

Extraktion eines Bewegungsmodells basierend auf Kartenmaterial von OpenStreetMap

(zur Simulation von Bewegungen innerhalb eines verteilten
Kamerasystems)

–Projektseminar v0.9–

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Gliederung

Einleitung

OSMConverter

Integration

Evaluierung

Einstieg

- ▶ Smart Cameras?
- ▶ OpenStreetMap
- ▶ warum eigene Lösung?



OpenStreetMap-Datenquelle

- ▶ WebExport
- ▶ planet.osm
- ▶ Metro-Projekt

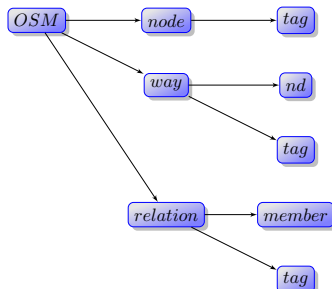
The screenshot displays the OpenStreetMap web application interface. On the left, a sidebar features the OpenStreetMap logo, a search bar containing 'Erfurt', and a list of links including 'Help', 'Community', and 'Map Key'. The main content area is divided into a top navigation bar with 'View', 'Edit', 'History', and 'Export' tabs, and a central map area. The 'Export' tab is active, showing a dialog box with the following sections:

- Export**: A 'Close' button and a section for 'Area to Export' with input fields for coordinates (51.047, 10.9235, 11.1587, 50.9175) and a 'Manually select a different area' button.
- Format to Export**: Radio buttons for 'OpenStreetMap XML Data' (selected), 'Map image (shows standard layer)', and 'Embeddable HTML'.
- Licence**: Text stating 'OpenStreetMap data is licensed under the Open Data Commons Open Database License (ODbL)'.
- Export**: A button at the bottom of the dialog.

The background map shows a detailed view of Erfurt, Germany, with a red pin marking the city center. The map includes labels for various districts and landmarks. The bottom of the interface features a scale bar (0 to 2 km) and a compass.

OpenStreetMap-Aufbau

► Node, Way, Relation -Tags



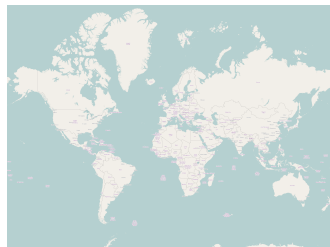
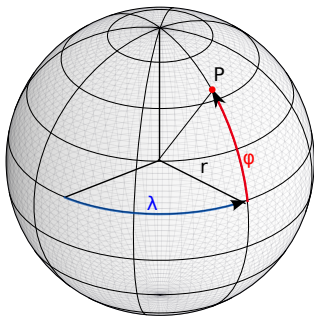
OpenStreetMap-Auszug

```
<osm>
  <node id="$ID" lat="$LAT" lon="$LON">
    <tag k="$KEY" v="$VALUE"/>
  </node>
  <way id="$ID" >
    <nd ref="$REF"/>
    <tag k="$KEY" v="$VALUE"/>
  </way>
  <relation id="$ID" >
    <member type="$TYPE" ref="$REF"/>
    <tag k="$KEY" v="$VALUE" />
  </relation>
</osm>
```

OpenStreetMap-Transporttypen/Projektion

- ▶ `typ= route`
- ▶ `route=train,light_rail,subway,tram,bus`
- ▶ typischer Relationenaufbau: `WWNWWNWWN`
- ▶ Mercator-Projektion der Knotenpositionen

→ Kartenprojektion



OpenStreetMap-Schichten (Ilmenau)

Level 0



Level 0+1

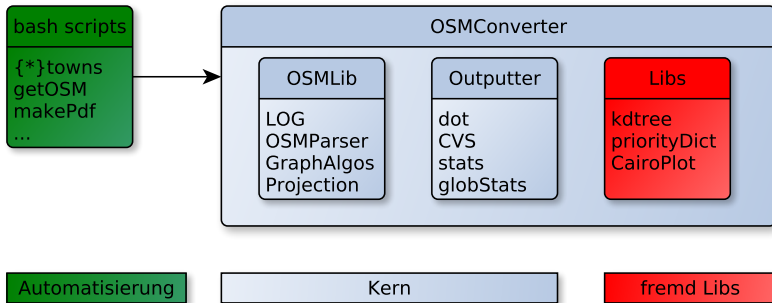


Level 0+1+2

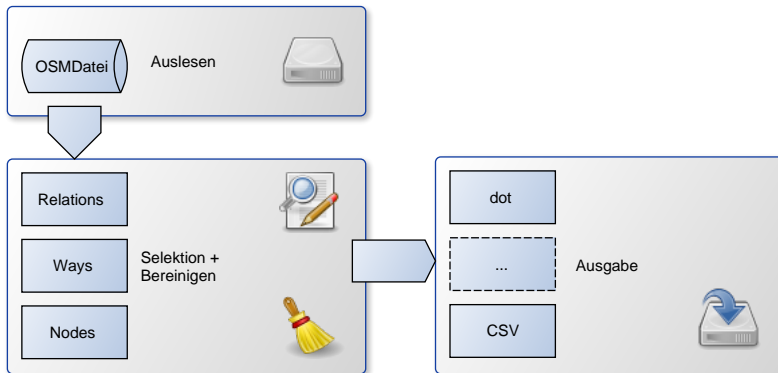


- ▶ Routinggraph
- ▶ Darstellung via Dot
- ▶ Graph-Metriken
- ▶ formales Bewegungsmodell
- ▶ Simulationserweiterungen

OSMConverter-Aufbau



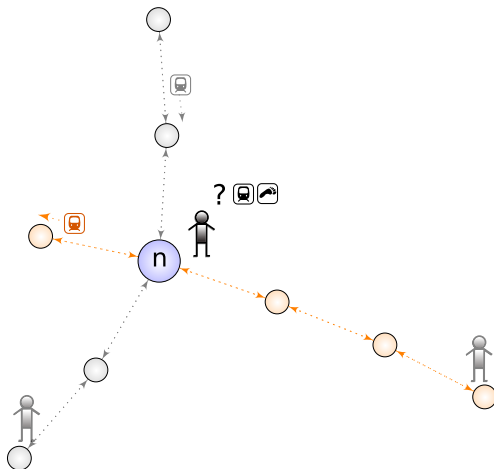
OSMConverter-Ablauf



Beispielaufruf (Berlin: neue metro.osm)

Simulation/Bewegungsmodell

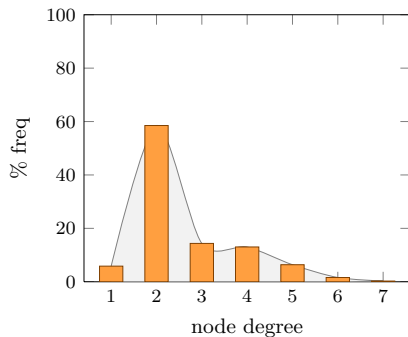
► Annahmen:



Evaluierung (Berlin)

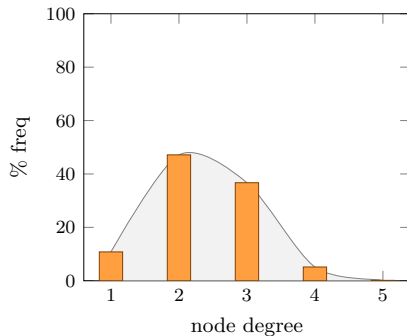


Berlin vs synthetisch



deg_{avg} cc_{global} $|E|$ deg_{max}
 2.61 0.14 983 7

$\overline{deg_{avg}}$ $\overline{cc_{global}}$ $\overline{|E|}$ $\overline{deg_{max}}$
 2.36 0.03 890 4.5



deg_{min} $|V|$
 1 376

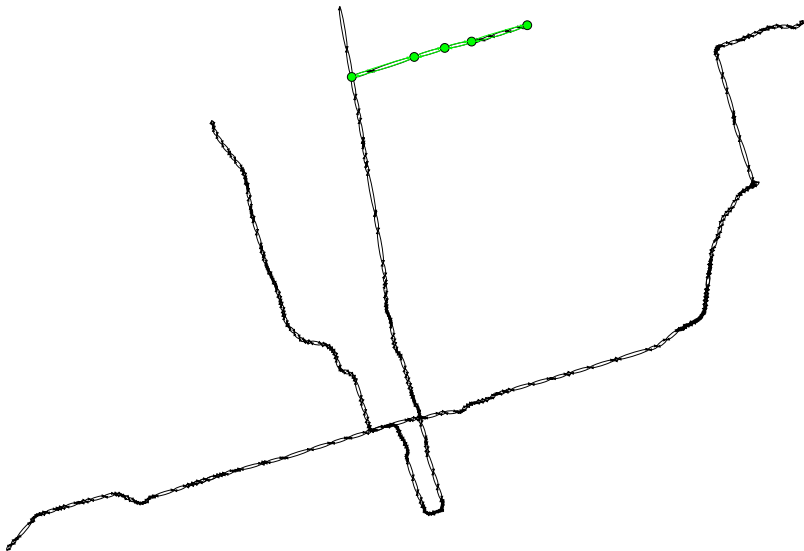
$\overline{deg_{min}}$ $|V|$
 1 376

weitere Städte

Stadt	deg_{avg}	cc_{global}	$ E $	deg_{max}	deg_{min}	$ V $
Paris	2.4	0.04	763	12	1	314
Rom	2.0	0.02	152	4	1	75
Frankfurt	2.5	0.09	526	11	1	208
Boston	2.0	0.03	98	5	1	49
Amsterdam	2.0	0.03	104	4	1	52
Shanghai	2.1	0.01	452	5	1	210
Karlsruhe	2.2	0.11	553	5	1	250
New-York	2.7	0.09	603	13	1	219
St. Petersburg	2.0	0.01	117	5	1	58
London	2.3	0.15	125	8	1	54

⇒ ähnliche Eigenschaften

Qualität (Toronto)



Fragen?

Vielen Dank für Ihre Aufmerksamkeit.

