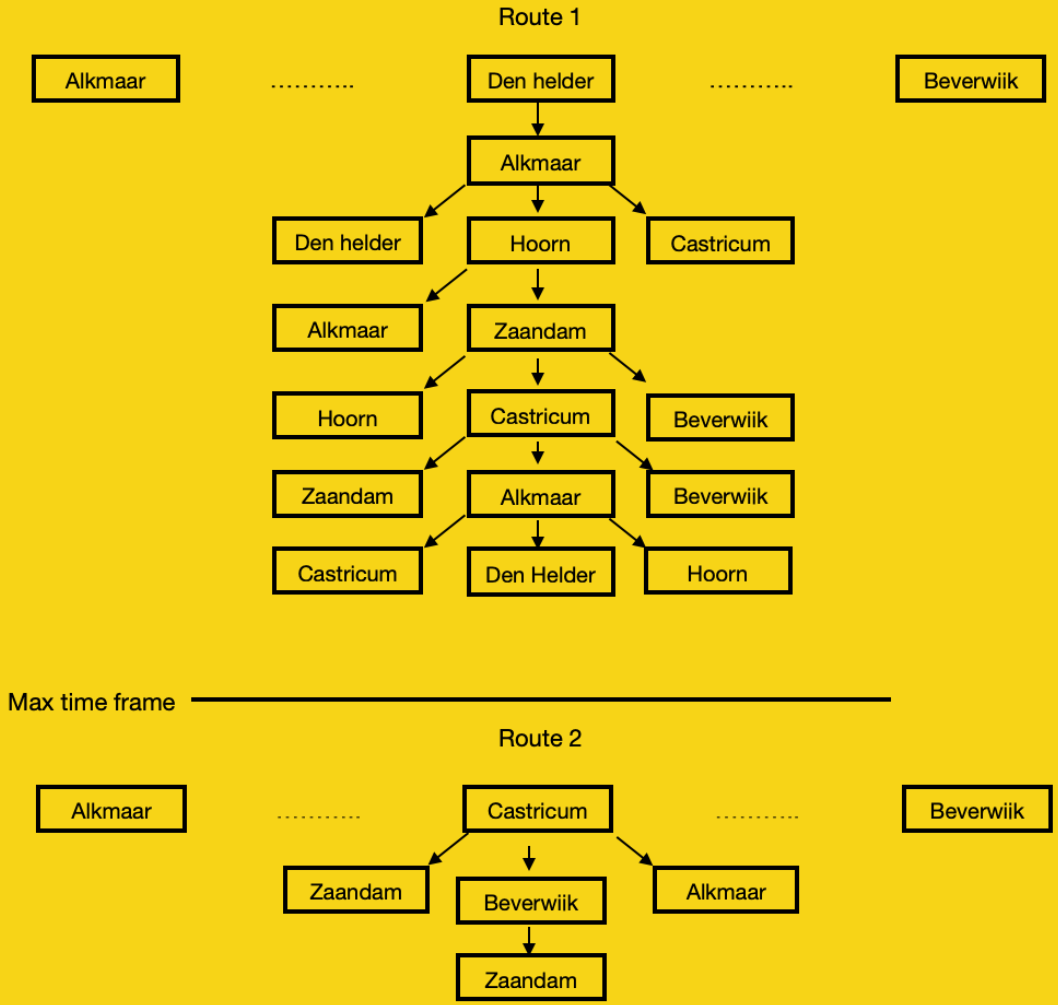
- $statespace = n^r = 2{,}35 * 10^{28}$

Methodologie

- ~~Random~~ RandomGreedy
- Kiest willekeurig station
- ~~Kiest willekeurig uit verbindingen~~ Kiest niet-gedekte verbinding
- Stopt traject voordat tijdsspanne is overschreden
- Stopt wanneer max aantal trajecten is bereikt

Methodologie

- Depth-first search
  - Elke route bereikt het einde van de tijdsspanne
  - ‘Bladeren’ gevonden bij max aantal trajecten

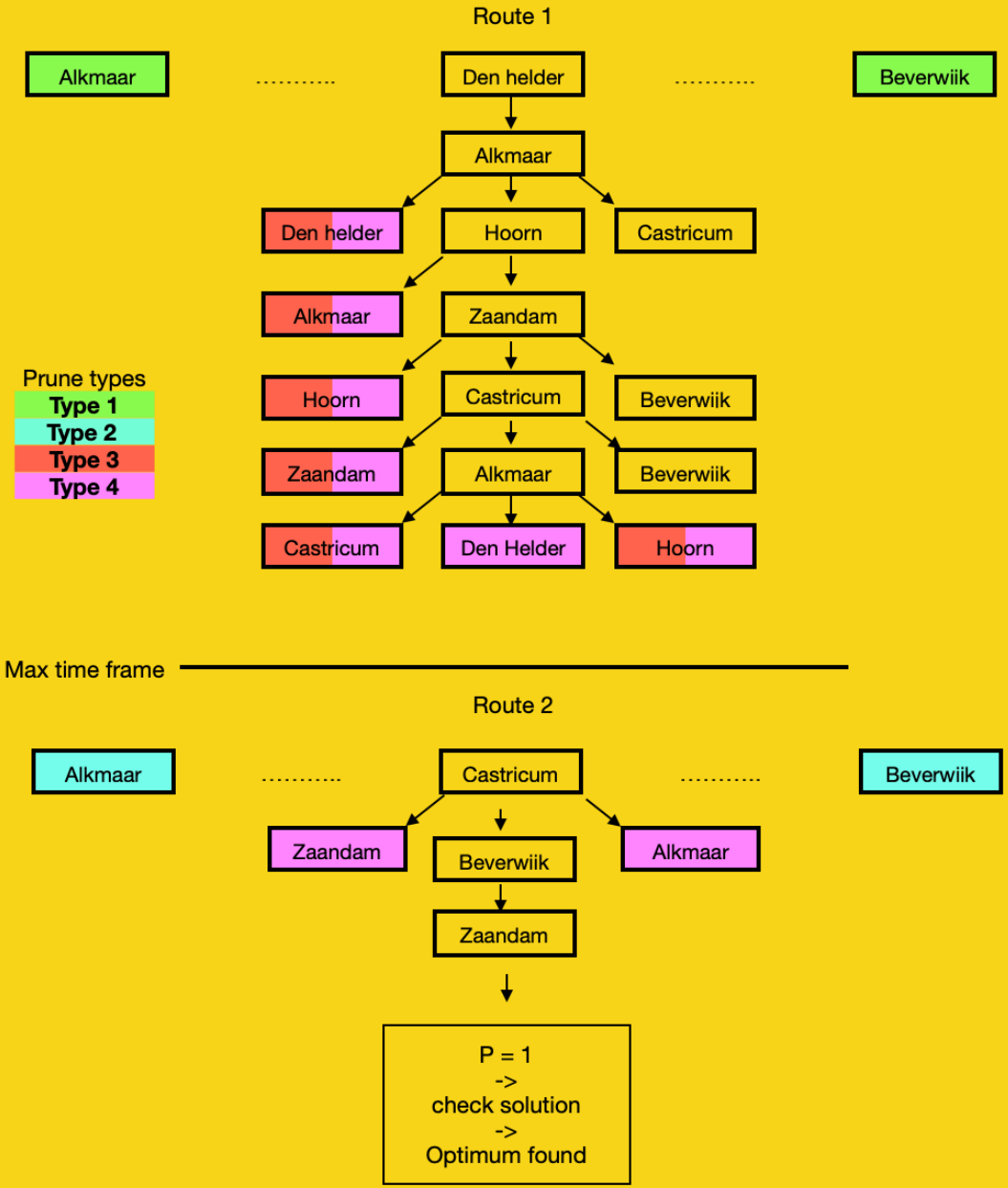


Methodologie

- Depth-first search

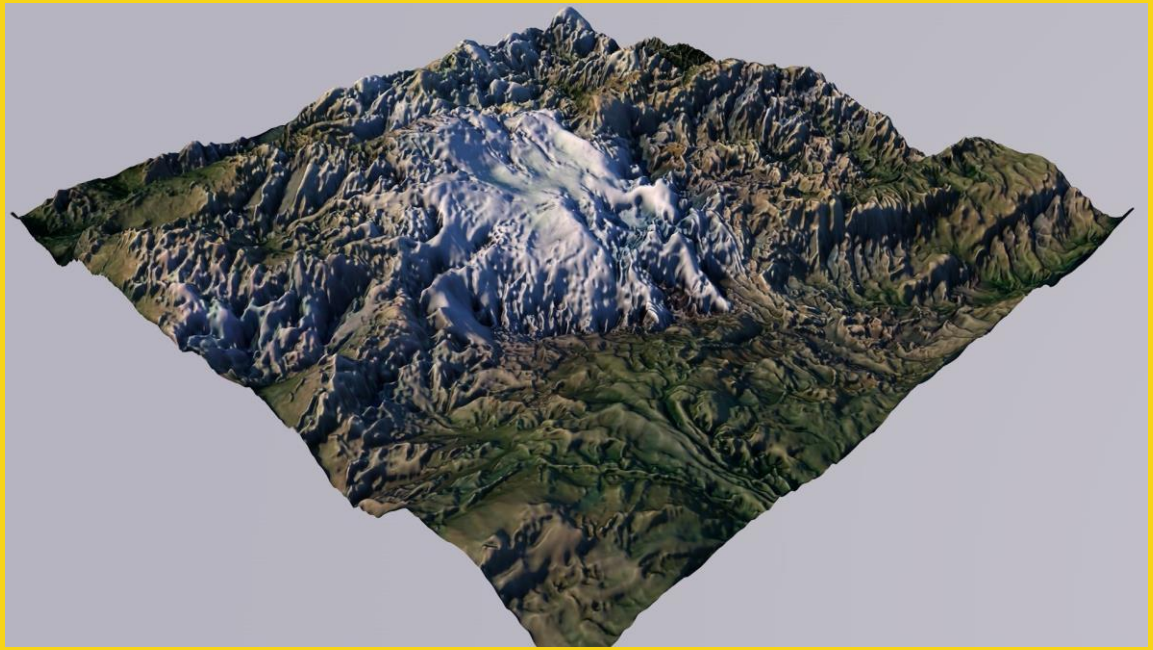
$$gereden \not> gedekte * \alpha$$

1. Doodlopende stations
2. Stations met één ongedekte verbinding
3. Traject staat geen overlap toe
4. Trajecten vermijden overlap

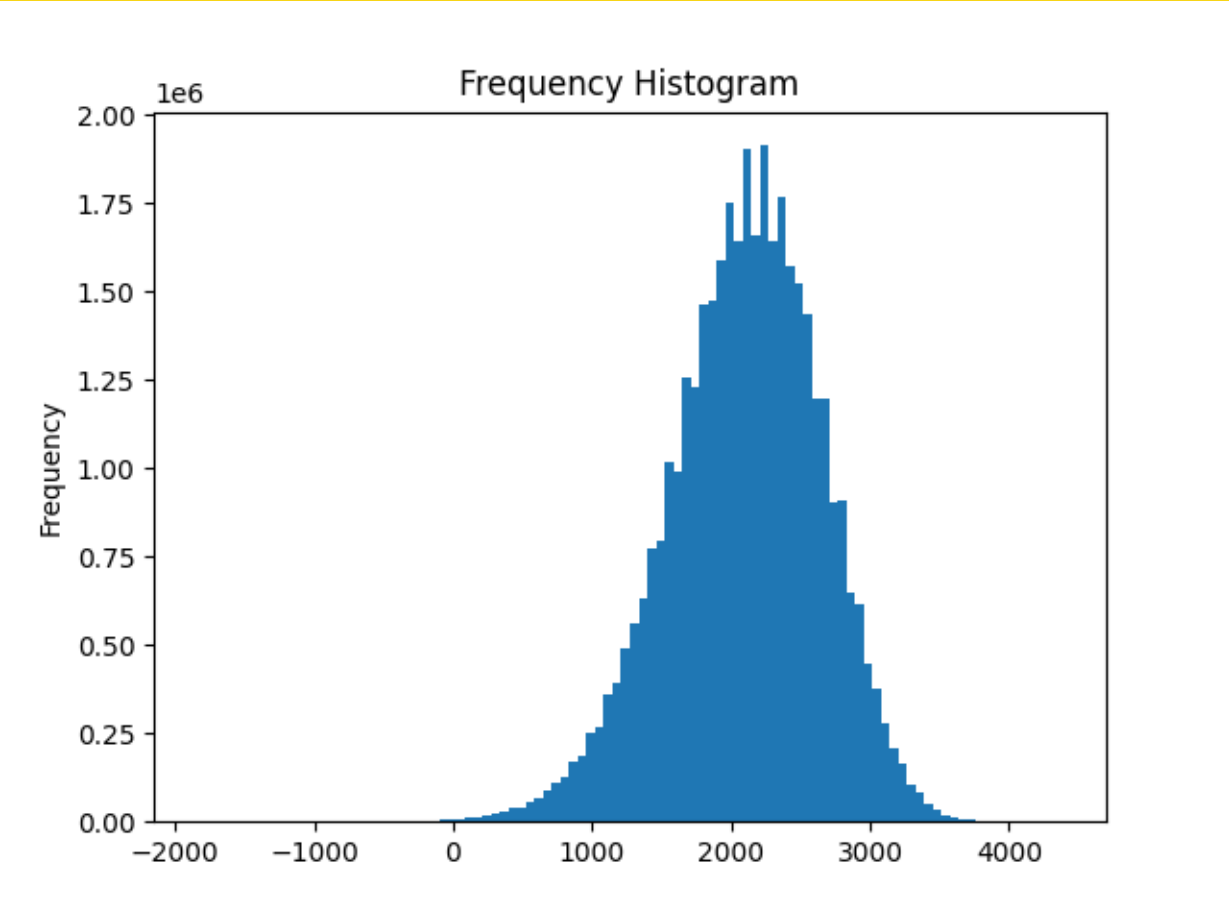


Methodologie

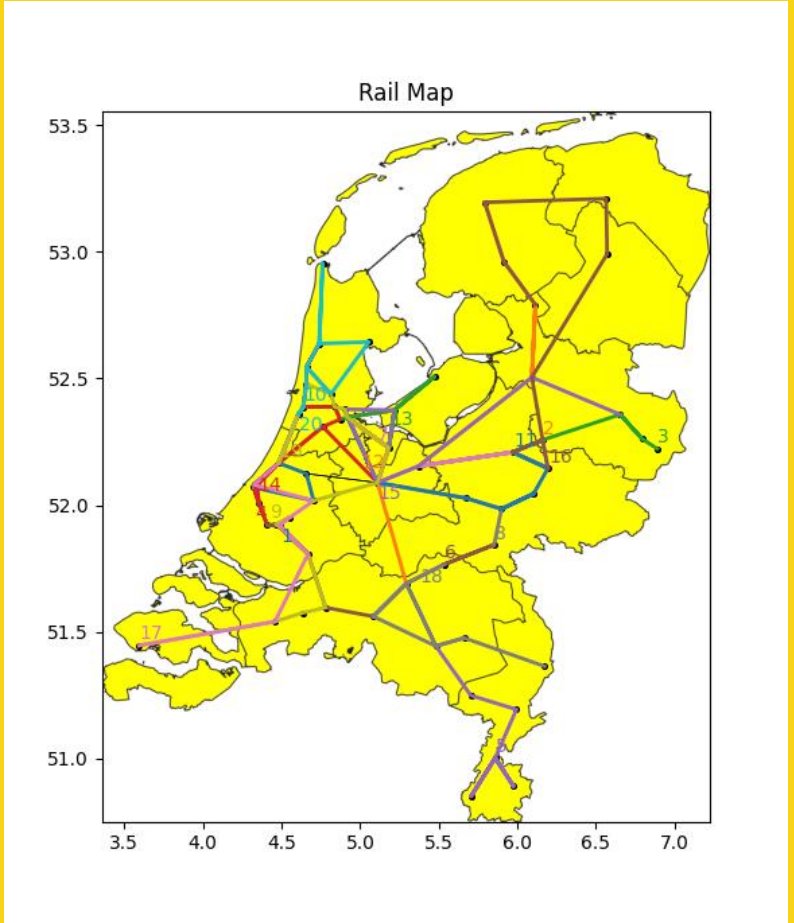
- Simulated Annealing
- Mogelijke mutaties:
    1. Route verwijderen
    2. Route aanmaken
    3. Route aanpasssen



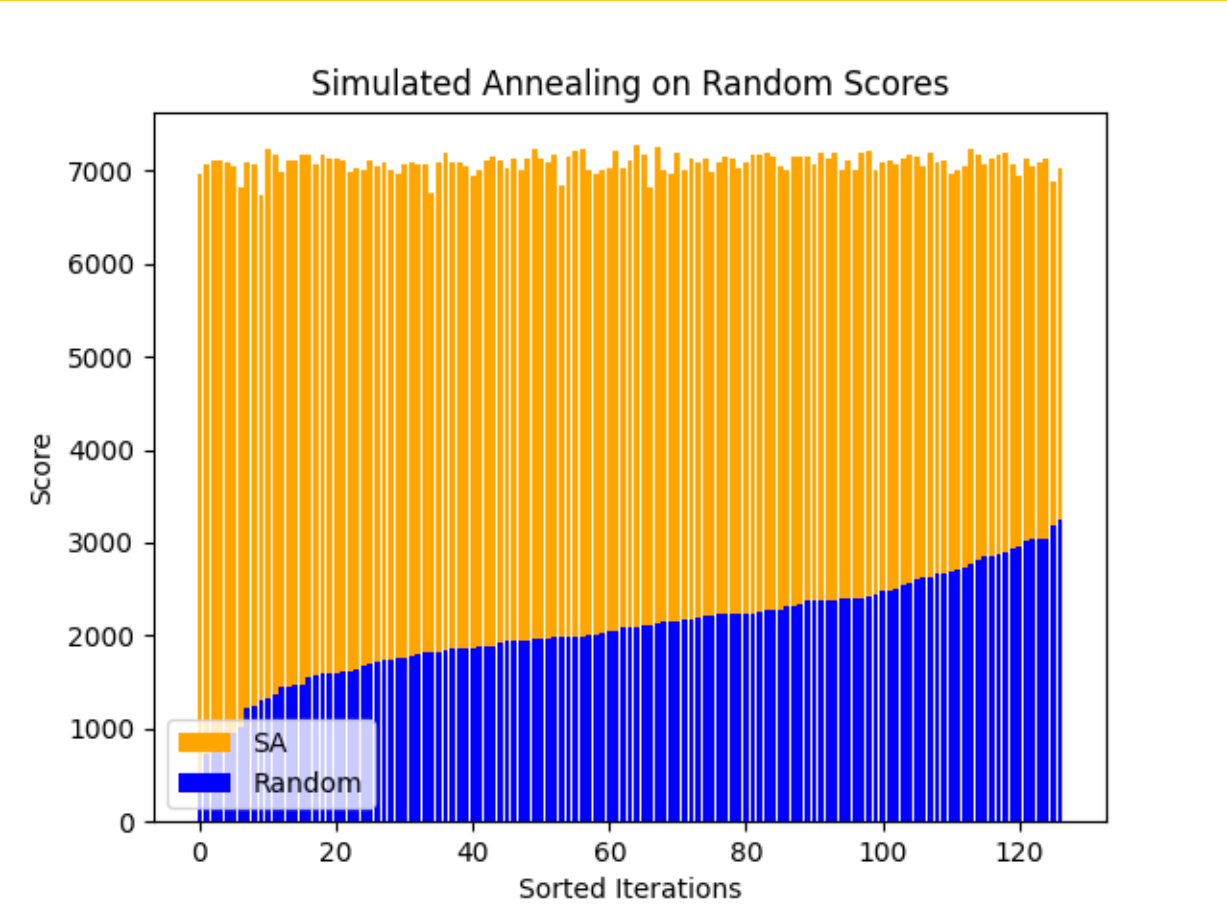
Resultaten - Random



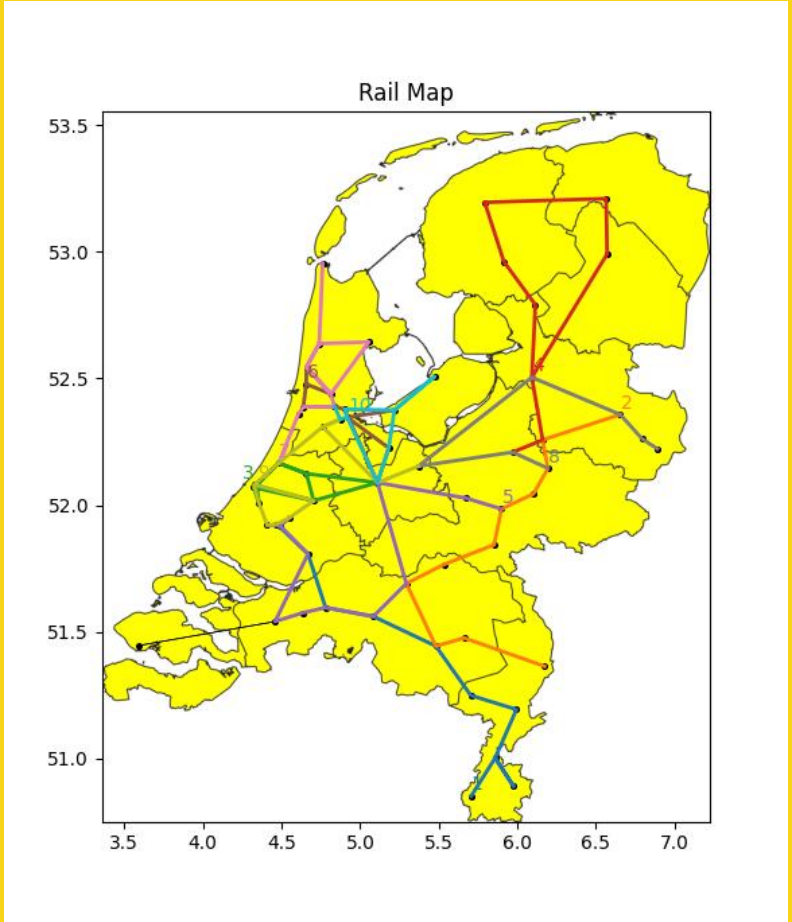
Beste score (4387.28):



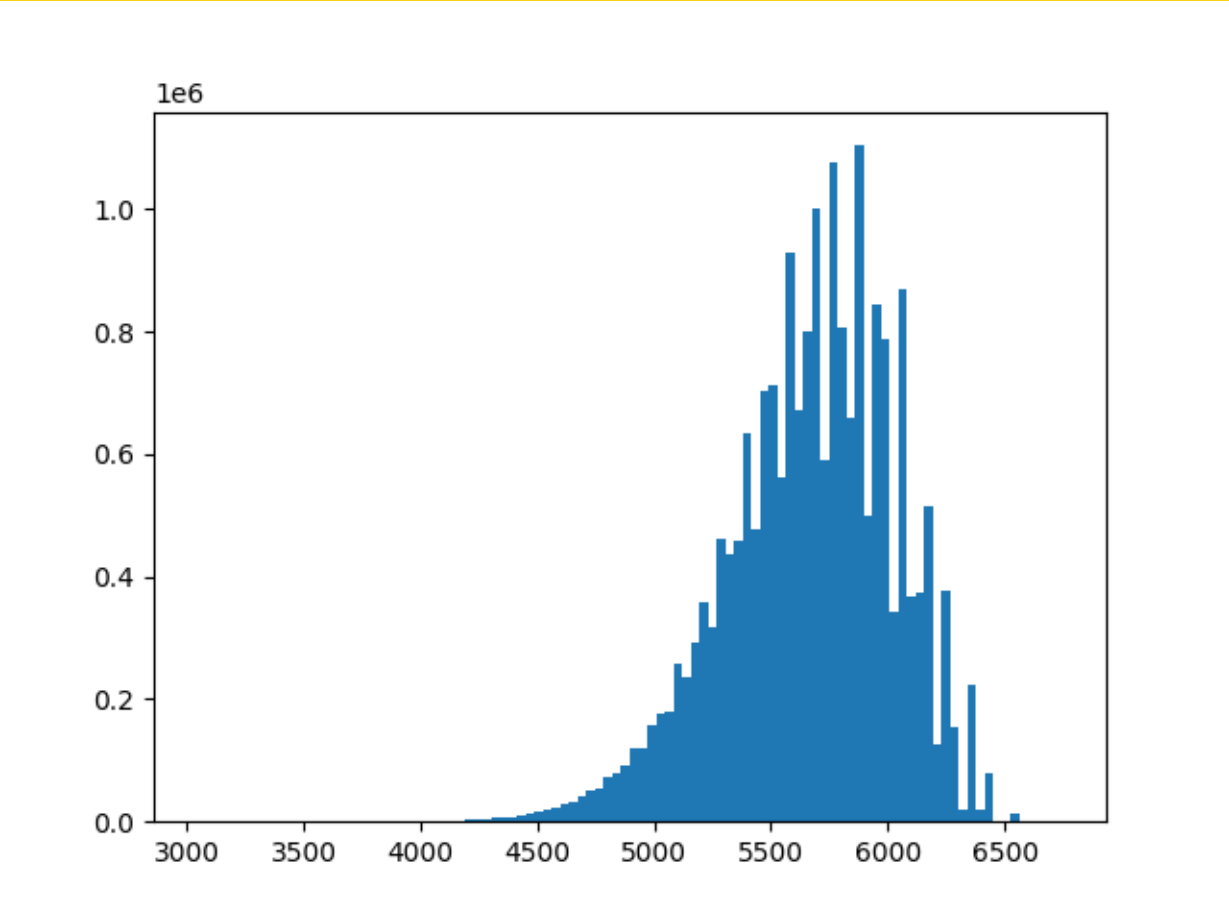
Resultaten – Random + SA



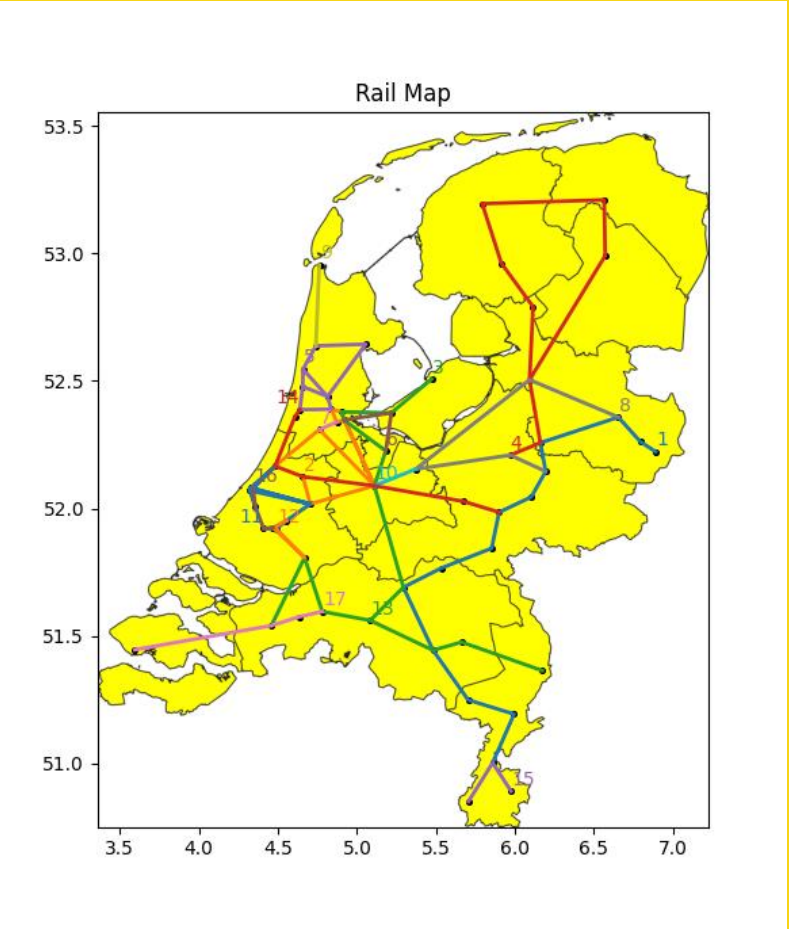
Beste score (7269.64):



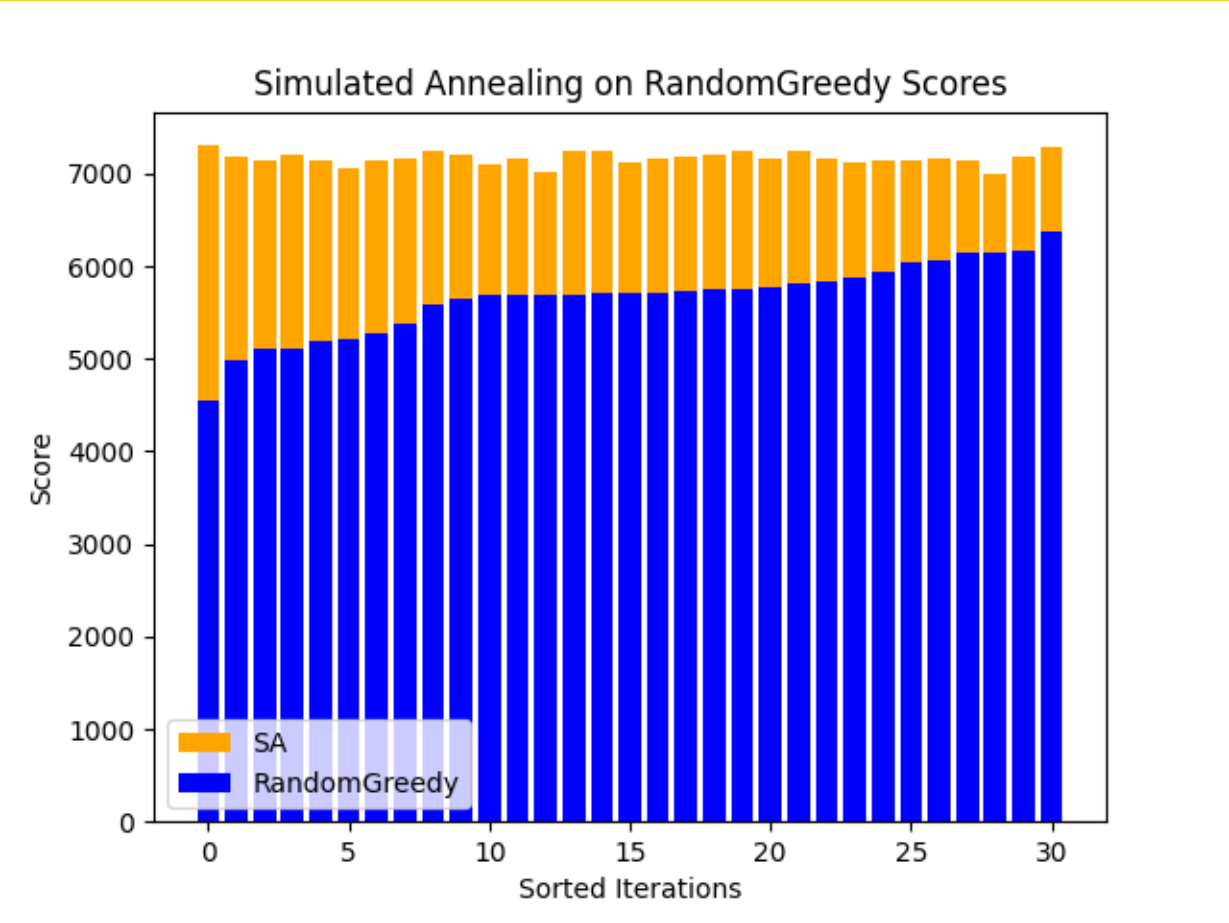
Resultaten - RandomGreedy



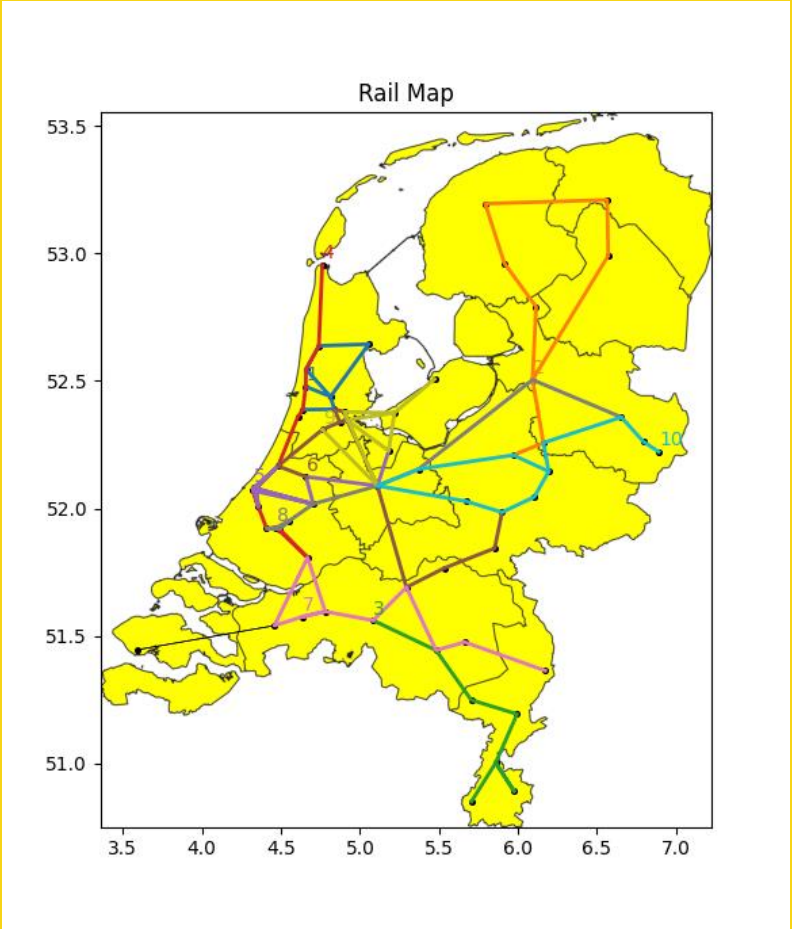
Beste score (6749.0):



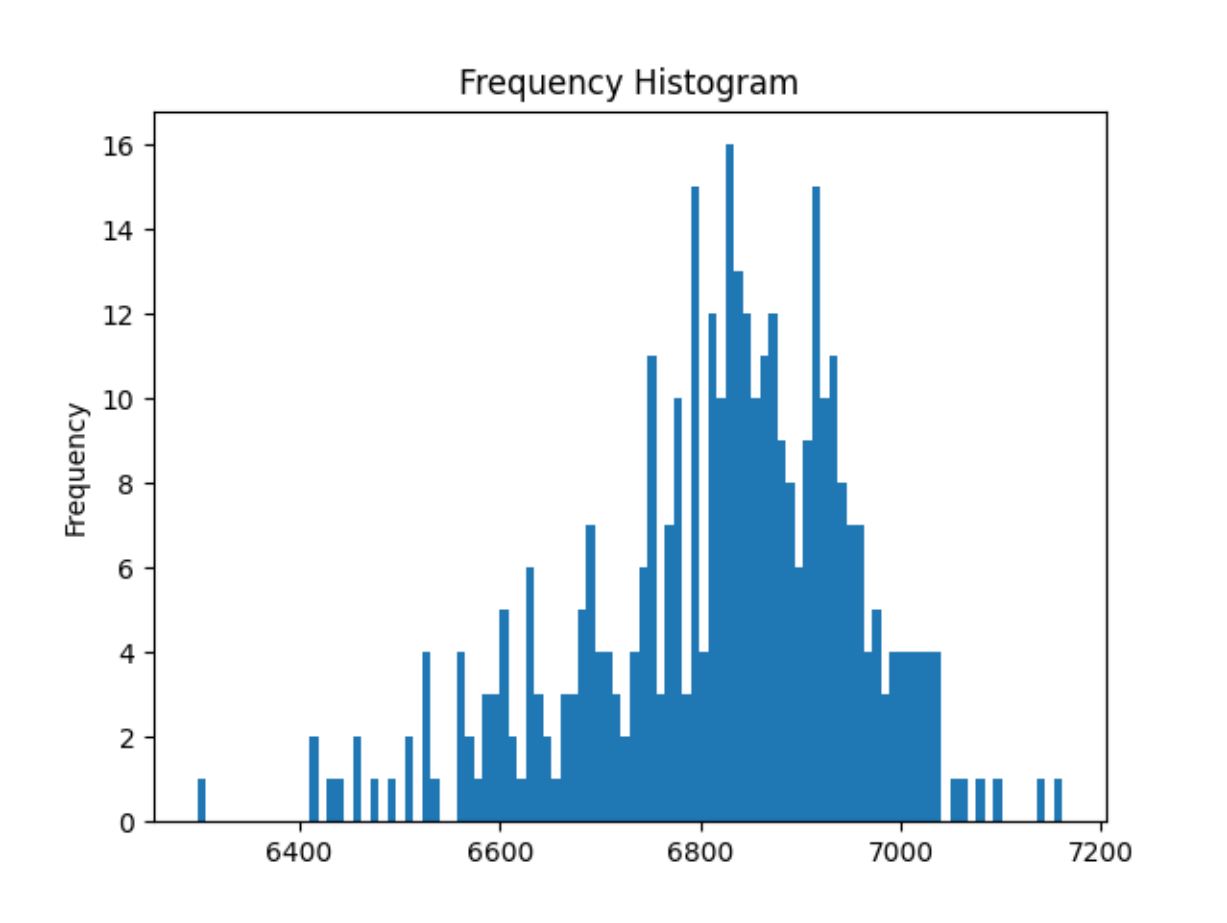
Resultaten – RandomGreedy + SA



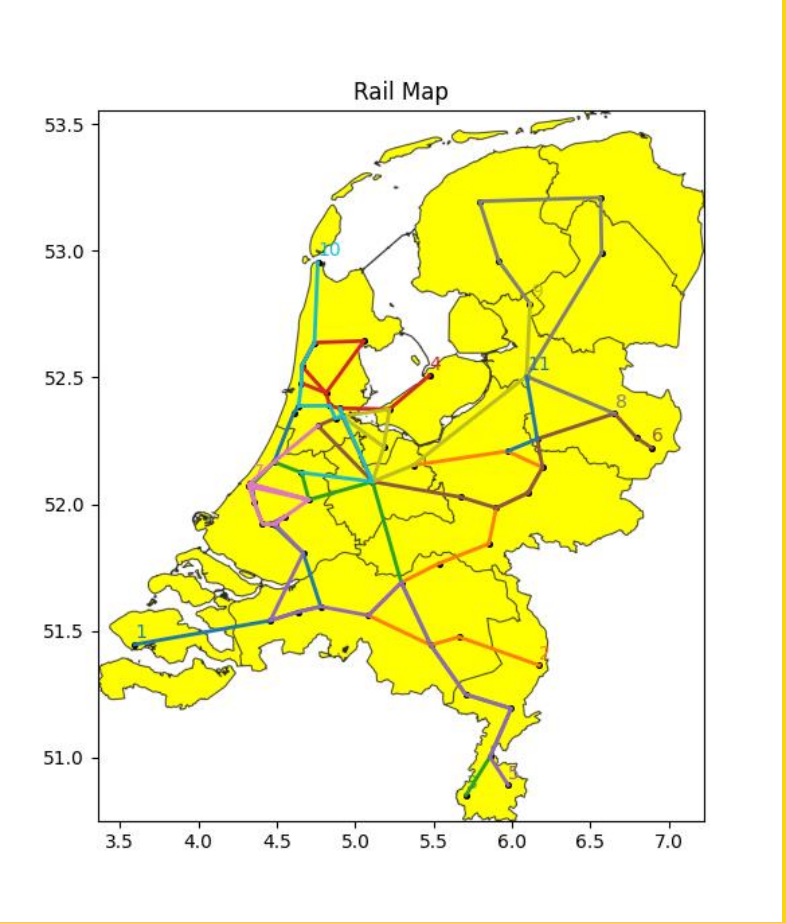
Beste score (7304.64):



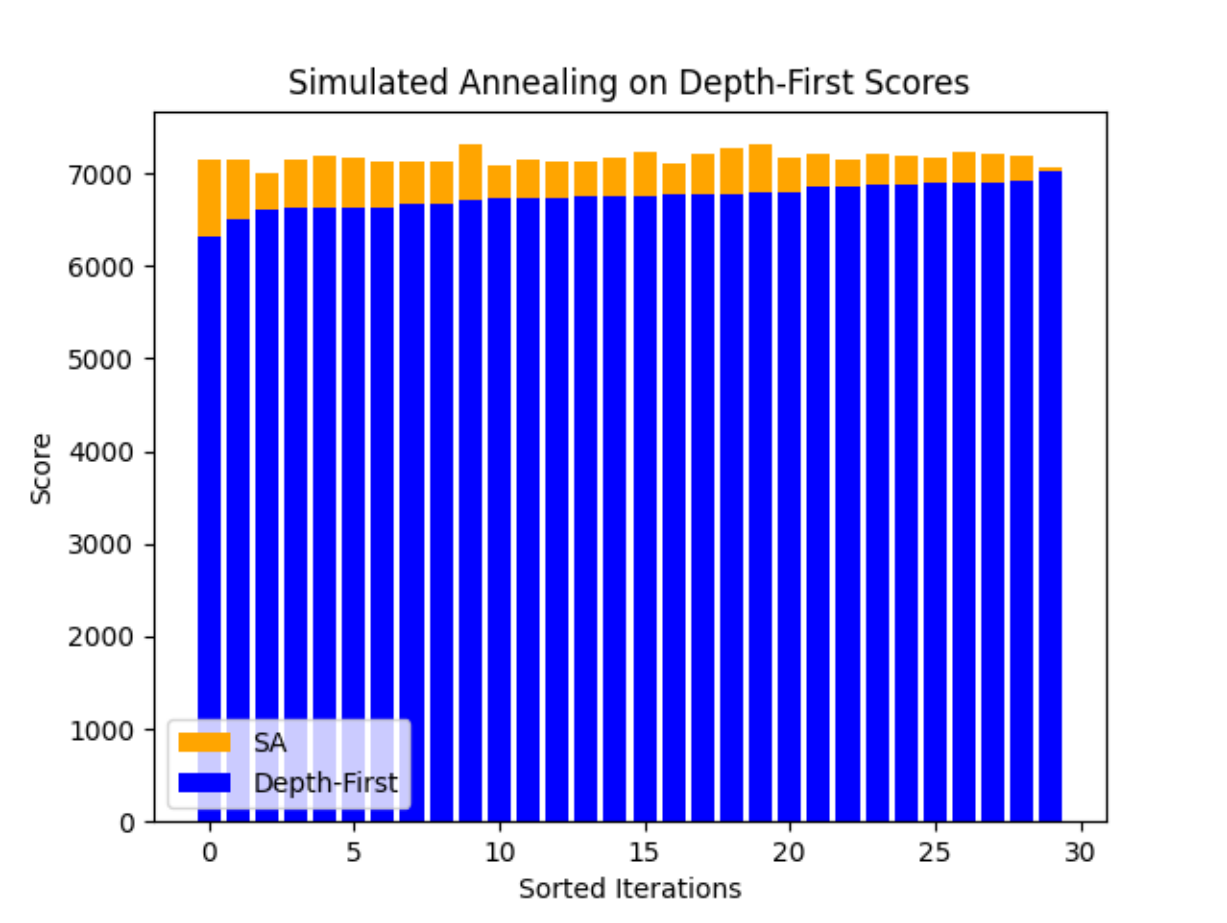
Resultaten – Depth-First



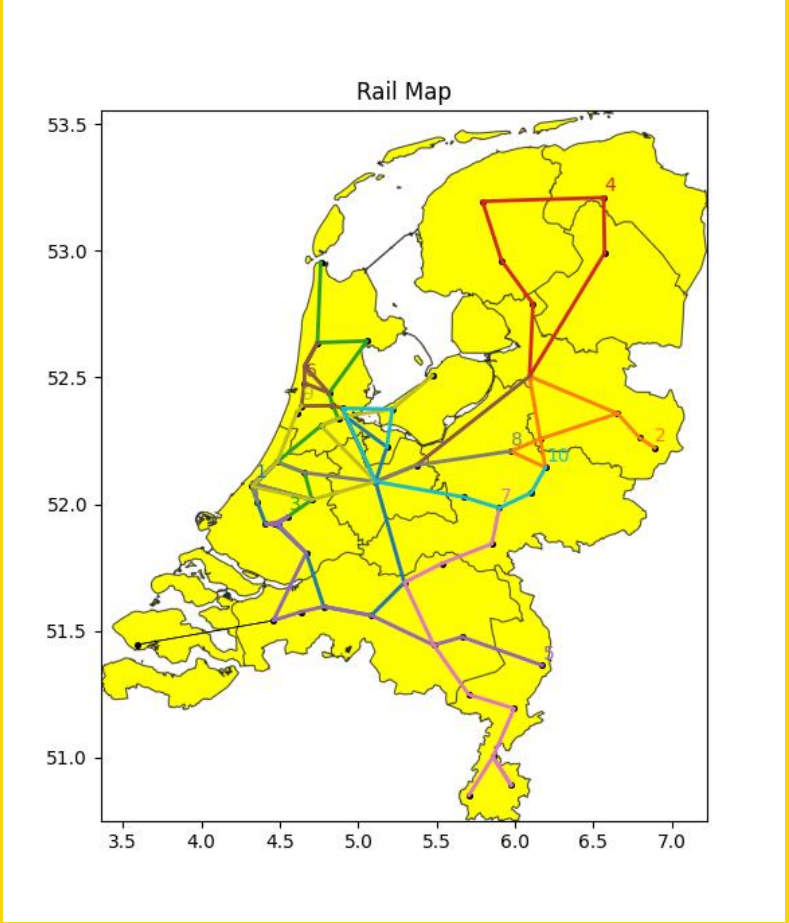
Beste score (7162.0):



Resultaten – Depth-First + SA

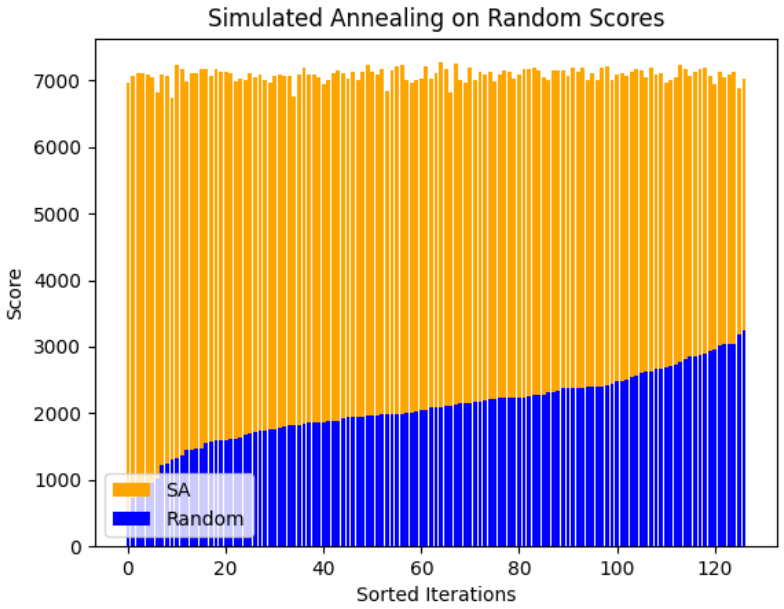


Beste score (7311.64):

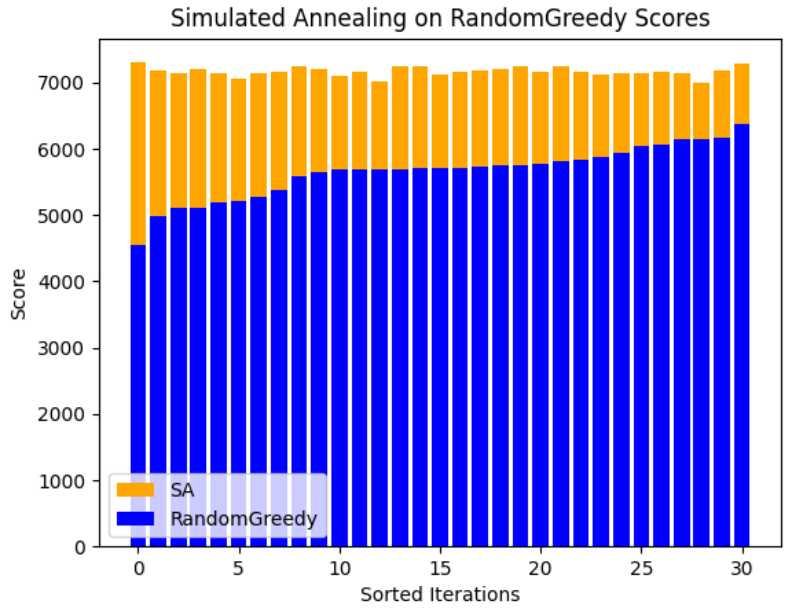


Vergelijking van de resultaten

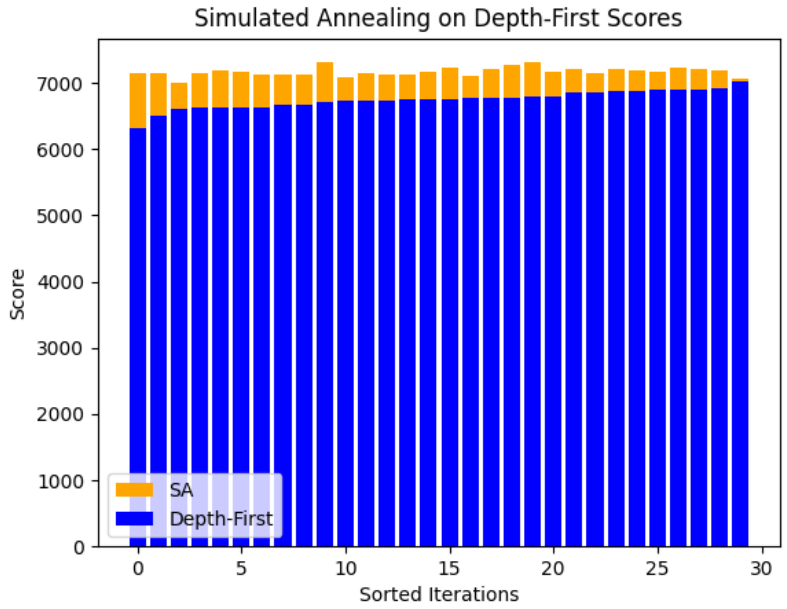
Random + SA



RandomGreedy + SA



Depth First + SA



Conclusie & Future Work

- Hoogste score = 7311
- Weinig trajecten met overlap indien nodig
- Met parameters ‘empirisch spelen’
- Goede combinaties onthouden
- Genetic algorithm?

Vragen?