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Route choice equilibration algorithm for stochastic dynamic traffic assignment with full route set

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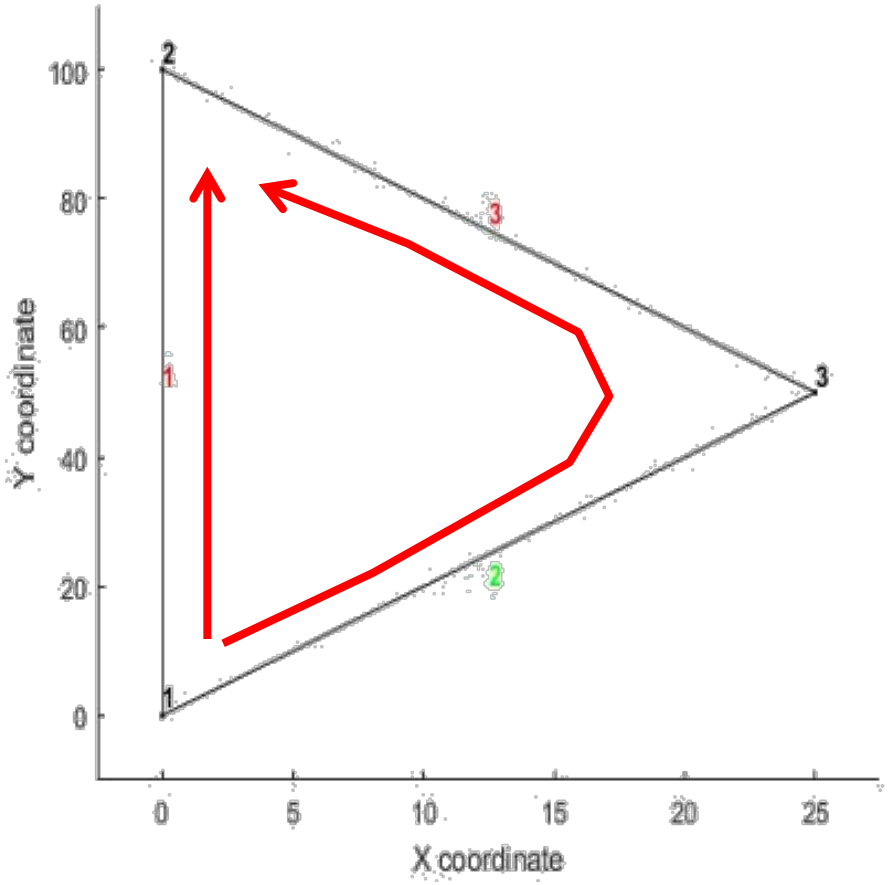
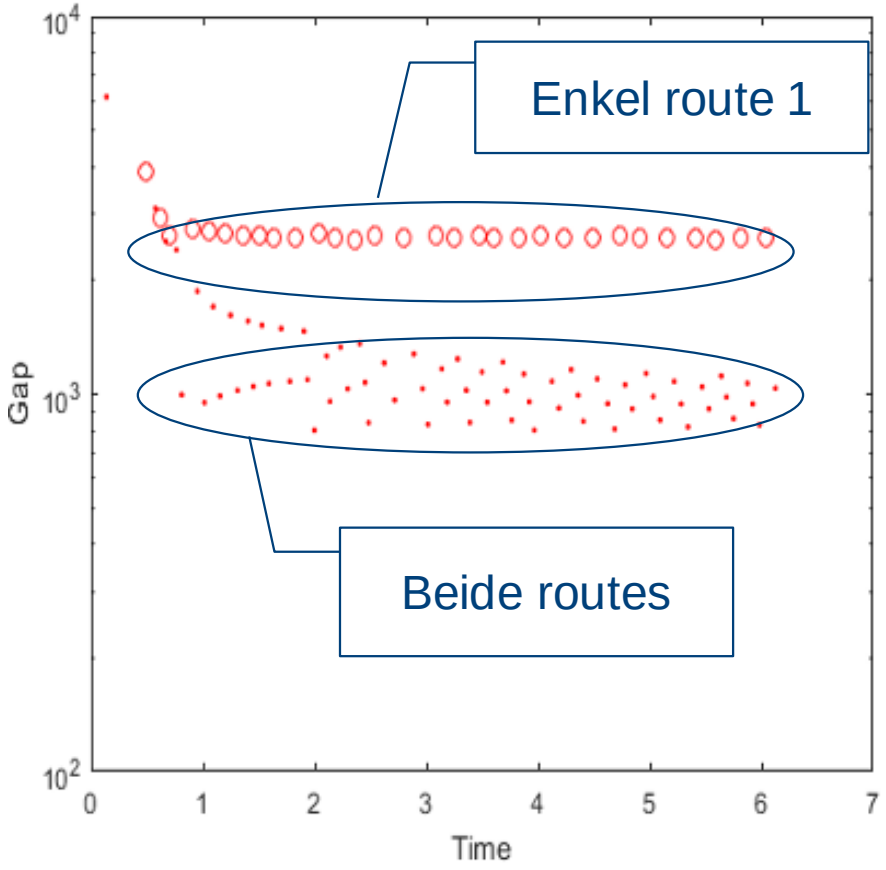
Motivatie

- Route keuze belangrijk

- Deterministisch VS Stochastisch

Route set





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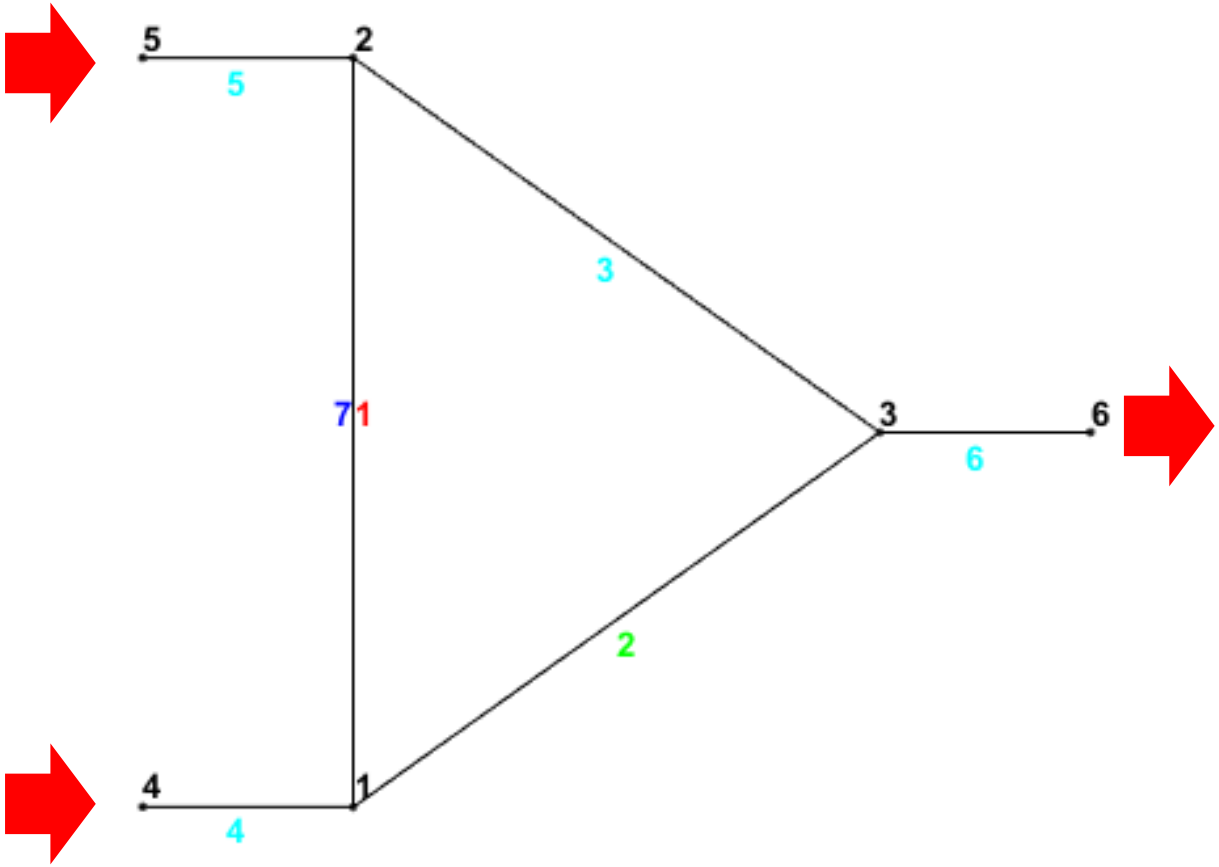
Route set – Bestemming gebaseerd



N1 > N2
Of
N1 < N2

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Volledig impliciet Vaste Route set

- Recursive Logit (Fosgerau, 2013)

- Path Probabilities:

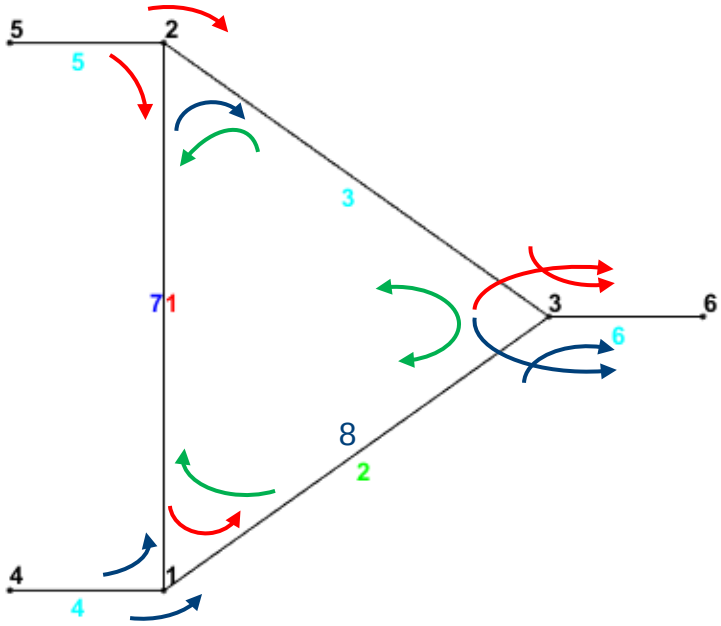
$P_{536} = P_{53} * P_{36}$

$P_{5726} = P_{57} * P_{72} * P_{26}$

} 1

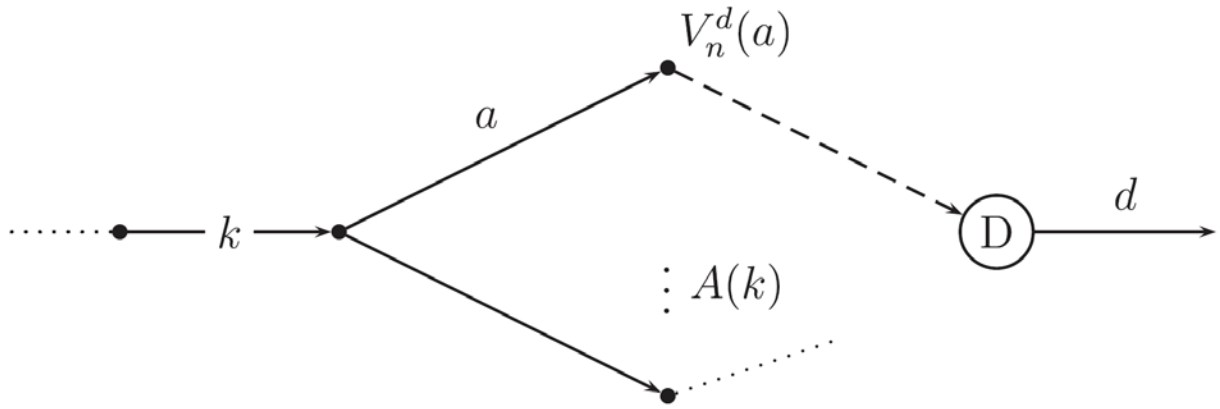
$P_{538736} = P_{53} * P_{38} * P_{81} * P_{13} * P_{36}$

$P_{426} = P_{42} * P_{26}$



Voor zelfde bestemming

Kans van een ‘turn'(cfr Dial, 71)



$$V_n^d(k) = E\left[\max_{a \in A(k)} \left(v_n(a|k) + \mu\varepsilon_n(a) + V_n^d(a)\right)\right]$$

$$v_n(a|k) = \beta_{TT} * TT + \beta_{UTurn} * Uturn + \beta_3 * Characteristic3 + \ldots$$

Left Turns, signalized intersections

System of equations

$$e \quad V_n^d(k) = \begin{cases} \mu \ln \sum_{a \in A} \left(\delta(a|k) \exp\left(\frac{1}{\mu} \left(v_n(a|k) + V_n^d(a) \right) \right) \right) & \forall k \in A \setminus d \\ 0 & k = d \end{cases}$$

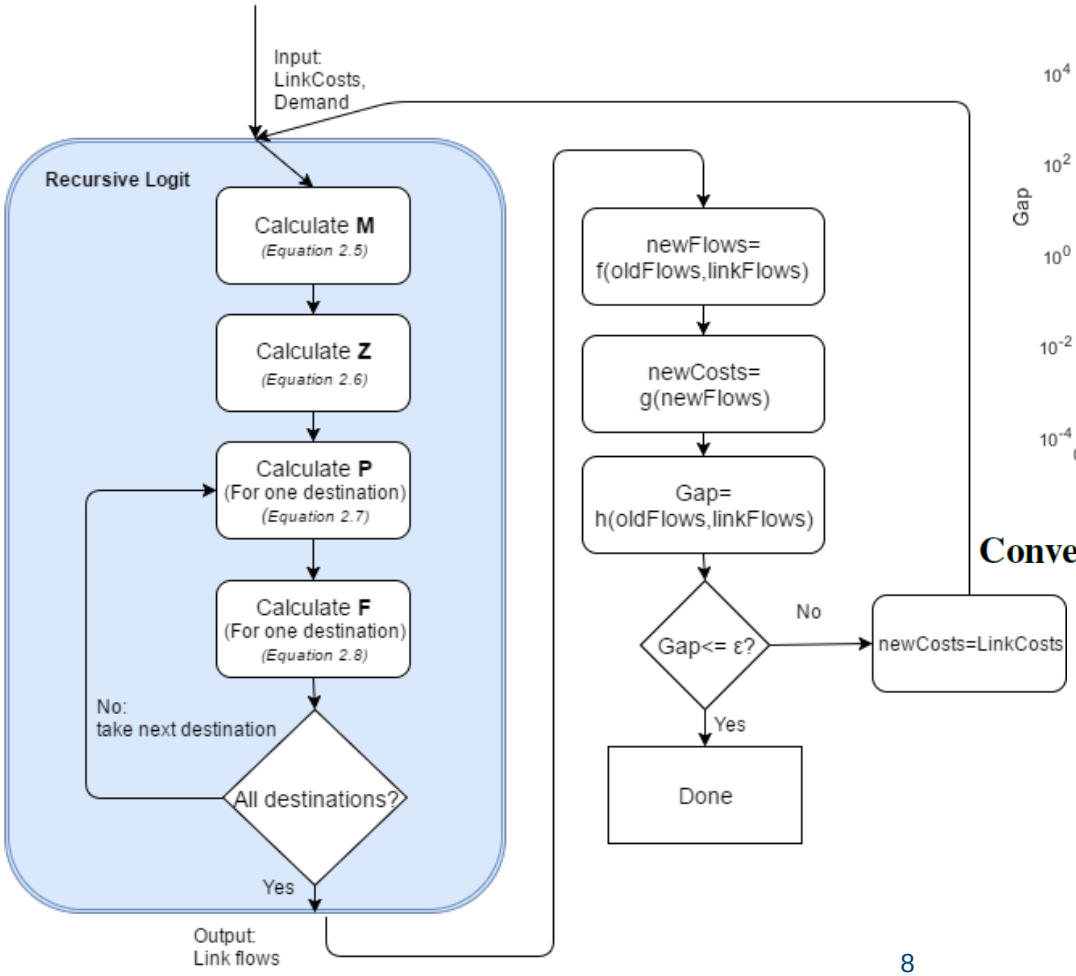
$$\mathbf{z} = \mathbf{M}\mathbf{z} + \mathbf{b} \Longleftrightarrow (\mathbf{I} - \mathbf{M})\,\mathbf{z} = \mathbf{b}$$

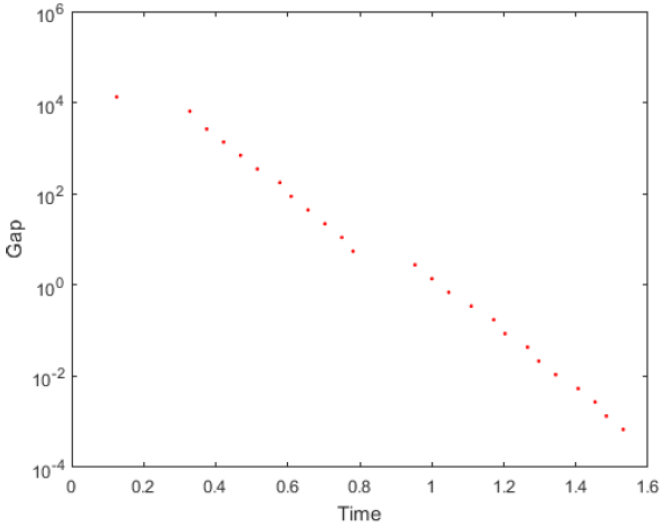
$\mathbf{b}$ $(|A| \times 1)$, $\mathbf{z}$ $(|A| \times 1)$ and $\mathbf{M}$ $(|A| \times |A|)$

$$z_k = \exp\left(\frac{1}{\mu} V_n^d(k) \right) \qquad M_{ka} = \delta(a|k) \exp\left(\frac{1}{\mu} v_n(a|k) \right)$$

$$P_k = \frac{M_k \bullet z^T}{M_k z}$$

Static Assignment





Convergence of recursive logit with proportional update

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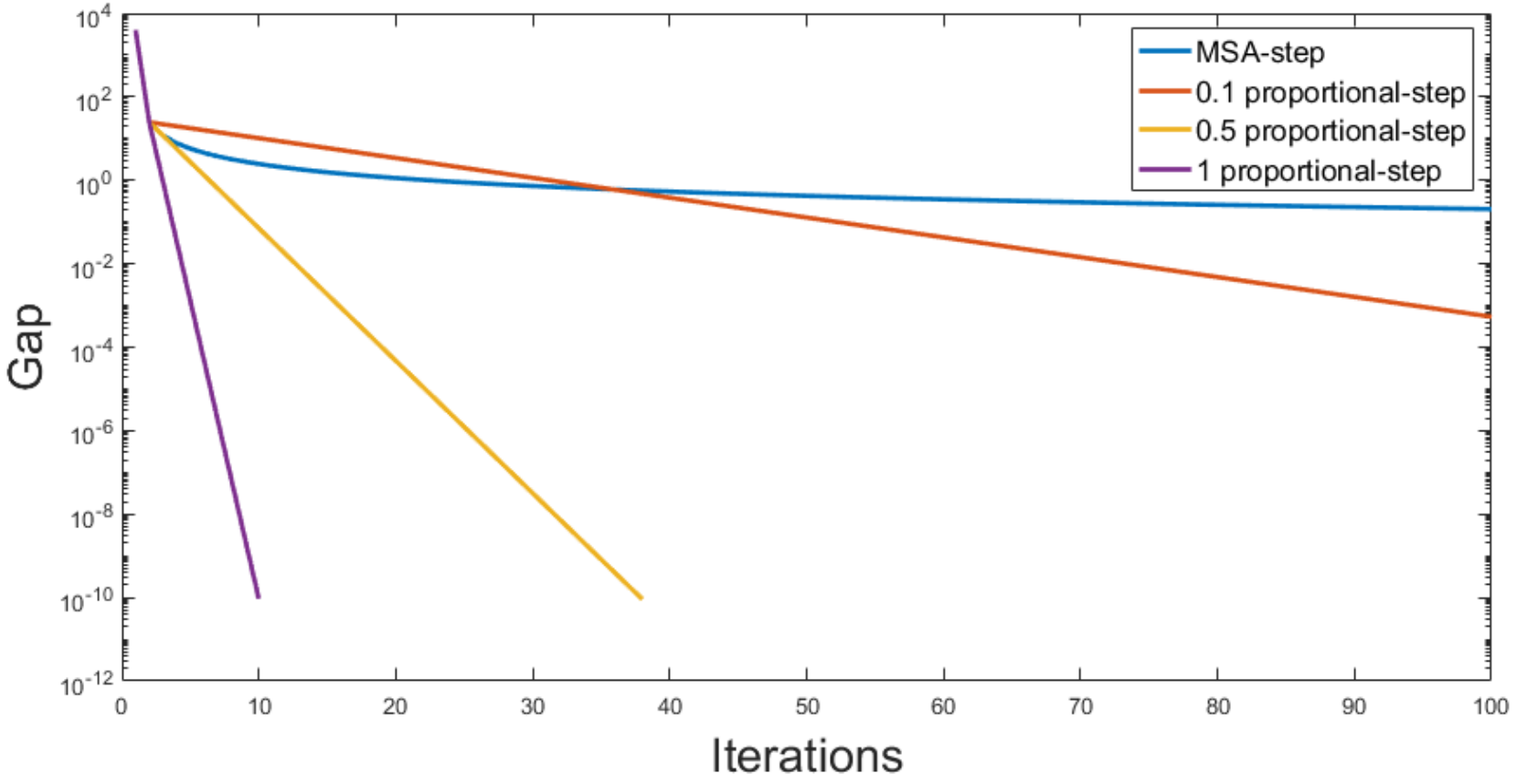
Invloed van de stap grootte



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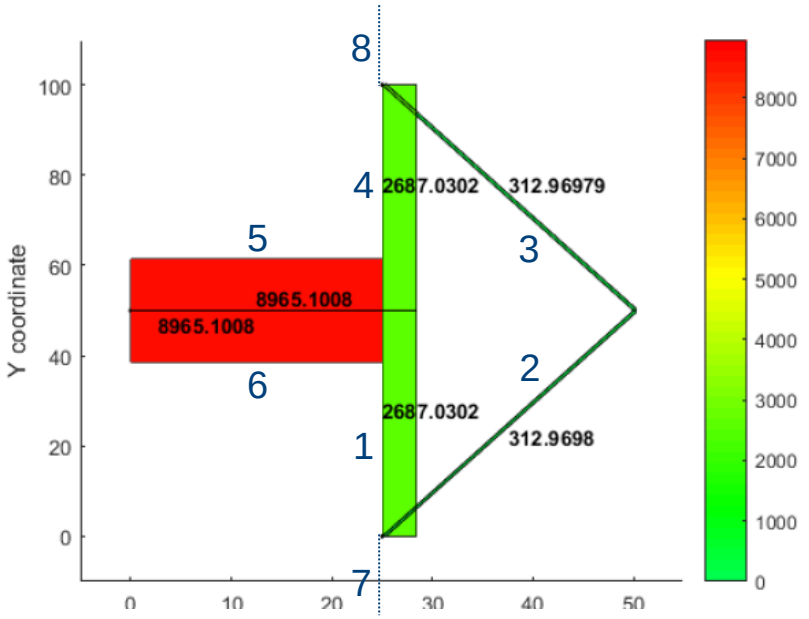
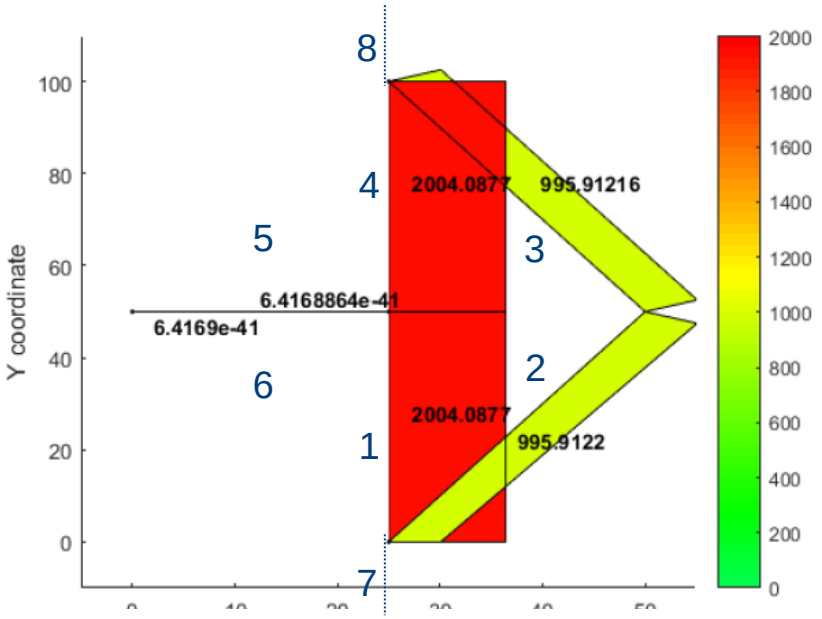
Route utiliteiten

- Som van link utiliteiten
- Geen Route correlaties
- -> iedere route onafhankelijk van andere routes

U-turn penalty's





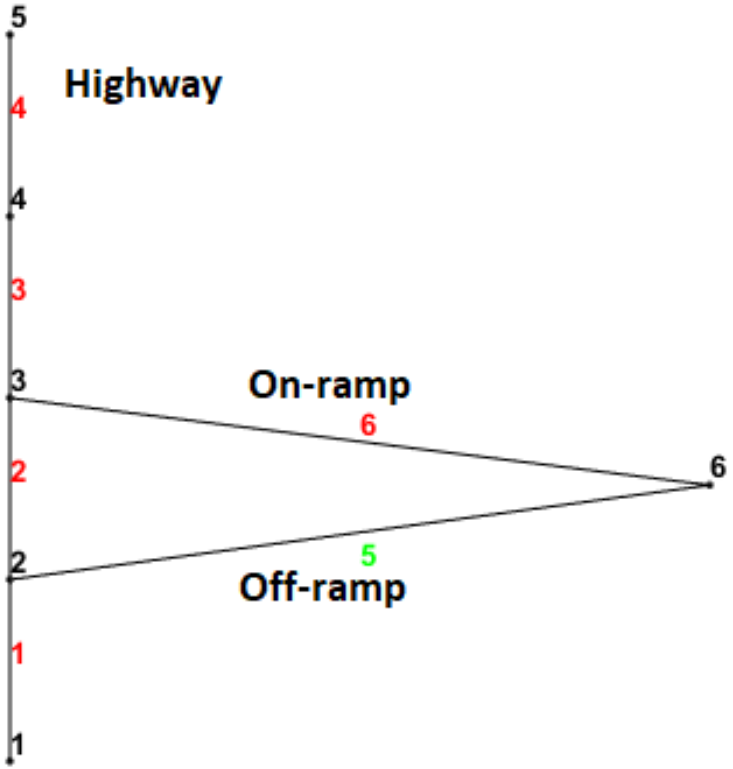
Without u-turn penalties

P	1	2	3	4	5	6	7	8
1				0,23	0,77			
2			1					
3								1
4								1
5						1		
6				0,23	0,77			
7	0,90	0,10						
8								

With u-turn penalties

P	1	2	3	4	5	6	7	8
1				1	~0			
2			1					
3								1
4								1
5						1		
6				1	~0			
7	0,67	0,33						
8								

Hierarchy



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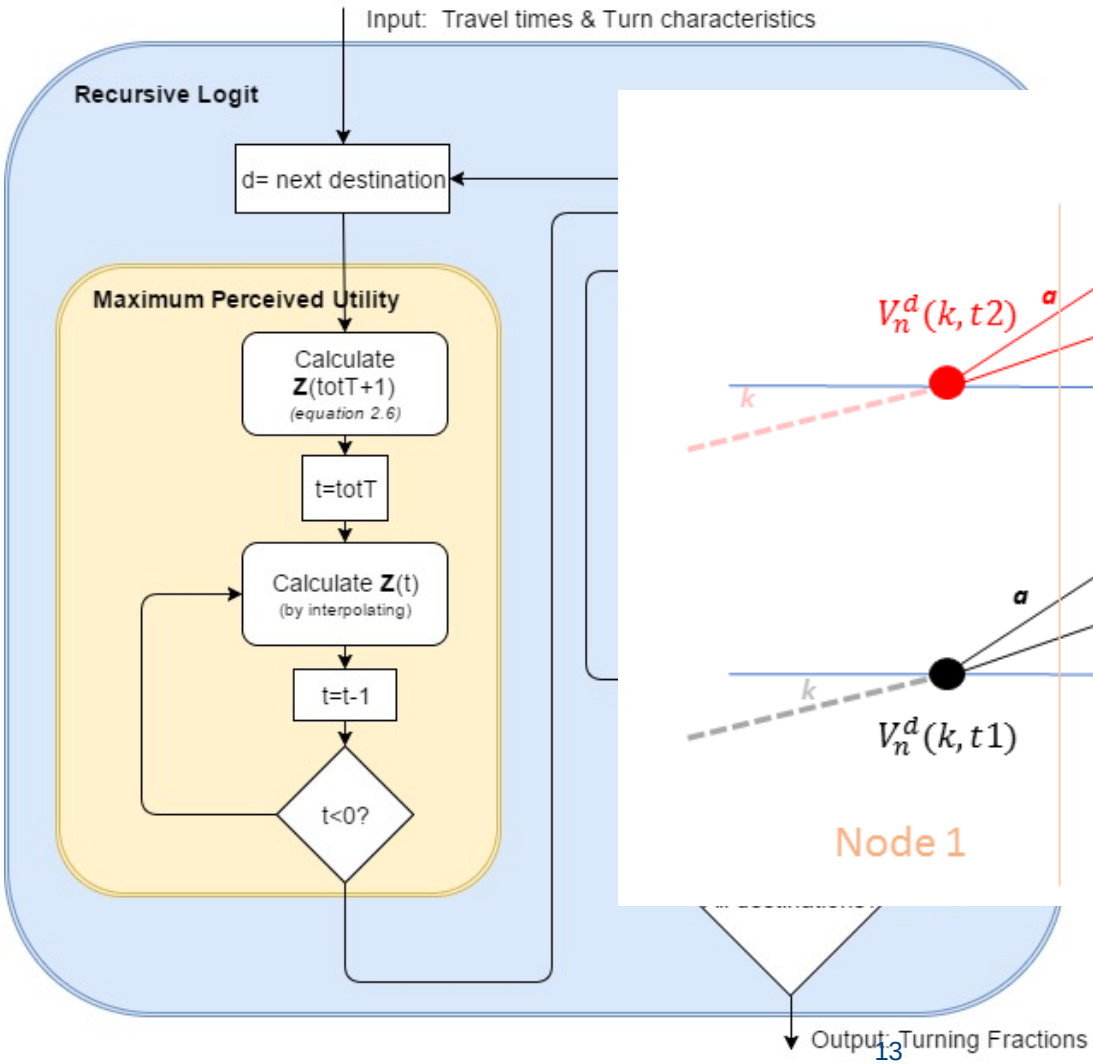
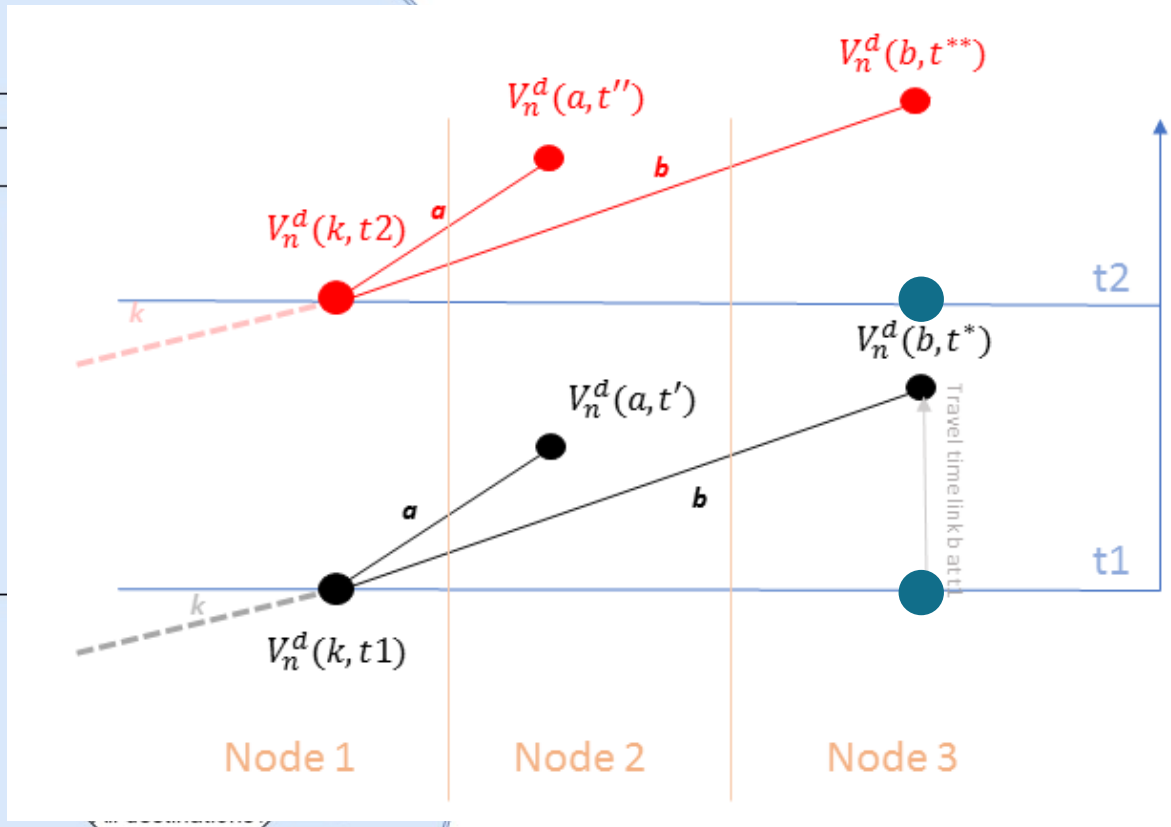
Dynamic Traffic Assignment





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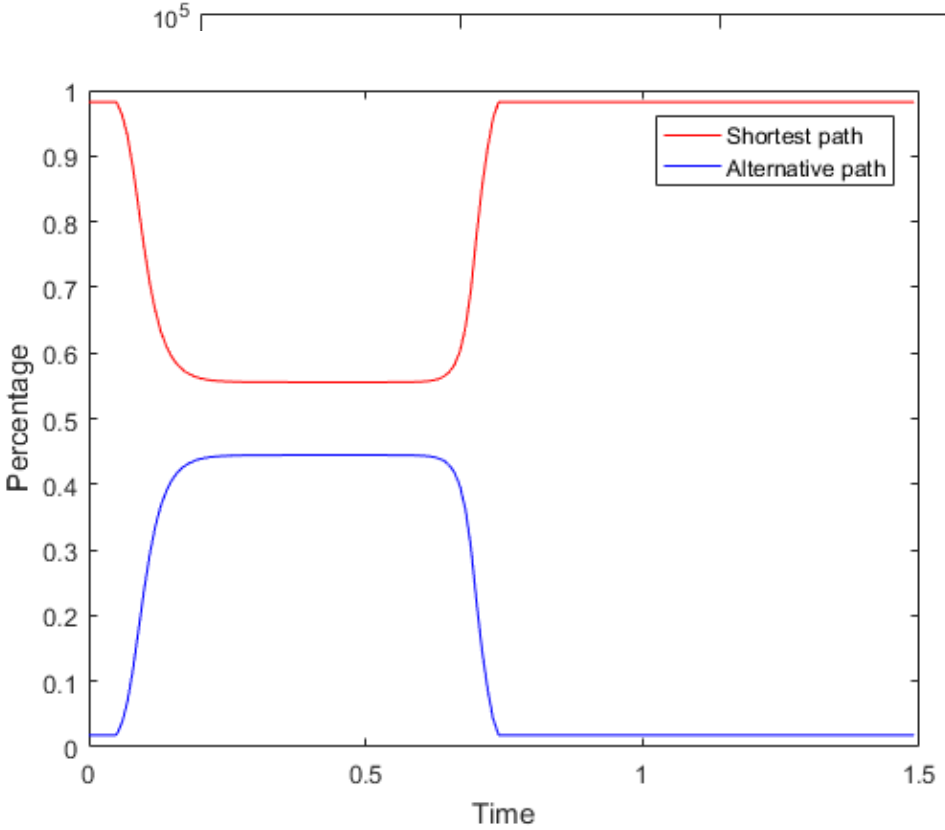
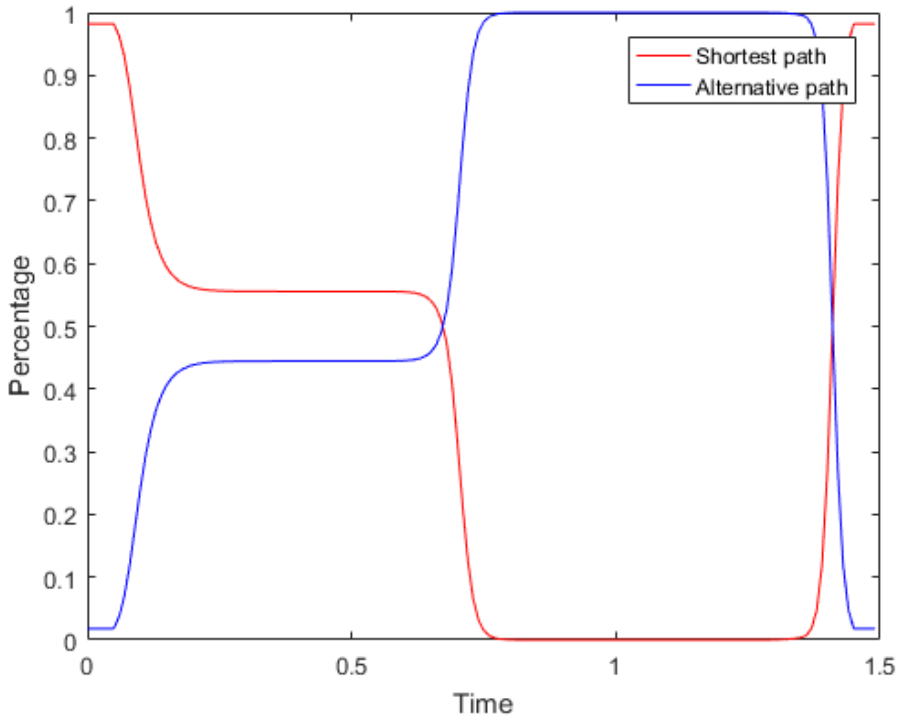
Dynamische Toedeling

- Over destinations
  - Maximum perceived utility (downstream utility)
    - Stelsel laatste tijdstap
    - Interpoleren andere tijdstappen
  - Kansen voor iedere Turn

Influence of the step size

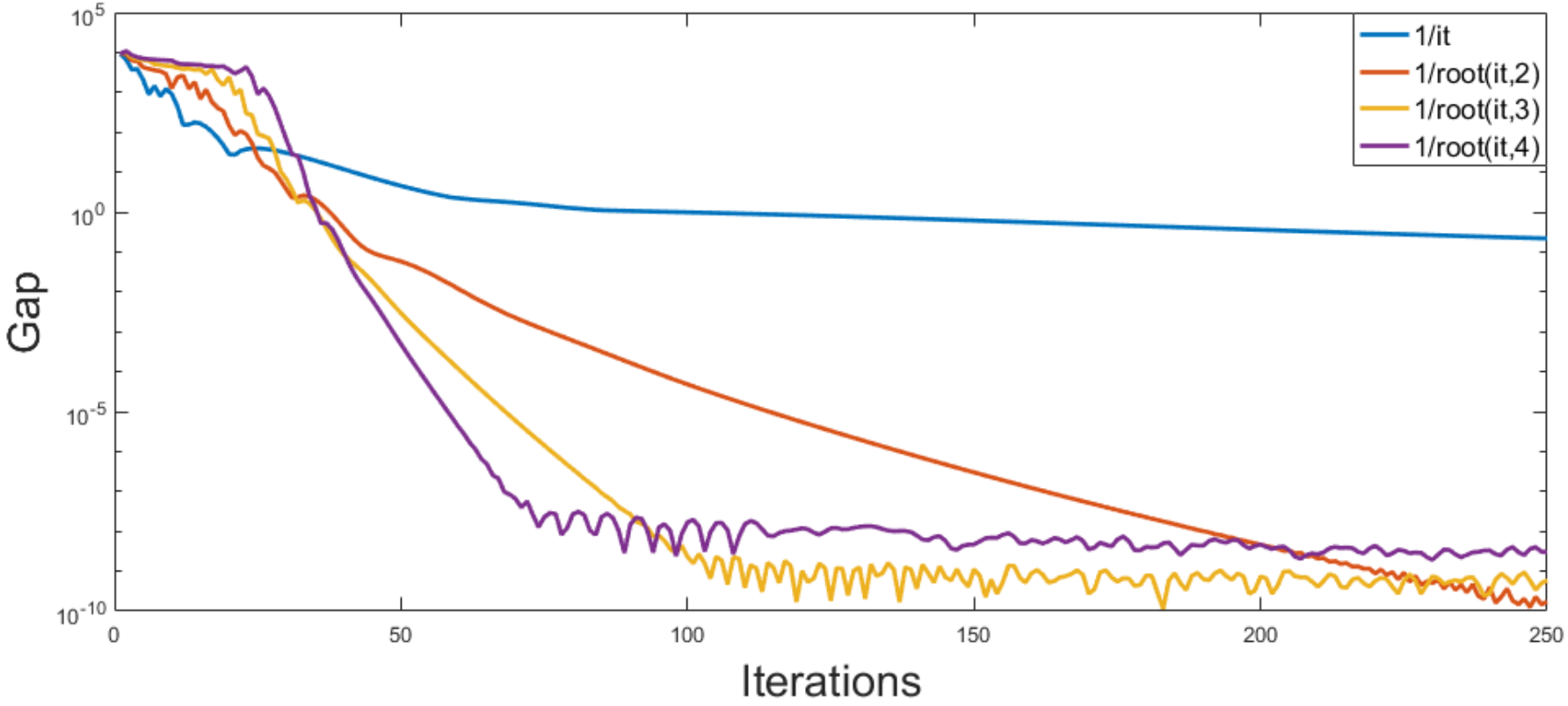


Iteration K +2



Iteration K+1

Step sizes dynamic



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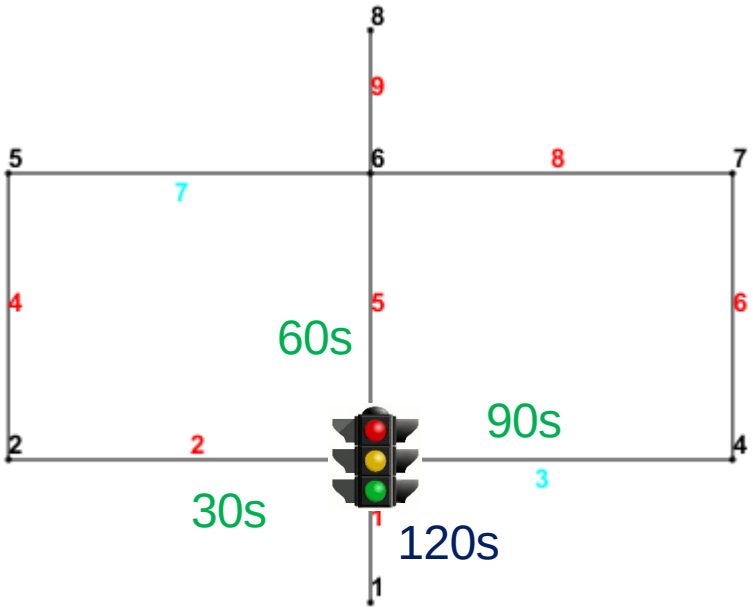
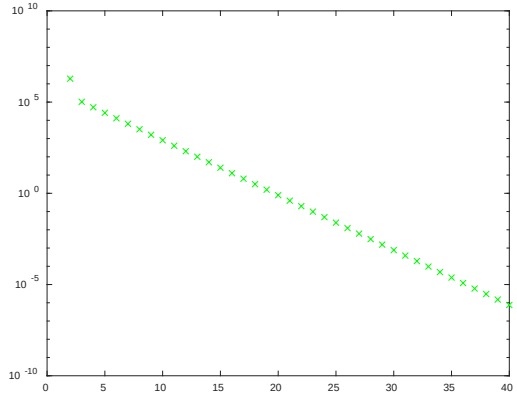
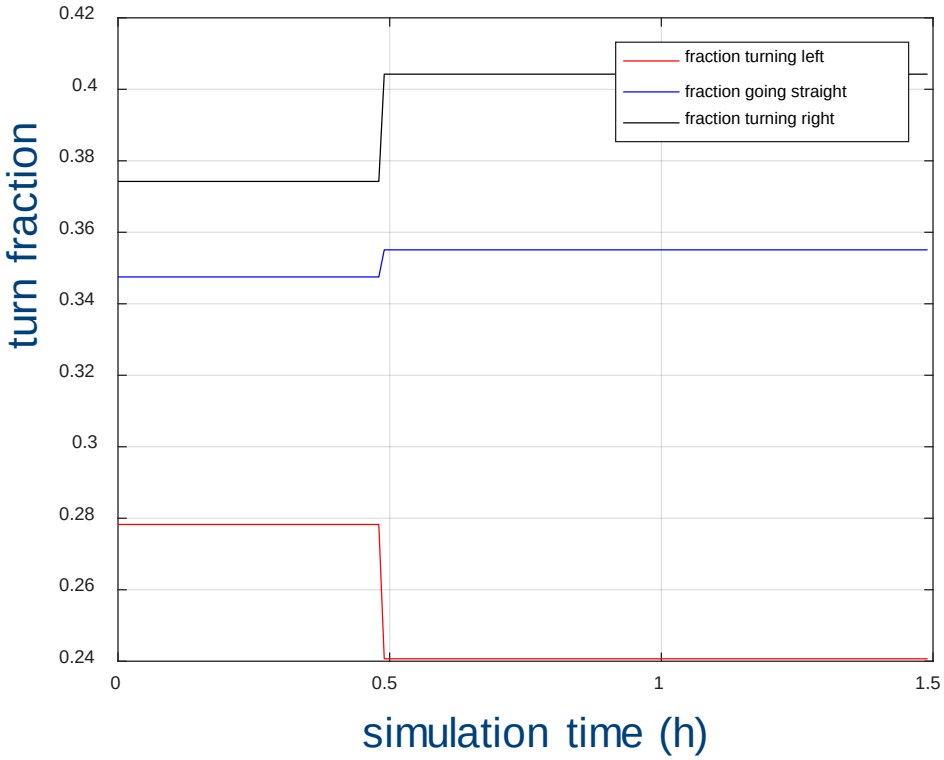
Intersection Delay







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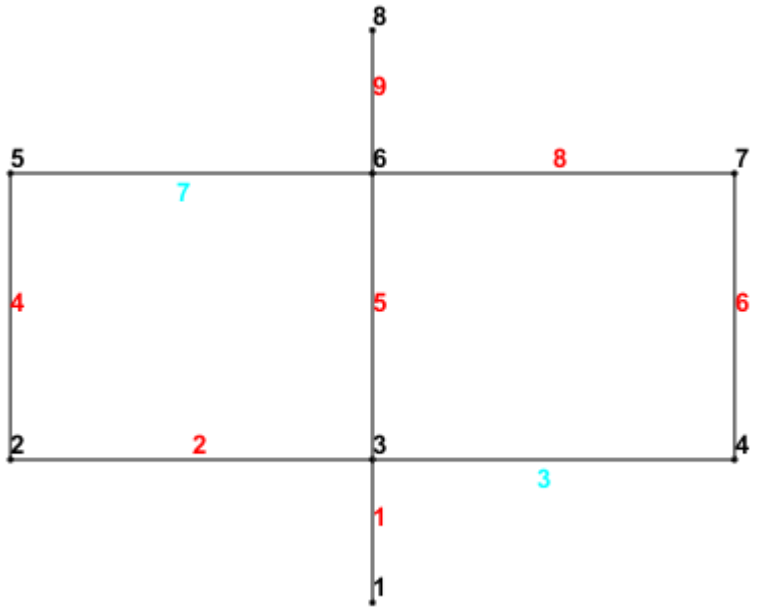
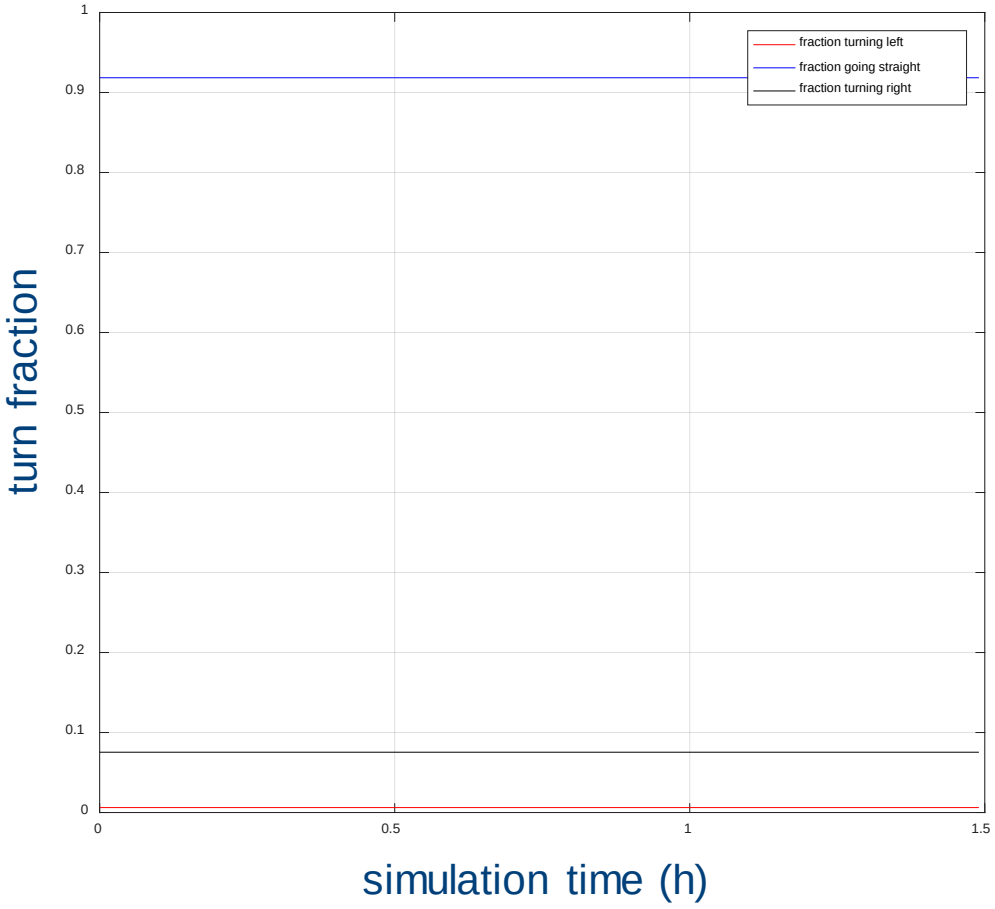
Intersection Delay – Left, Right Penalty





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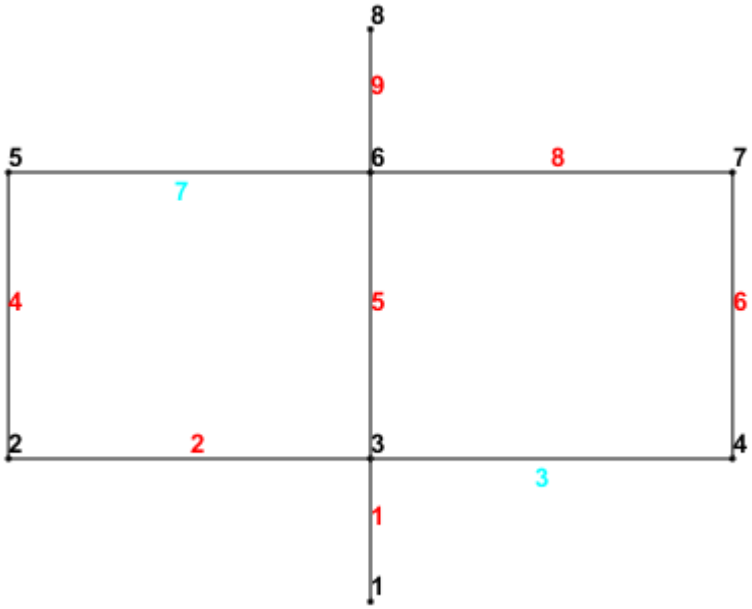
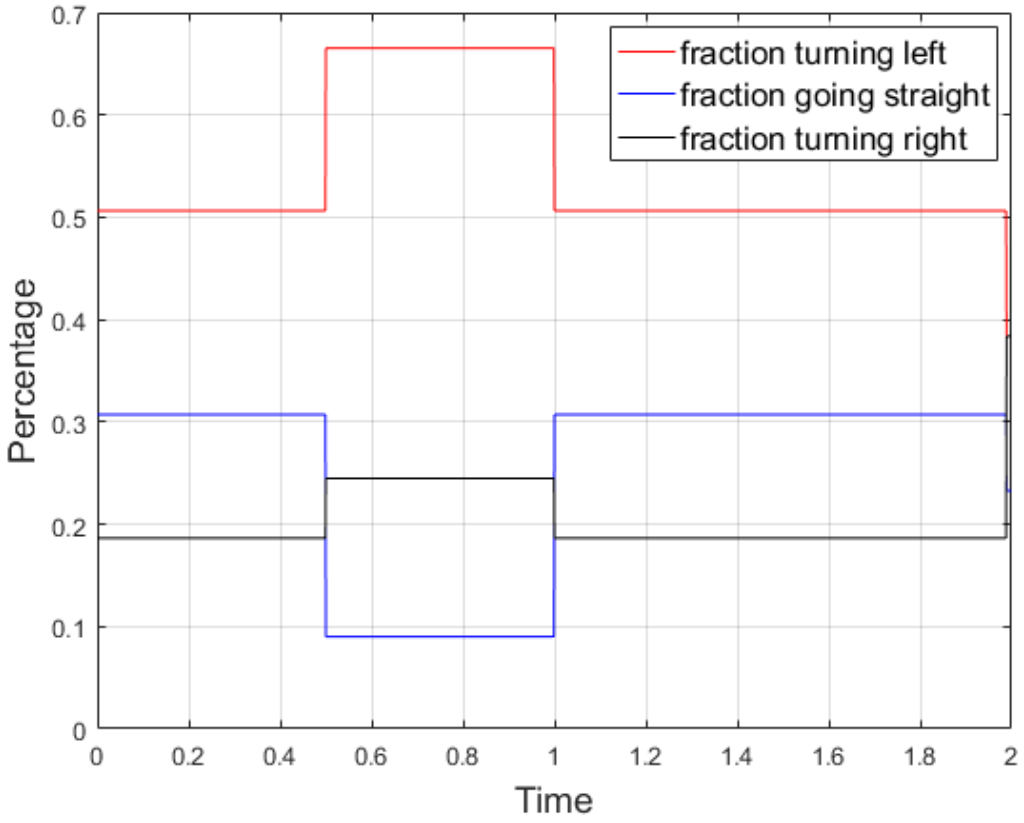
Dynamic toll





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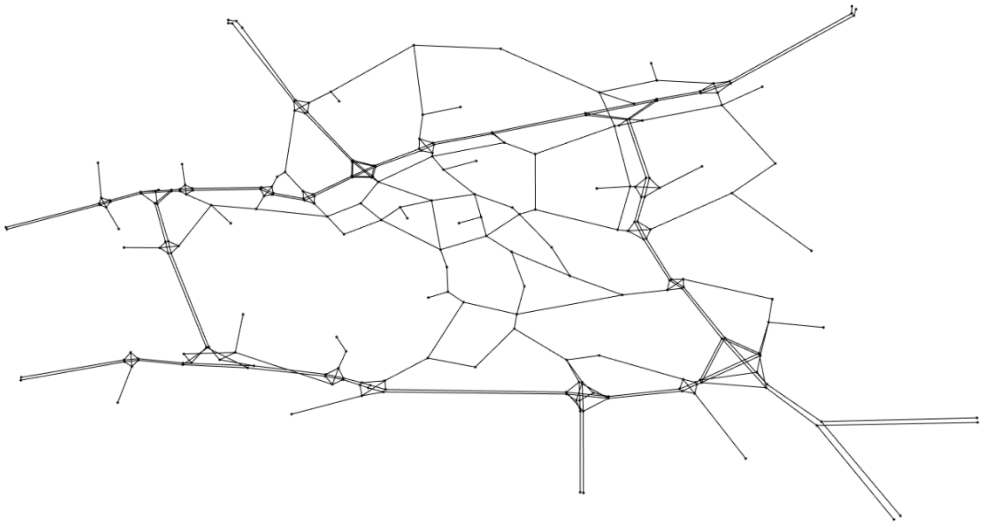
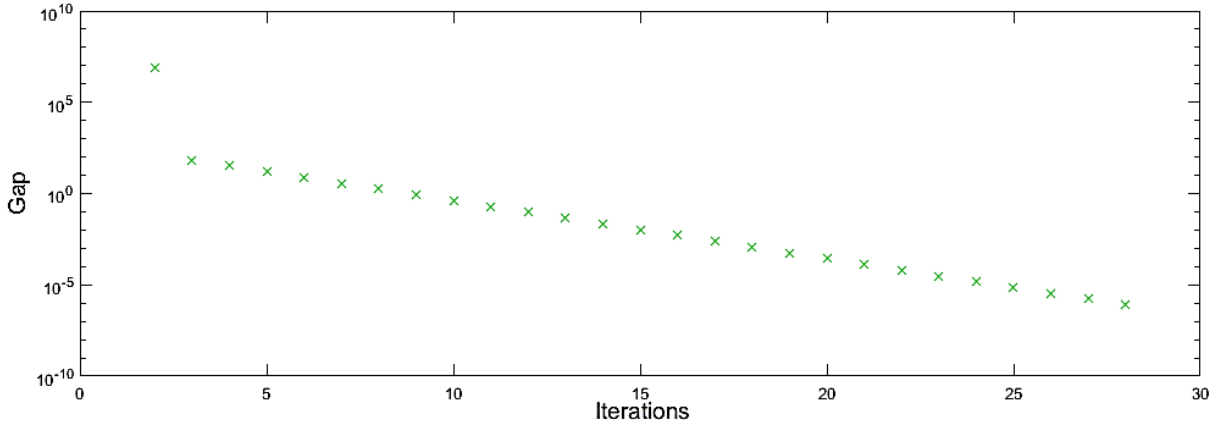
Rotterdam



Network	size	#Nodes	#Links	#OD's	#Dest	Period
Rotterdam	600 km	331	562	1890	44	4h



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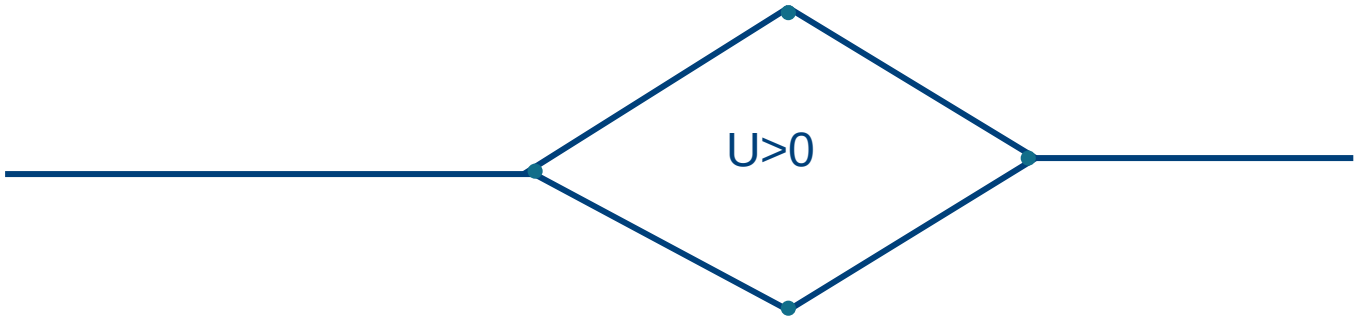
Guaranteed solution?

$$\mathbf{z} = \mathbf{M}\mathbf{z} + \mathbf{b} \Longleftrightarrow (\mathbf{I} - \mathbf{M})\,\mathbf{z} = \mathbf{b}$$



Route set generator

- Vaste route set
- Enkel realistische routes (criteria voor selecteren)

Of evaluator?

Conclusie

- Volledige vaste route set
  - In DTA?
  - Stabieler (betere convergentie)
  - Uitbreidbare turn utiliteiten

  - Minpunt onlogische routes

Niet alleen als keuze model, ook als evaluator of generator

Vragen