On the Way to a Multi-Modal Energy-Efficient Route

Matthias Prandtstetter
AIT Austrian Institute of Technology
Mobility Department
Dynamic Transportation Systems
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From A to B

finding routes from A to B

- different objectives (e.g. shortest, fastest, etc.)
- incorporate different mode of transport (e.g. walking, car, public transport)
- intermodal routes
- efficient w.r.t. runtimes
- independent (e.g. interchangeable maps)

Energy Efficiency

- incorporating e-mobility
- range anxiety
- suggestion of recharging stations

Computation of Energy Consumption

- kinetic energy

$$E_{kin} = 1/2 \cdot mv^2 \tag{1}$$

- potential energy

$$E_{pot} = mGh \tag{2}$$

- drag

$$E_{drag} = 1/2 c_W A \rho v^2 \cdot l \tag{3}$$

- rolling friction

$$E_{roll} = c_R F_N \cdot l \tag{4}$$

- auxiliary consumers

$$E_{aux} = \sum_{dev} P_{dev} \cdot t \tag{5}$$

Computation of Energy Consumption
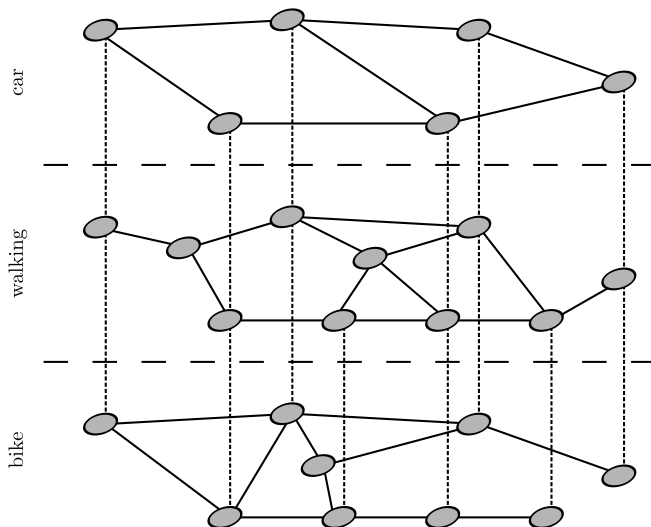
- total energy consumption without recuperation

$$E_{tot} = E_{kin} + E_{pot} + E_{drag} + E_{roll} + E_{aux} \tag{6}$$

- total energy consumption with recuperation

$$E_{tot} = \frac{E_{kin} + E_{pot} + E_{drag} + E_{roll} + E_{aux}}{0.8} - \left(E_{kin}^- + E_{pot}^- \right) \cdot 0.6 \tag{7}$$
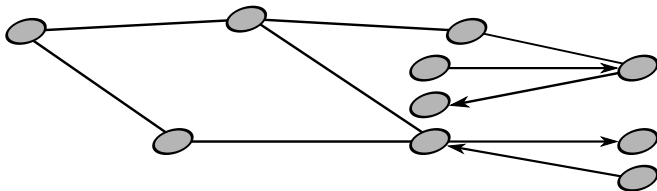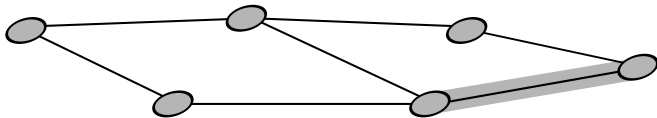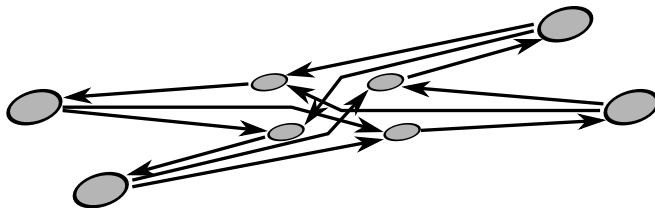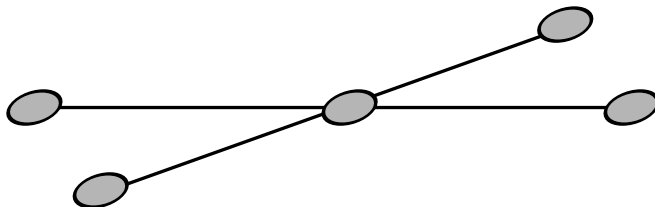
Map Representation
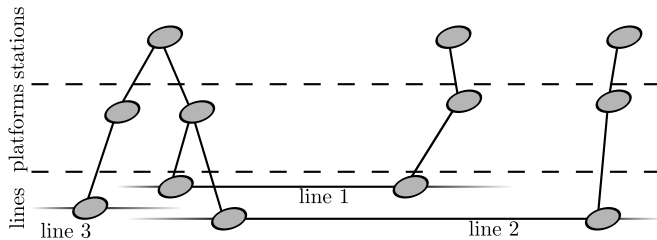
Multi-Modality

Map Representation

Access Restrictions

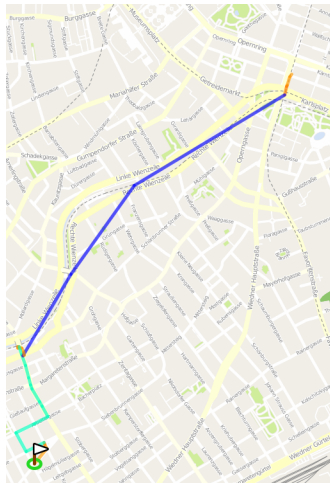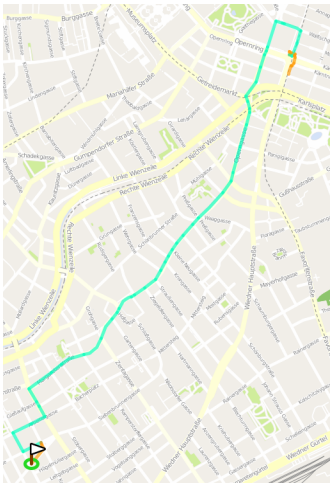# Map Representation

Turn Restrictions

Map Representation

Public Transport

Results

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