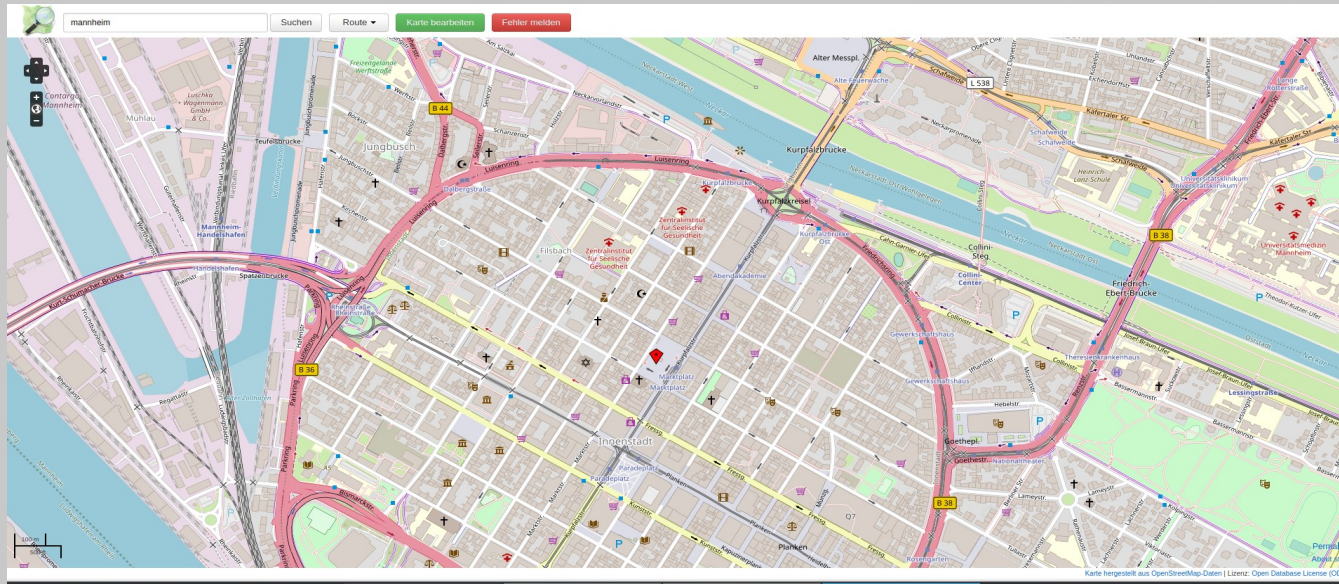


SUMO OSM POI Tools

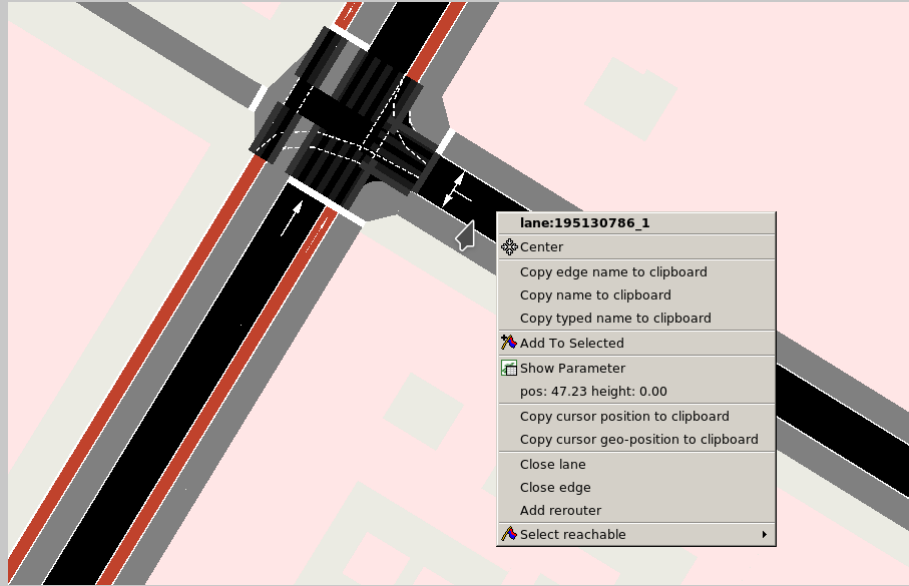


This document describes some useful Tools to work with Points of Interest (POIs) from Open Street Map (OSM) Data in SUMO Traffic Simulations.

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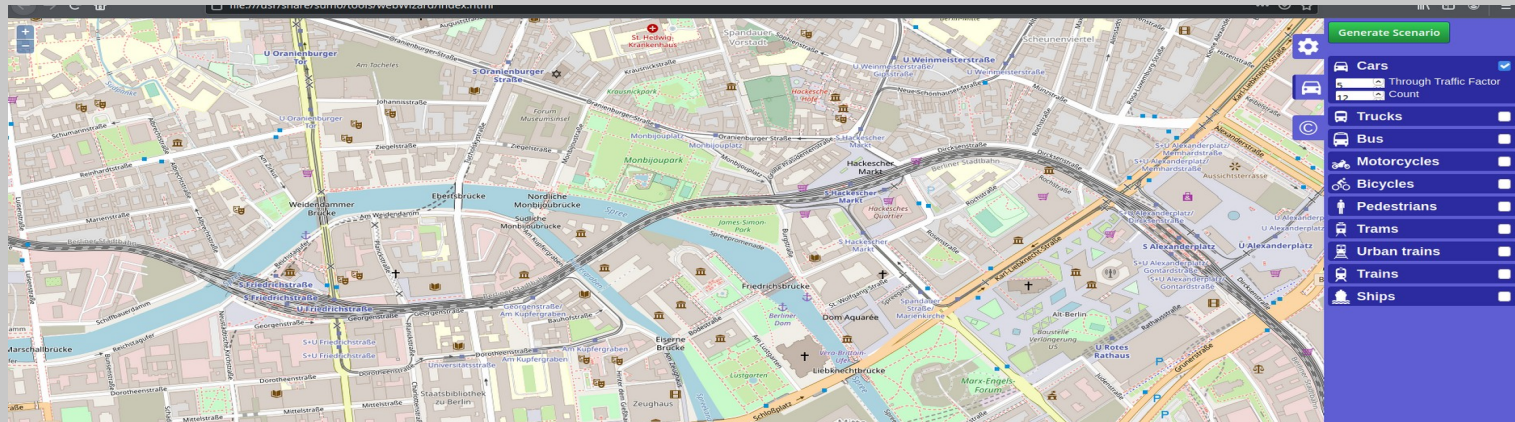
Motivation to develop the OSM POI Tools



In our research project “KI4ROBOFLEET” we faced the problem, that Routes can only be defined by Edges and Lanes in SUMO. Importing a map from Open Street Maps allows just to display the POIs (and Polygons), but an interaction between POIs (or Polygons) and vehicles is not possible in SUMO.

Therefore a workaround has to be found. Another issue was the import of parking Areas, which are exported by OSM but cannot be utilized in SUMO. Finally we also wanted to have a nice SUMO Map with customized colors of the POIs and Polygons. To get all this issues done automatically, we wrote some useful scripts with a GUI for a user friendly usage.

Step 1: Use the osmWebWizard



Change to your SUMO_HOME Directory (e.g. /usr/share/sumo)
Go to the subdirectory “tools” (e.g. /usr/share/sumo/tools)
Type “python osmWebWizard.py” and the browser starts
Pick a region on the Map and make settings for random traffic
Click the “Generate Scenario” Button and SUMO starts.

Step 2: inspect the created files

Check where the newly created files are stored (e.g. *home/myname/Sumo/2020-12-03-17-58-39*)

Following files should have been created by the OSM WebWizard:

- build.bat
- osm_bbox.osm.xml
- osm.netccfg
- osm.net.xml
- osm.passenger.trips.xml
- osm.polycfg
- osm.poly.xml
- osm.sumocfg
- osm.view.xml
- run.bat

The number of created files depends on the settings in OSM WebWizard

Step 2: inspect the created files

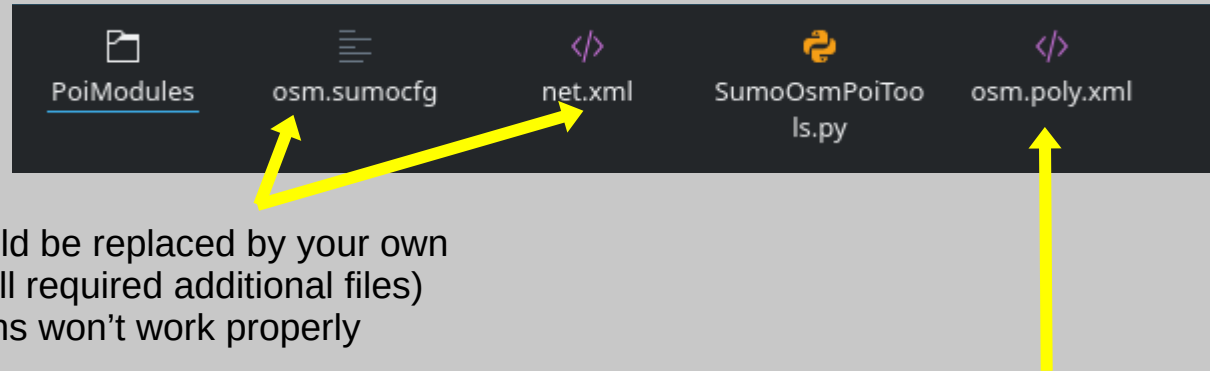
Description of the created files:

build.bat	Microsoft batch file which we don't use
osm_bbox.osm.xml	
osm.netcfg	Configuration File for SUMO "netconvert" (not used)
osm.net.xml	The bare street-Net (without any buildings, etc.)
osm.passenger.trips.xml	List of random routes for random car traffic
osm.polycfg	Configzration File for SUMO "polyconvert"(not used)
osm.poly.xml	List of all POIs and Polygons of the Map
osm.sumocfg	SUMO Main file which loads all other files
osm.view.xml	View (and delay) Settings for the SUMO GUI
run.bat	Microsoft batch file which we don't use

Step 3: Start the GUI for the SUMO OSM POI Tools

1. Chang to the directory “SumoOsmPoiTools”

You will find the following files:



This 2 dummy files should be replaced by your own
osm.sumocfg file (with all required additional files)
Otherwise some functions won't work properly

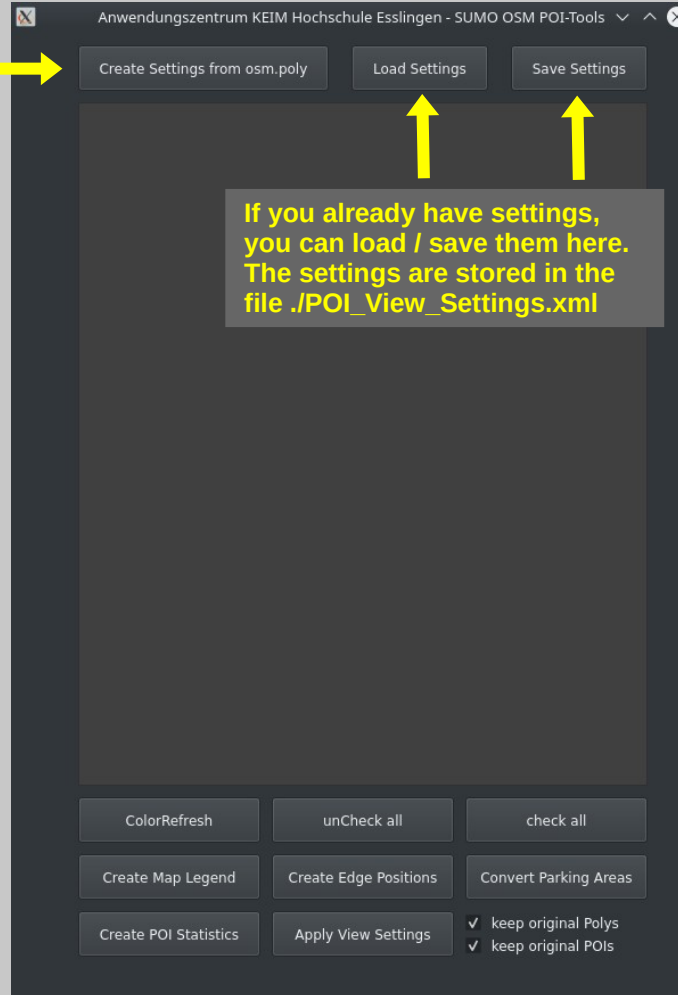
2. Replace this file with your own “osm.poly.xml” from Step 2

3. Run the python3 script:

```
/SumoOsmPoiTools$ python3 SumoOsmPoiTools.py
```

Step 4: create initial Settings

By pressing this button
all <poly> and <poi> Tags
are read from “osm.poly.xml”
and random colors are assigned



Step 5: adjust and apply Settings

The screenshot shows the 'Anwendungszentrum KEIM Hochschule Esslingen - SUMO OSM POI-Tools' window. At the top, there are buttons: 'Create Settings from osm.poly', 'Load Settings', and 'Save Settings'. Below these is a table with the following columns: Type, Name, visibility, RGB, fill polys, and Layer. The first row is highlighted in yellow and contains the following data: POLY: man_made.surveillance, ✓, isVisible, 255, 69, 38, 1, 1.00. Below the table are several buttons: 'ColorRefresh', 'unCheck all', 'check all', 'Create Map Legend', 'Create Edge Positions', 'Convert Parking Areas', and 'Apply View Settings'. At the bottom right, there are two checkboxes: 'keep original Polys' and 'keep original POIs'. Arrows point from the text boxes to these elements: one to the first row of the table, one to the 'ColorRefresh' button, one to the 'unCheck all' button, one to the 'Apply View Settings' button, and one to the 'keep original POIs' checkbox.

Type	Name	visibility	RGB	fill polys	Layer
POLY: man_made.surveillance		✓ isVisible	255 69 38	1 1.00	
POLY: amenity.bicycle_repair_s		✓ isVisible	182 113 128	1 1.00	
POLY: building.hut		✓ isVisible	127 166 112	1 1.00	
POLY: building.train_station		✓ isVisible	182 228 222	1 1.00	
POLY: building.ship		✓ isVisible	55 143 219	1 1.00	
POLY: historic.ship		✓ isVisible	224 88 89	1 1.00	
POLY: tourism.museum		✓ isVisible	93 105 123	1 1.00	
POLY: sport.soccer;basketball		✓ isVisible	215 197 74	1 1.00	
POI: amenity.fast_food		✓ isVisible	193 175 158	1 1.00	
		✓ isVisible	185 0 118	1 1.00	
		✓ isVisible	107 130 149	1 1.00	
		✓ isVisible	107 130 149	1 1.00	
		✓ isVisible	107 130 149	1 1.00	

press here after changing RGB values to refresh the displayed colors

press here to (un)check all entries

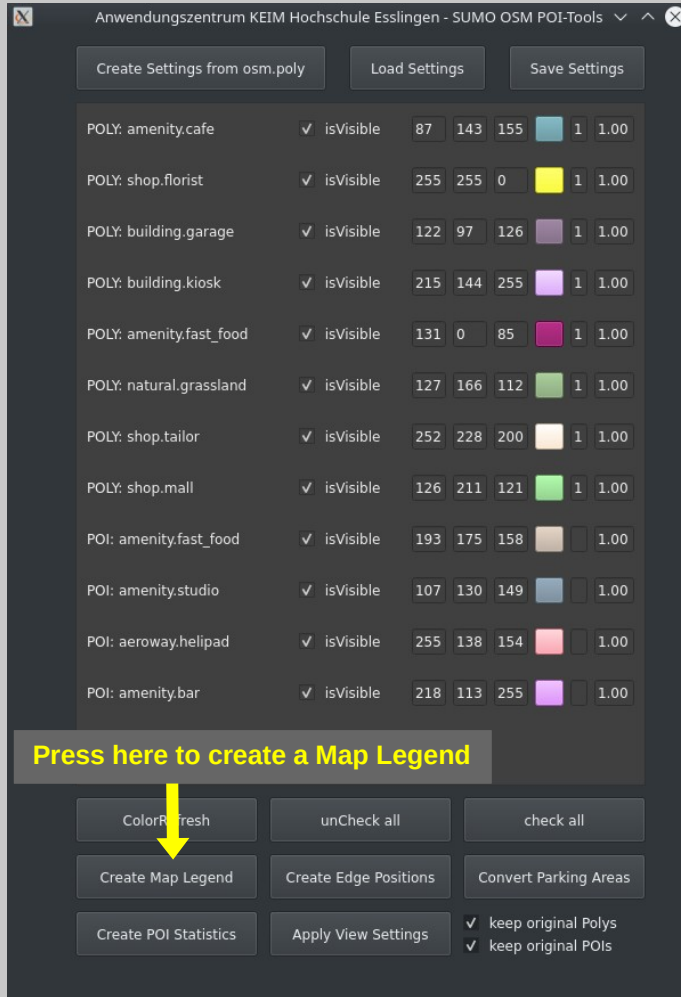
Set here how to deal with entries in osm.poly.xml for which no settings are defined

Finally press here to apply the current settings to your osm.poly.xml
-> a new file "osm.poly.customized.xml" is created

To make the Settings visible in SUMO you have to Replace the original osm.poly.xml with the osm.poly.customized.xml

Set here how to deal with entries in osm.poly.xml for which no settings are defined

Step 6: (optionally) create a Map Legend



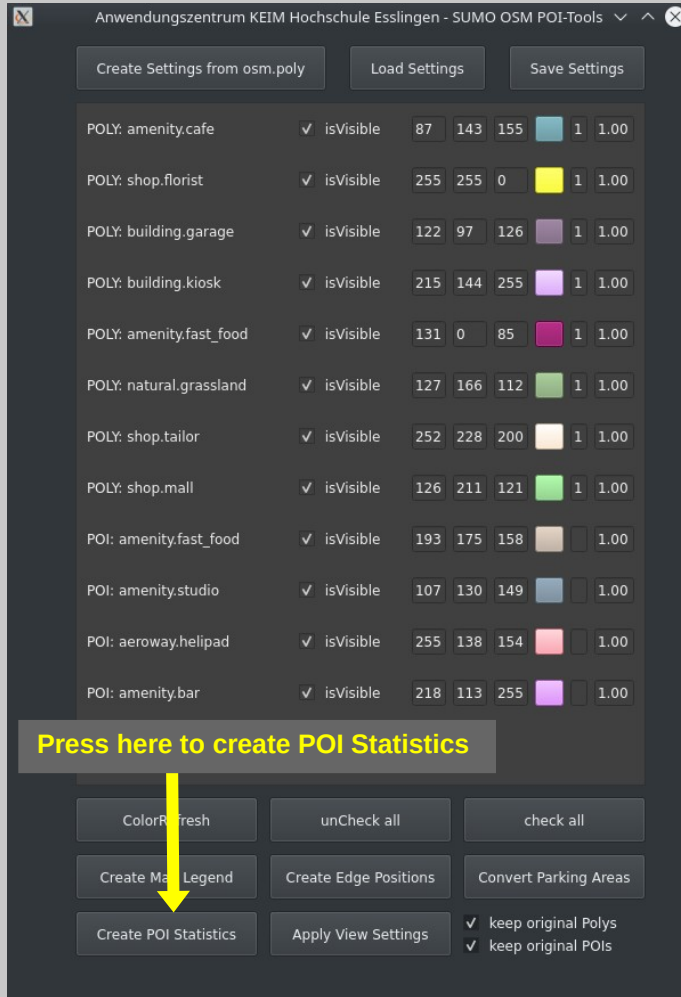
Squares for POLYs

Circles for POIs

amenity.cafe
shop.florist
building.garage
building.kiosk
amenity.fast_food
natural.grassland
shop.tailor
shop.mall
amenity.fast_food
amenity.studio
aeroway.helipad
amenity.bar

The file ./POI_Legend.png is created

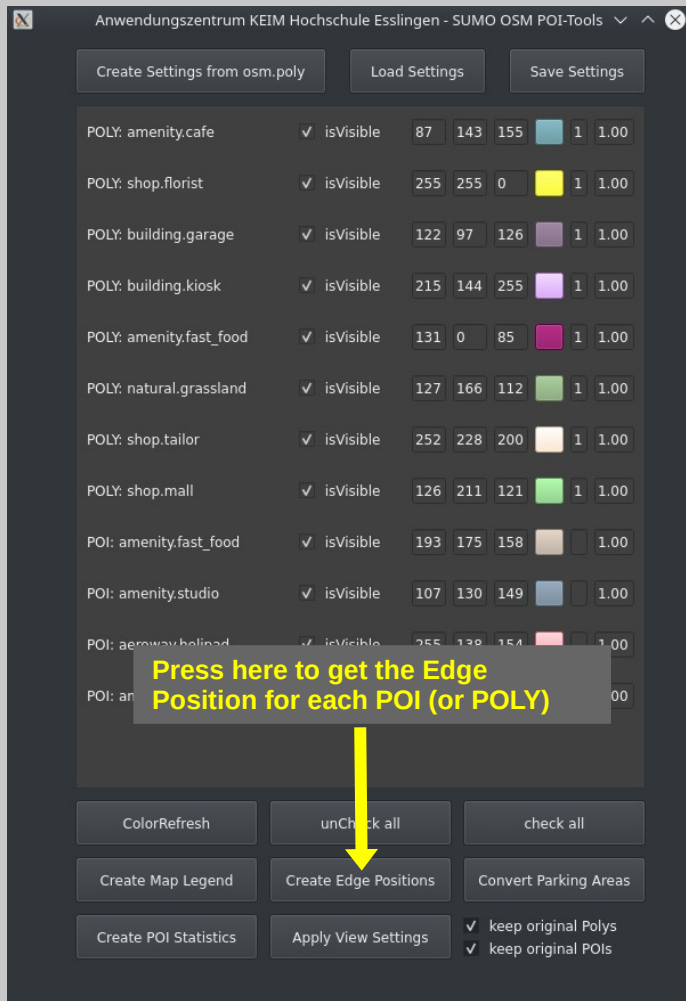
Step 7: (optionally) create POI Statistics



82 poly,shop.doityourself,1
83 poly,natural.tree_row,7
84 poly,waterway.river,2
85 poly,sport.swimming,1
86 poly,amenity.fuel,1
87 poly,building.parish_hall,1
88 poly,historic.memorial,2
89 poly,amenity.social_centre,1
90 poly,amenity.bicycle_parking,7
91 poly,building.memorial,1
92 poly,tourism.artwork,1
93 poly,building.silo,2
94 poly,landuse.brownfield,1
95 poly,sport.basketball;soccer,1
96 poly,building.construction,9
97 poly,landuse.construction,6
98 poly,landuse.retail,3
99 poly,man_made.water_tower,1
100 poly,sport.multi,2
101 poly,historic.passage,1
102 poly,man_made.bridge,6
103 poly,sport.table_tennis,3
104 poly,man_made.surveillance,1
105 poly,amenity.bicycle_repair_station,1
106 poly,building.hut,1
107 poly,building.train_station,1
108 poly,building.ship,1
109 poly,historic.ship,1

The file **./PoiStatistics.csv** is created.
Each unique entry in **osm.poly.xml** is counted

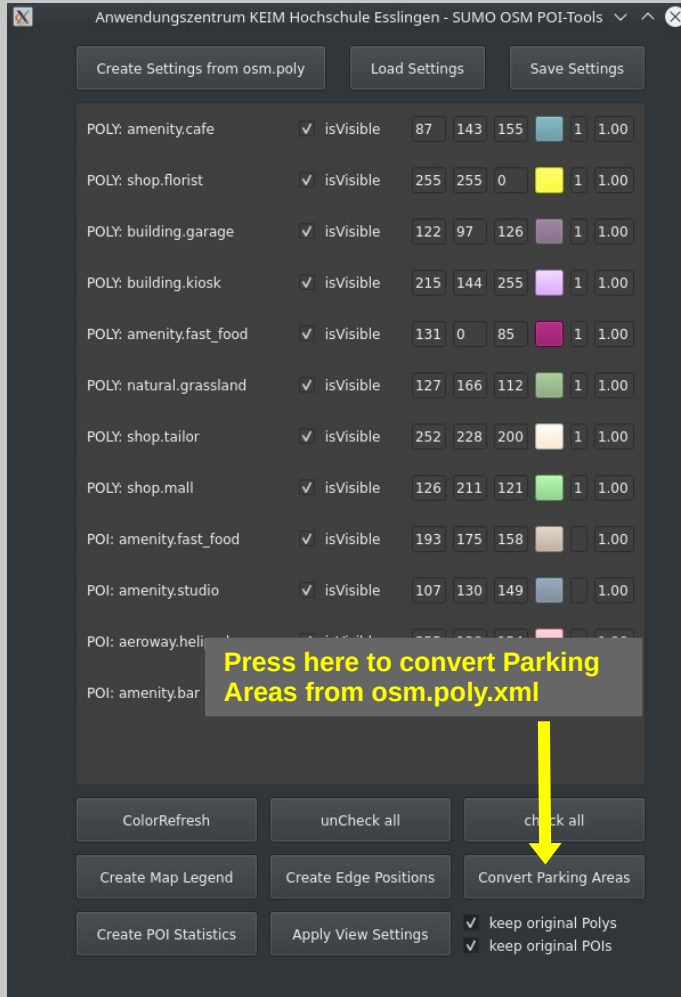
Step 8: create POI EdgePositions file



```
<polyposition>
<polyposition id="147407756" type="amenity.bar" lane="25548343#1 0" position="11.47" details="{ 'addr:city':
<polyposition id="168246142" type="amenity.cafe" lane="171452686 0" position="65.92" details="{ 'addr:city':
<polyposition id="174441433" type="aeroway.helipad" lane="169689583#3 0" position="8.96" details="{ 'aeroway
<polyposition id="178958709#1" type="shop.florist" lane="793914526 w1 0" position="4.02" details="{ 'addr:c
<polyposition id="182747680" type="building.garage" lane="334457598#0 0" position="99.14" details="{ 'build
<polyposition id="182747698" type="building.garage" lane="169684595#2 0" position="26.32" details="{ 'addr:c
<polyposition id="182747707" type="building.garage" lane="237029638#1 0" position="41.90" details="{ 'buildi
<polyposition id="182748611" type="building.garage" lane="2449795599 0 0" position="3.23" details="{ 'build
<polyposition id="182748613" type="building.garage" lane="334457598#0 0" position="51.56" details="{ 'build
<polyposition id="182748615" type="building.garage" lane="169689362#0 0" position="36.67" details="{ 'build
<polyposition id="182750865" type="building.garage" lane="532149775#2 0" position="41.46" details="{ 'build
<polyposition id="182750867" type="building.garage" lane="532149775#2 0" position="20.09" details="{ 'build
<polyposition id="182753486" type="building.garage" lane="24608228 0" position="69.78" details="{ 'building'
<polyposition id="182753488" type="building.garage" lane="24608228 0" position="32.14" details="{ 'building'
<polyposition id="182754714" type="building.garage" lane="169684595#5 0" position="15.57" details="{ 'buildi
<polyposition id="182754715" type="building.garage" lane="169684595#7 0" position="10.83" details="{ 'buildi
<polyposition id="182754717" type="building.garage" lane="169684595#2 0" position="69.18" details="{ 'buildi
<polyposition id="185332035" type="building.kiosk" lane="clus_r 1763710124 1 3718516 1763718524 28226023
<polyposition id="188472750" type="amenity.fast_food" lane="175077738 0" position="10.45" details="{ 'addr:c
<polyposition id="189928045" type="natural.grassland" lane="24377399 0" position="482.76" details="{ 'natura
<polyposition id="197146176" type="amenity.fast_food" lane="5997830#0 0" position="12.05" details="{ 'addr:c
<polyposition id="197146181#1" type="shop.tailor" lane="27088458 w2 0" position="2.58" details="{ 'addr:cit
<polyposition id="197885379#1" type="shop.mall" lane="174845336#0 0" position="120.71" details="{ 'addr:city
<polyposition id="209312375" type="building.garage" lane="25832158 0" position="22.88" details="{ 'building
<polyposition id="209497671" type="amenity.bar" lane="258979225#1 0" position="17.46" details="{ 'addr:city'
<polyposition id="209967643" type="building.garage" lane="209962016 0" position="40.41" details="{ 'building
```

The file `./EdgePositions.xml` is created.
The lane ID and the lanePosition can be used to define Start- and Endpoints for SUMO Routes (from one POI or POLY to another)

Step 9: convert Parking Areas

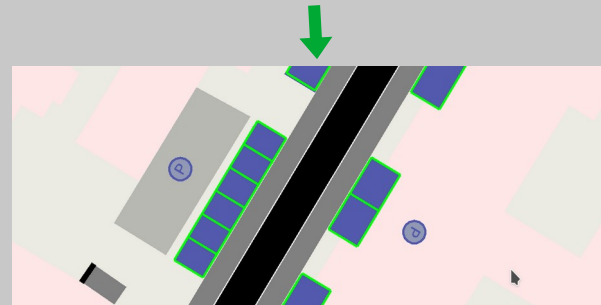


```
2 <additional>
3 <parkingArea id="101202313" lane="564962290#1 0" friendlyPos="true" roadsideCapacity="1" startPos="101.92" endPos="101.92"/>
4 <parkingArea id="101219015" lane="40350414#3 0" friendlyPos="true" roadsideCapacity="1" startPos="76.26" endPos="76.26"/>
5 <parkingArea id="102203931" lane="24554928#0 0" friendlyPos="true" roadsideCapacity="1" startPos="18.98" endPos="18.98"/>
6 <parkingArea id="102559458" lane="264144246 0" friendlyPos="true" roadsideCapacity="1" startPos="17.80" endPos="17.80"/>
7 <parkingArea id="102664328" lane="-74194500#0 0" friendlyPos="true" roadsideCapacity="1" startPos="38.36" endPos="38.36"/>
8 <parkingArea id="102902690" lane="22332013#1 0" friendlyPos="true" roadsideCapacity="1" startPos="3.51" endPos="3.57"/>
9 <parkingArea id="111556866" lane="236135657 w0 0" friendlyPos="true" roadsideCapacity="1" startPos="0.00" endPos="0.00"/>
10 <parkingArea id="114806087" lane="150549252#1 0" friendlyPos="true" roadsideCapacity="1" startPos="26.38" endPos="90.88"/>
11 <parkingArea id="130294359" lane="-131229979 0" friendlyPos="true" roadsideCapacity="1" startPos="17.06" endPos="21.77"/>
12 <parkingArea id="131229978" lane="114323879#1 0" friendlyPos="true" roadsideCapacity="10" startPos="37.40" endPos="37.40"/>
13 <parkingArea id="150570217" lane="-4403852#0 0" friendlyPos="true" roadsideCapacity="1" startPos="16.31" endPos="16.31"/>
```

The file ./parkingAreas.xml is created.

```
6 <configuration xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
7
8   <input>
9     <net-file value="osm.net.xml"/>
10    <route-files value="InitialRoute.xml"/>
11    <additional-files value="osm.poly.xml, parkingAreas.xml"/>
12  </input>
```

Add parkingAreas.xml to osm.sumocfg



Now the Parking Areas are visible in the Map (and not just as an osm.poly.xml entry)
The Parking Areas can be utilized now by the vehicles.