Bevorzugter Zitierstil für diesen Vortrag

Scheduling models in MatSim

KW Axhausen

IVT
ETH
Zürich

January 2011
Learning approach of the generic one-day transport model

\[ k(t,r,j)_{i,n} \]

Competition for slots on networks and in facilities

Mental map

Activity scheduling

\[ q_i \equiv (t,r,j)_{i,n} \]
Equilibrium search in ABM & assignment combinations

Initial schedules

 OD aggregation

Assignment

$Q_{ij,t}$

$q_i \equiv p(t,r,j)_{i,n}$

Distribution of schedules

$k(t,r,j)_Q$
Equilibrium search in MATSim

Initial schedules

Simulation of flows on networks and to facilities

$q_i \equiv (t,r,j)_{i,n}$

$(Optimal)$ Replanning (inc. connection)

$k(t,r,j)_{i,n}$

Score (utility) calculation

$U_i(t,r,j)_{i,n}$
Current Vickrey-type utility function

\[ U_{\text{plan}} = U_{\text{act}} + U_{\text{travel}} \]

\[ U_{\text{act}} = U_{\text{act,ij}} + U_{\text{act,ij}'} \]

\[ U_{\text{travel}} = \sum_{i=1}^{n} \sum_{i=1}^{n} U_{\text{travel,ij}} \]
Activity scheduling with Vickrey-style utility function

- Number and type of activities
- Sequence of activities
  - Start and duration of activity
  - Composition of the group undertaking the activity
  - Expenditure division
  - Location of the activity
- Movement between sequential locations
  - Location of access and egress from the mean of transport
    - Parking type
  - Vehicle/means of transport
  - Route/service
  - Group travelling together
  - Expenditure division
Number and sequence of activities

MATSIM

• Conditional random draw from observed chains

Alternatives:

• Bowman-style NL logit models
• Albatross – style rule based models
Start and duration of activities

MATSIM

- Random mutation (minutes)
- planomat – GA based optimisation (minutes)

Alternatives:

- (Bowman-style NL logit models) for rough time-periods
- Albatross – style rule based models
Location of activities

MATSIM

• Workplace/School: Conditional random allocation
• Other: Time-spaced constrained random allocation
• Other: Time-space and capacity constrained RUM/ML model

Alternatives:

• (Bowman-style NL logit models)
• Albatross – style rule based models
Choice of main mode

MATSIM

- Initial plan: MNL
- Updates: planomat – GA-based optimisation

Alternatives:

- (Bowman-style NL logit models)
- Albatross-style mode choice
Choice of access mode/point

MATSIM

- Public transport: Next stop and walking
- Parking: Part of shortest path with BPR-based capacity functions for the parking links

Alternatives:

- Generally ignored
Shortest path between locations

MATSIM

- A* - Dijkstra

Alternatives:

- Out-of-scope
Activity schedule with Joh-style utility function

- Number and type of activities
- Sequence of activities
  - Start and duration of activity
  - Composition of the group undertaking the activity
  - Expenditure division
  - Location of the activity
- Movement between sequential locations
  - Location of access and egress from the mean of transport
    - Parking type
  - Vehicle/means of transport
  - Route/service
  - Group travelling together
  - Expenditure division
Joh’s 2004 utility function for activities

\[ U_{\text{perf},ij}(t_{\text{perf},ij}) = U_{ij}^{\text{min}} + \frac{U_{ij}^{\text{max}} - U_{ij}^{\text{min}}}{(1 + \gamma_{ij} \cdot \exp[\beta_{ij}(\alpha_{ij} - t_{\text{perf},ij})])^{1/\gamma_{ij}}} \]
Planomat-X with schedule recycling

Utility in utility points

Travel distance in meters

Travel time in seconds

MATSim iteration

Utility

Travel distance

Travel time
Planomat-X with schedule recycling

Final average utility score of executed schedules (in utility points)

Initial score = 2.28

Replanning runtime* per agent (in msec)

15

676

151
Activity scheduling with some **best response modules**

- **Number and type of activities**
- **Sequence of activities**
  - **Start and duration of activity**
  - Composition of the group undertaking the activity
  - Expenditure division
  - **Location of the activity**
  - Movement between sequential locations
    - **Location of access and egress from the mean of transport**
      - Parking type and location
    - **Vehicle/means of transport**
    - **Route/service**
    - Group travelling together
    - Expenditure division
Source of variation in MATSim tomorrow

• Home location
• Work location

• Congestion feedback from facilities and network

• Quality of location
• Social network membership

• Agent-specific taste parameters (via socio-demographics)
• (Agent-specific choice sets)
Activity scheduling with some best response modules

- Number and type of activities
- Sequence of activities

- Start and duration of activity
- Composition of the group undertaking the activity
- Expenditure division
- Location of the activity

- Movement between sequential locations

- Location of access and egress from the mean of transport
  - Parking type and location
- Vehicle/means of transport
- Route/service
- Group travelling together
- Expenditure division
• Dr. Michael Balmer, senozon AG
• Dr. David Charypar
• Francesco Ciari
• Christoph Dobler
• Dr. Matthias Feil
• Dr. Jeremy K. Hackney
• Andreas Horni
• Konrad Meister
• Kirill Müller
• Nicolas Lefebvre
• Dr. Marcel Rieser, senozon AG
• Dr. Nadine Schüssler
• Rashid Waraich