MATSIM-T: A micro-simulation system of activity demand

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May 2006
Development team

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How do we explain behaviour at the microscopic level?

Elements:

- Generalised costs of the route-mode-location alternative
- Budgets and long term commitments
- Taste (Values, attitudes, life style) by socio demographics
- Personal world (i.e. Mental map)
- Social network membership (minimum: household)
Generalised cost of a route-mode-destination alternative

Elements:

- (Comfort and risk adjusted) time spent traveling, inc. schedule delay (relative to intended arrival time)
- (Decision time-frame relevant) monetary expenditure
- (Comfort and risk adjusted) time spent at the location by type
- Activity expenditure
- Social content
Overall learning approach

- Competition for slots on networks and in facilities
- Activity scheduling
- Mental map

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

$q_i = (t,r,j)_{i,n}$
Side remark

Competition for slots on networks and in facilities

Activity scheduling

Parameter calibration

Observed schedules and generalised costs

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

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

\[ \beta_{i,t,r,j,k} \]
Overall approach: Getting started

“World”

Competition for slots on networks and in facilities

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

Mental map

Activity scheduling

Population

\[ \beta_{i,t, r,j,k} \]

\[ q_i = (t,r,j)_{i,n} \]
planomat: The task

employee

housewife

young pupil
planomat: GA-based scheduler

- ~3 seconds / agent
Test bed: Kanton Zürich

All relevant networks and facilities:

- NavTeq network
- Time-tabled public transport
- Estimate of facilities for each hectare

Agent population by hectare (7 dimensions) (1.2 mio)
Travel demand

Detailed measurements
Speeding up the process (1% sample)
10% sample (Part 1)

Population

1 Conversion
- Municipalities
  - Landuse raster
- Activity pattern distribution

2 Mapping
- Raster to municipality

3 Distribution
- Adding activity chains
- Plans
  - Person attributes
  - Home raster (R)
  - Home municipality (M)
  - Activity chain

4 Distribution
- Work & education
  - Commuters

Pendlermatrix 2000

5 Disaggregation
- Municipality to raster
- Plans
  - Person attributes
  - Home raster (R)
  - Home municipality (M)
  - Activity chain
  - Location (M) prim-act
10% sample (Part 1)

**Plans**
- Person attributes
- Home Raster (L_ID)
- Activity chain
- Location (L_ID) Prim-Act
- Location (L_ID) Sec-Act
- Initial times

**Landuse raster data**

**6 Location Choice**

**Initial Activity Timing**
adding initial start time & activity durations

**Initial times**

**8 Modal Split**

**Mode distribution**

**Plans (%) mit**
- Person attributes
- Home Raster (L_ID)
- Activity chain
- Location (L_ID) Prim-Act
- Location (L_ID) Sec-Act
- Initial times

**Swiss Street Network**

**Matsim**
route and time re-planning

**Plans**
- Person attributes
- Home raster (R)
- Activity chain
- Location (R) prim-act
- Location (R) sec-act
MATSIM-T simulates the OD matrix
MATSIM-T converges ODs into schedules
MATSIM-T starts with schedules
Next steps

- Transfer to www.sourceforge.net
- Adding co-developers
- Regaining full scheduler (planomat)
- Further improvement of the optimiser of the planomat
- Parameter estimates for the scheduler
- Visualisation and analysis tools
- Integration of tools to design systems (DRT, parking capacities, etc.)
- Integrating social networks
Sources

Software:

www.matsim.org

Papers:

www.ivt.ethz.ch/vpl/publications/reports/index_EN
Starting points

Balmer, M., K.W. Axhausen and K. Nagel (Forthcoming) A demand generation framework for large scale micro-simulations, Transportation Research Record.


