Understanding the microscopic simulation mechanism using GMNS and DTALite v0.5

Data set

DLSim/release at main · asu-trans-ai-lab/DLSim · GitHub

Learning Goal:

Levels of modeling elements:

Category	Lement	GMNS file names
A	Network	Node.csv, link.csv
b	Demand	input_path.csv
c	Signal	timing.csv,
D	Scenario	Setting
E1	Link output	link_performance.csv,
E2	Path output	path.csv
E3	Agent output	agent.csv
E4	Trajectory output	trajectory.csv

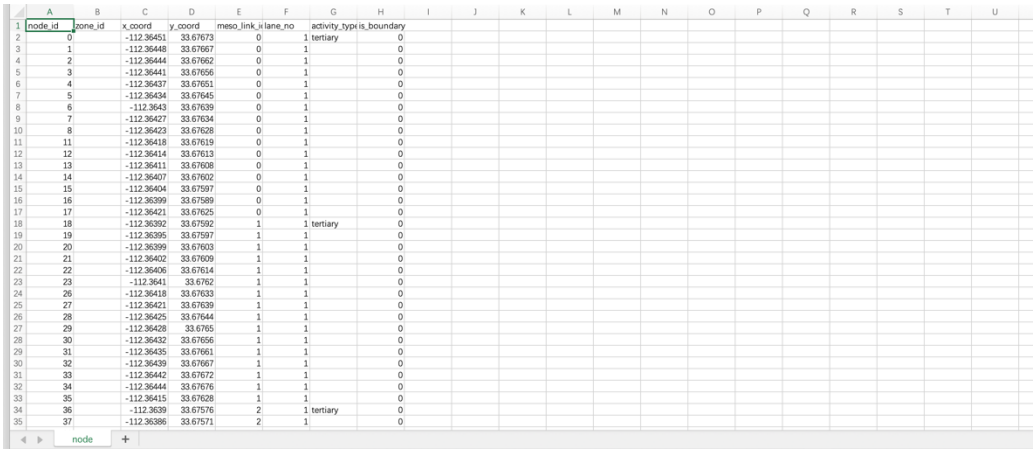
1. Network Generation

Export map.osm from OpenStreetMap and use osm2gmns to generate node.csv and link.csv with GMNS format for complete network. Then, use net2cell to generate cell based microscopic network.

Testing scripts

GitHub - asu-trans-ai-lab/osm_test_data_set

osm_test_data_set/loop_101.ipynb at main · asu-trans-ai-lab/osm_test_data_set · GitHub



node_id	zone_id	x_coord	y_coord	meso_link_id	lane_no	activity_type	is_boundary
0		-112.36451	33.67673	0	1	tertiary	0
1		-112.36448	33.67667	0	1		0
2		-112.36444	33.67662	0	1		0
3		-112.36441	33.67656	0	1		0
4		-112.36437	33.67651	0	1		0
5		-112.36434	33.67645	0	1		0
6		-112.3643	33.67639	0	1		0
7		-112.36427	33.67634	0	1		0
8		-112.36423	33.67628	0	1		0
11		-112.36418	33.67619	0	1		0
12		-112.36414	33.67613	0	1		0
13		-112.36411	33.67608	0	1		0
14		-112.36407	33.67602	0	1		0
15		-112.36404	33.67597	0	1		0
16		-112.36399	33.67589	0	1		0
17		-112.36421	33.67625	0	1		0
18		-112.36392	33.67592	1	1	tertiary	0
19		-112.36395	33.67597	1	1		0
20		-112.36399	33.67603	1	1		0
21		-112.36402	33.67609	1	1		0
22		-112.36406	33.67614	1	1		0
23		-112.3641	33.6762	1	1		0
24		-112.36418	33.67633	1	1		0
25		-112.36421	33.67639	1	1		0
26		-112.36425	33.67644	1	1		0
27		-112.36428	33.6765	1	1		0
28		-112.36432	33.67656	1	1		0
29		-112.36435	33.67661	1	1		0
30		-112.36439	33.67667	1	1		0
31		-112.36442	33.67672	1	1		0
32		-112.36444	33.67676	1	1		0
33		-112.36415	33.67628	1	1		0
34		-112.3639	33.67576	2	1	tertiary	0
35		-112.36386	33.67571	2	1		0

node

FIG. 1 NODE.CSV

link_id	from_node	to_node_id	facility_type	dir_flag	length	lanes	capacity	free_speed	link_type	cost	geometry	meso_link_i	cell_type	additional_c	movement_str
0	0	1			7	1		nan	1		LINESTRING	0	1	0	
1	1	2			7	1		nan	1		LINESTRING	0	1	0	
2	2	3			7	1		nan	1		LINESTRING	0	1	0	
3	3	4			7	1		nan	1		LINESTRING	0	1	0	
4	4	5			7	1		nan	1		LINESTRING	0	1	0	
5	5	6			7	1		nan	1		LINESTRING	0	1	0	
6	6	7			7	1		nan	1		LINESTRING	0	1	0	
7	7	8			7	1		nan	1		LINESTRING	0	1	0	
8	8	17			4.38293219	1		nan	1		LINESTRING	0	1	0	
9	17	11			7	1		nan	1		LINESTRING	0	1	0	
10	11	12			7	1		nan	1		LINESTRING	0	1	0	
11	12	13			7	1		nan	1		LINESTRING	0	1	0	
12	13	14			7	1		nan	1		LINESTRING	0	1	0	
13	14	15			7	1		nan	1		LINESTRING	0	1	0	
14	15	16			9.85781206	1		nan	1		LINESTRING	0	1	0	
15	18	19			7	1		nan	1		LINESTRING	1	1	0	
16	19	20			7	1		nan	1		LINESTRING	1	1	0	
17	20	21			7	1		nan	1		LINESTRING	1	1	0	
18	21	22			7	1		nan	1		LINESTRING	1	1	0	
19	22	23			7	1		nan	1		LINESTRING	1	1	0	
20	23	35			9.81031711	1		nan	1		LINESTRING	1	1	0	
21	35	26			7	1		nan	1		LINESTRING	1	1	0	
22	26	27			7	1		nan	1		LINESTRING	1	1	0	
23	27	28			7	1		nan	1		LINESTRING	1	1	0	
24	28	29			7	1		nan	1		LINESTRING	1	1	0	
25	29	30			7	1		nan	1		LINESTRING	1	1	0	
26	30	31			7	1		nan	1		LINESTRING	1	1	0	
27	31	32			7	1		nan	1		LINESTRING	1	1	0	
28	32	33			7	1		nan	1		LINESTRING	1	1	0	
29	33	34			4.33543725	1		nan	1		LINESTRING	1	1	0	
30	36	37			7	1		nan	1		LINESTRING	2	1	0	
31	37	38			7	1		nan	1		LINESTRING	2	1	0	
32	38	39			7	1		nan	1		LINESTRING	2	1	0	
33	39	40			7	1		nan	1		LINESTRING	2	1	0	

link

FIG. 2 LINK.CSV

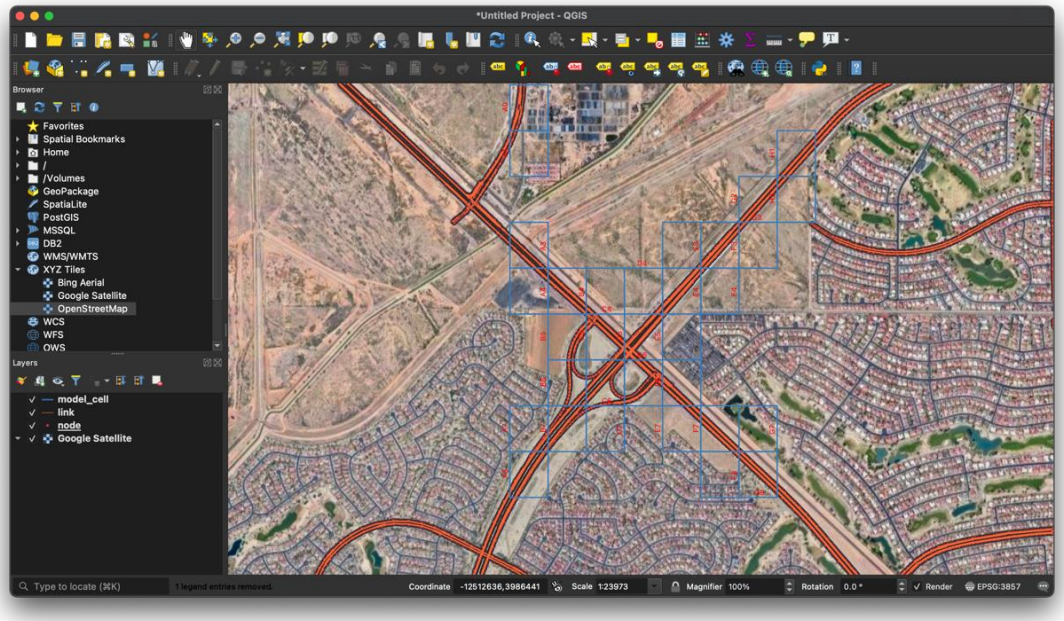
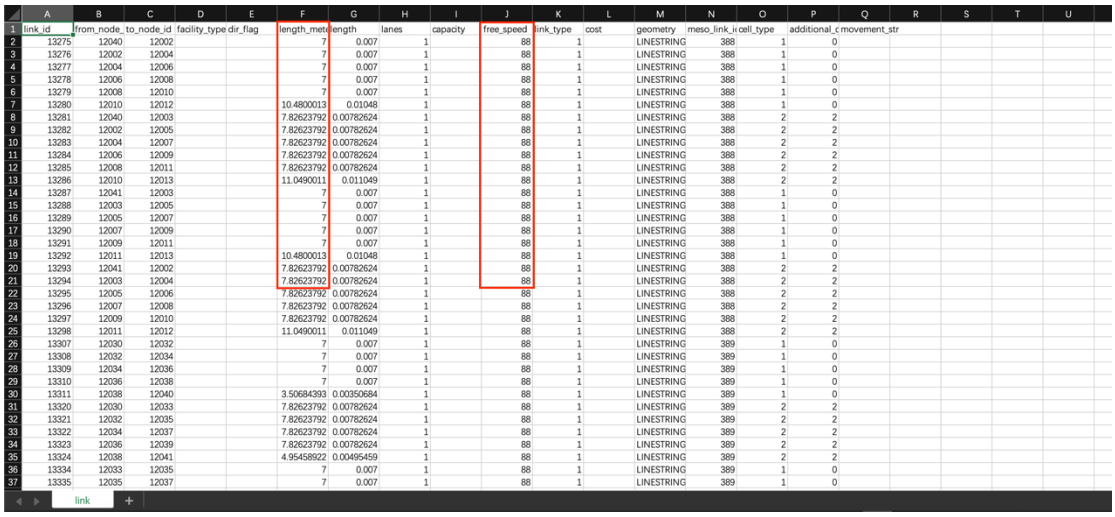


FIG. 3 VISUALIZATION IN QGIS

Here are some steps to process network information.

1) Change the unit of length (from meters to km) in link.csv.
2) Give default values of free_speed, capacity and vdf_tt in link.csv.
3) Lane change penalty in link.csv.
4) Use model cell_code to select subarea node.csv and link.csv.

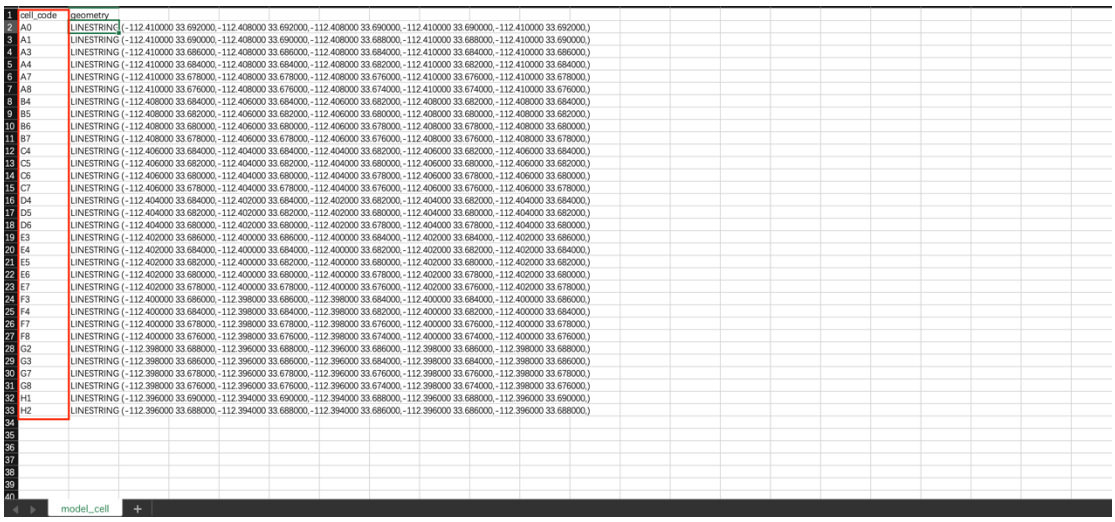
Select a subset of nodes within the defined cell_codes, e.g. A3, A4, B3, B4 and use VLOOKUP to screen the nodes and from_node_id, to_node_id in links.csv



link_id	from_node_	to_node_id	facility_type	dir_flag	length_meti	length	lanes	capacity	free_speed	link_type	cost	geometry	meso_link_ii	cell_type	additional_c	movement_str
13275	12040	12002			7	0.007	1		88	1		LINESTRING	388	1	0	
13276	12002	12004			7	0.007	1		88	1		LINESTRING	388	1	0	
13277	12004	12006			7	0.007	1		88	1		LINESTRING	388	1	0	
13278	12006	12008			7	0.007	1		88	1		LINESTRING	388	1	0	
13279	12008	12010			7	0.007	1		88	1		LINESTRING	388	1	0	
13280	12010	12012			10.4800013	0.01048	1		88	1		LINESTRING	388	1	0	
13281	12040	12003			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13282	12002	12005			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13283	12004	12007			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13284	12006	12009			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13285	12008	12011			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13286	12010	12013			11.0490011	0.011049	1		88	1		LINESTRING	388	2	2	
13287	12041	12003			7	0.007	1		88	1		LINESTRING	388	1	0	
13288	12003	12005			7	0.007	1		88	1		LINESTRING	388	1	0	
13289	12005	12007			7	0.007	1		88	1		LINESTRING	388	1	0	
13290	12007	12009			7	0.007	1		88	1		LINESTRING	388	1	0	
13291	12009	12011			7	0.007	1		88	1		LINESTRING	388	1	0	
13292	12011	12013			10.4800013	0.01048	1		88	1		LINESTRING	388	1	0	
13293	12041	12002			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13294	12003	12004			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13295	12005	12006			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13296	12007	12008			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13297	12009	12010			7.82623792	0.00782624	1		88	1		LINESTRING	388	2	2	
13298	12011	12012			11.0490011	0.011049	1		88	1		LINESTRING	388	2	2	
13307	12030	12032			7	0.007	1		88	1		LINESTRING	389	1	0	
13308	12032	12034			7	0.007	1		88	1		LINESTRING	389	1	0	
13309	12034	12036			7	0.007	1		88	1		LINESTRING	389	1	0	
13310	12036	12038			7	0.007	1		88	1		LINESTRING	389	1	0	
13311	12038	12040			3.50684393	0.00350684	1		88	1		LINESTRING	389	1	0	
13320	12030	12033			7.82623792	0.00782624	1		88	1		LINESTRING	389	2	2	
13321	12032	12035			7.82623792	0.00782624	1		88	1		LINESTRING	389	2	2	
13322	12034	12037			7.82623792	0.00782624	1		88	1		LINESTRING	389	2	2	
13323	12036	12039			7.82623792	0.00782624	1		88	1		LINESTRING	389	2	2	
13324	12038	12041			4.95458922	0.00495459	1		88	1		LINESTRING	389	2	2	
13334	12033	12035			7	0.007	1		88	1		LINESTRING	389	1	0	
13335	12035	12037			7	0.007	1		88	1		LINESTRING	389	1	0	

link

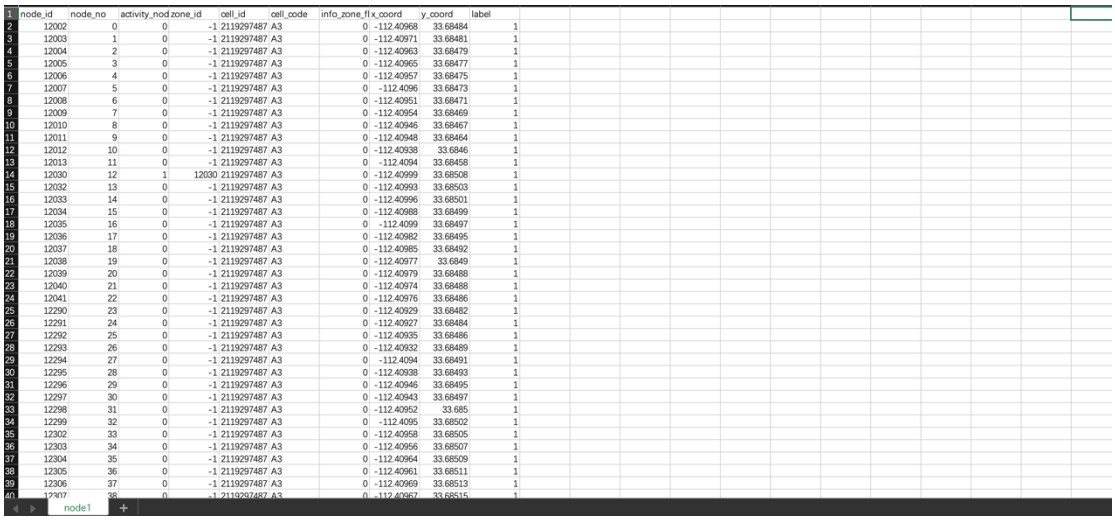
FIG. 4 MODIFICATION OF LINK.CSV (NEED TO FURTHER IMPROVEMENT)



cell_code	geometry
A0	LINESTRING (-112.410000 33.692000, -112.408000 33.692000, -112.408000 33.690000, -112.410000 33.690000, -112.410000 33.692000,)
A1	LINESTRING (-112.410000 33.690000, -112.408000 33.690000, -112.408000 33.688000, -112.410000 33.688000, -112.410000 33.690000,)
A3	LINESTRING (-112.410000 33.686000, -112.408000 33.686000, -112.408000 33.684000, -112.410000 33.684000, -112.410000 33.686000,)
A4	LINESTRING (-112.410000 33.684000, -112.408000 33.684000, -112.408000 33.682000, -112.410000 33.682000, -112.410000 33.684000,)
A7	LINESTRING (-112.410000 33.678000, -112.408000 33.678000, -112.408000 33.676000, -112.410000 33.676000, -112.410000 33.678000,)
A8	LINESTRING (-112.410000 33.676000, -112.408000 33.676000, -112.408000 33.674000, -112.410000 33.674000, -112.410000 33.676000,)
B4	LINESTRING (-112.408000 33.684000, -112.406000 33.684000, -112.406000 33.682000, -112.408000 33.682000, -112.408000 33.684000,)
B5	LINESTRING (-112.408000 33.682000, -112.406000 33.682000, -112.406000 33.680000, -112.408000 33.680000, -112.408000 33.682000,)
B6	LINESTRING (-112.408000 33.680000, -112.406000 33.680000, -112.406000 33.678000, -112.408000 33.678000, -112.408000 33.680000,)
B7	LINESTRING (-112.408000 33.678000, -112.406000 33.678000, -112.406000 33.676000, -112.408000 33.676000, -112.408000 33.678000,)
C4	LINESTRING (-112.406000 33.684000, -112.404000 33.684000, -112.404000 33.682000, -112.406000 33.682000, -112.406000 33.684000,)
C5	LINESTRING (-112.406000 33.682000, -112.404000 33.682000, -112.404000 33.680000, -112.406000 33.680000, -112.406000 33.682000,)
C6	LINESTRING (-112.406000 33.680000, -112.404000 33.680000, -112.404000 33.678000, -112.406000 33.678000, -112.406000 33.680000,)
C7	LINESTRING (-112.406000 33.678000, -112.404000 33.678000, -112.404000 33.676000, -112.406000 33.676000, -112.406000 33.678000,)
D4	LINESTRING (-112.404000 33.684000, -112.402000 33.684000, -112.402000 33.682000, -112.404000 33.682000, -112.404000 33.684000,)
D5	LINESTRING (-112.404000 33.682000, -112.402000 33.682000, -112.402000 33.680000, -112.404000 33.680000, -112.404000 33.682000,)
D6	LINESTRING (-112.404000 33.680000, -112.402000 33.680000, -112.402000 33.678000, -112.404000 33.678000, -112.404000 33.680000,)
E3	LINESTRING (-112.402000 33.686000, -112.400000 33.686000, -112.400000 33.684000, -112.402000 33.684000, -112.402000 33.686000,)
E4	LINESTRING (-112.402000 33.684000, -112.400000 33.684000, -112.400000 33.682000, -112.402000 33.682000, -112.402000 33.684000,)
E5	LINESTRING (-112.402000 33.682000, -112.400000 33.682000, -112.400000 33.680000, -112.402000 33.680000, -112.402000 33.682000,)
E6	LINESTRING (-112.402000 33.680000, -112.400000 33.680000, -112.400000 33.678000, -112.402000 33.678000, -112.402000 33.680000,)
E7	LINESTRING (-112.402000 33.678000, -112.400000 33.678000, -112.400000 33.676000, -112.402000 33.676000, -112.402000 33.678000,)
F3	LINESTRING (-112.400000 33.686000, -112.398000 33.686000, -112.398000 33.684000, -112.400000 33.684000, -112.400000 33.686000,)
F4	LINESTRING (-112.400000 33.684000, -112.398000 33.684000, -112.398000 33.682000, -112.400000 33.682000, -112.400000 33.684000,)
F7	LINESTRING (-112.400000 33.678000, -112.398000 33.678000, -112.398000 33.676000, -112.400000 33.676000, -112.400000 33.678000,)
F8	LINESTRING (-112.400000 33.676000, -112.398000 33.676000, -112.398000 33.674000, -112.400000 33.674000, -112.400000 33.676000,)
G2	LINESTRING (-112.398000 33.688000, -112.396000 33.688000, -112.396000 33.686000, -112.398000 33.686000, -112.398000 33.688000,)
G3	LINESTRING (-112.398000 33.686000, -112.396000 33.686000, -112.396000 33.684000, -112.398000 33.684000, -112.398000 33.686000,)
G7	LINESTRING (-112.398000 33.678000, -112.396000 33.678000, -112.396000 33.676000, -112.398000 33.676000, -112.398000 33.678000,)
G8	LINESTRING (-112.398000 33.676000, -112.396000 33.676000, -112.396000 33.674000, -112.398000 33.674000, -112.398000 33.676000,)
H1	LINESTRING (-112.396000 33.690000, -112.394000 33.690000, -112.394000 33.688000, -112.396000 33.688000, -112.396000 33.690000,)
H2	LINESTRING (-112.396000 33.688000, -112.394000 33.688000, -112.394000 33.686000, -112.396000 33.686000, -112.396000 33.688000,)

model_cell

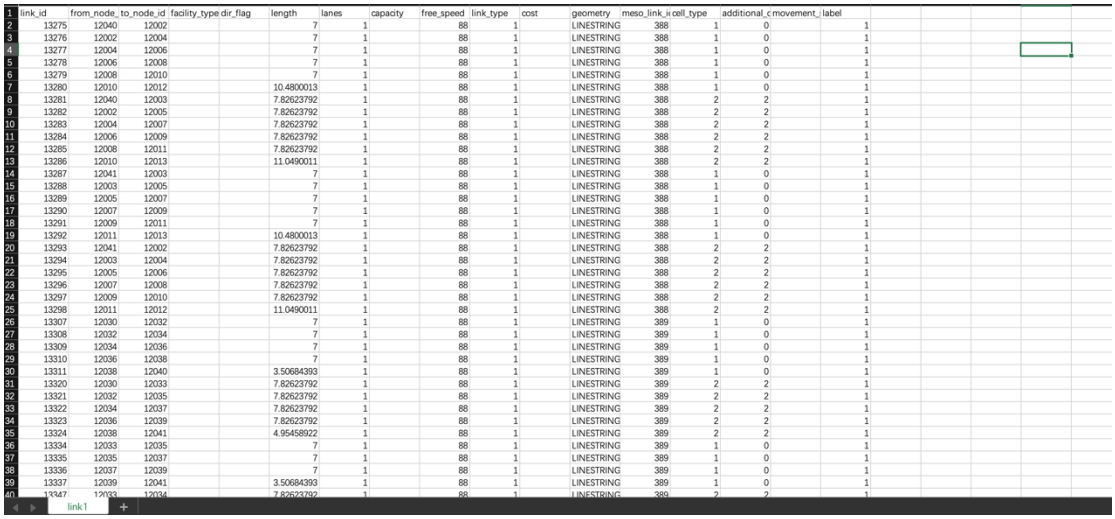
FIG. 5 MODEL_CELL.CSV



node_id	node_no	activity_nod	zone_id	cell_id	cell_code	info_zone_fl	x_coord	y_coord	label
12002	0	0	-1	2119297487	A3	0	-112.40968	33.68484	1
12003	1	0	-1	2119297487	A3	0	-112.40971	33.68481	1
12004	2	0	-1	2119297487	A3	0	-112.40963	33.68479	1
12005	3	0	-1	2119297487	A3	0	-112.40965	33.68477	1
12006	4	0	-1	2119297487	A3	0	-112.40957	33.68475	1
12007	5	0	-1	2119297487	A3	0	-112.4096	33.68473	1
12008	6	0	-1	2119297487	A3	0	-112.40951	33.68471	1
12009	7	0	-1	2119297487	A3	0	-112.40954	33.68469	1
12010	8	0	-1	2119297487	A3	0	-112.40946	33.68467	1
12011	9	0	-1	2119297487	A3	0	-112.40948	33.68464	1
12012	10	0	-1	2119297487	A3	0	-112.40938	33.6846	1
12013	11	0	-1	2119297487	A3	0	-112.4094	33.68458	1
12030	12	1	12030	2119297487	A3	0	-112.40999	33.68508	1
12032	13	0	-1	2119297487	A3	0	-112.40993	33.68503	1
12033	14	0	-1	2119297487	A3	0	-112.40996	33.68501	1
12034	15	0	-1	2119297487	A3	0	-112.40988	33.68499	1
12035	16	0	-1	2119297487	A3	0	-112.4099	33.68497	1
12036	17	0	-1	2119297487	A3	0	-112.40982	33.68495	1
12037	18	0	-1	2119297487	A3	0	-112.40985	33.68492	1
12038	19	0	-1	2119297487	A3	0	-112.40977	33.6849	1
12039	20	0	-1	2119297487	A3	0	-112.40979	33.68488	1
12040	21	0	-1	2119297487	A3	0	-112.40974	33.68488	1
12041	22	0	-1	2119297487	A3	0	-112.40976	33.68486	1
12290	23	0	-1	2119297487	A3	0	-112.40929	33.68482	1
12291	24	0	-1	2119297487	A3	0	-112.40927	33.68484	1
12292	25	0	-1	2119297487	A3	0	-112.40935	33.68486	1
12293	26	0	-1	2119297487	A3	0	-112.40932	33.68489	1
12294	27	0	-1	2119297487	A3	0	-112.4094	33.68491	1
12295	28	0	-1	2119297487	A3	0	-112.40938	33.68493	1
12296	29	0	-1	2119297487	A3	0	-112.40946	33.68495	1
12297	30	0	-1	2119297487	A3	0	-112.40943	33.68497	1
12298	31	0	-1	2119297487	A3	0	-112.40952	33.685	1
12299	32	0	-1	2119297487	A3	0	-112.4095	33.68502	1
12302	33	0	-1	2119297487	A3	0	-112.40958	33.68505	1
12303	34	0	-1	2119297487	A3	0	-112.40956	33.68507	1
12304	35	0	-1	2119297487	A3	0	-112.40964	33.68509	1
12305	36	0	-1	2119297487	A3	0	-112.40961	33.68511	1
12306	37	0	-1	2119297487	A3	0	-112.40969	33.68513	1
12307	38	0	-1	2119297487	A3	0	-112.40967	33.68515	1

node1

FIG. 6 SELECTED NODE.CSV



link_id	from_node_	to_node_id	facility_type	dir_flag	length	lanes	capacity	free_speed	link_type	cost	geometry	meso_link_i	cell_type	additional_c	movement_	label
13275	12040	12002			7	1		88	1		LINESTRING	388	1	0		1
13276	12002	12004			7	1		88	1		LINESTRING	388	1	0		1
13277	12004	12006			7	1		88	1		LINESTRING	388	1	0		1
13278	12006	12008			7	1		88	1		LINESTRING	388	1	0		1
13279	12008	12010			7	1		88	1		LINESTRING	388	1	0		1
13280	12010	12012			10.4800013	1		88	1		LINESTRING	388	1	0		1
13281	12040	12003			7.82623792	1		88	1		LINESTRING	388	2	2		1
13282	12002	12005			7.82623792	1		88	1		LINESTRING	388	2	2		1
13283	12004	12007			7.82623792	1		88	1		LINESTRING	388	2	2		1
13284	12006	12009			7.82623792	1		88	1		LINESTRING	388	2	2		1
13285	12008	12011			7.82623792	1		88	1		LINESTRING	388	2	2		1
13286	12010	12013			11.0490011	1		88	1		LINESTRING	388	2	2		1
13287	12041	12003			7	1		88	1		LINESTRING	388	1	0		1
13288	12003	12005			7	1		88	1		LINESTRING	388	1	0		1
13289	12005	12007			7	1		88	1		LINESTRING	388	1	0		1
13290	12007	12009			7	1		88	1		LINESTRING	388	1	0		1
13291	12009	12011			7	1		88	1		LINESTRING	388	1	0		1
13292	12011	12013			10.4800013	1		88	1		LINESTRING	388	1	0		1
13293	12041	12002			7.82623792	1		88	1		LINESTRING	388	2	2		1
13294	12003	12004			7.82623792	1		88	1		LINESTRING	388	2	2		1
13295	12005	12006			7.82623792	1		88	1		LINESTRING	388	2	2		1
13296	12007	12008			7.82623792	1		88	1		LINESTRING	388	2	2		1
13297	12009	12010			7.82623792	1		88	1		LINESTRING	388	2	2		1
13298	12011	12012			11.0490011	1		88	1		LINESTRING	388	2	2		1
13307	12030	12032			7	1		88	1		LINESTRING	389	1	0		1
13308	12032	12034			7	1		88	1		LINESTRING	389	1	0		1
13309	12034	12036			7	1		88	1		LINESTRING	389	1	0		1
13310	12036	12038			7	1		88	1		LINESTRING	389	1	0		1
13311	12038	12040			3.50684393	1		88	1		LINESTRING	389	1	0		1
13320	12030	12033			7.82623792	1		88	1		LINESTRING	389	2	2		1
13321	12032	12035			7.82623792	1		88	1		LINESTRING	389	2	2		1
13322	12034	12037			7.82623792	1		88	1		LINESTRING	389	2	2		1
13323	12036	12039			7.82623792	1		88	1		LINESTRING	389	2	2		1
13324	12038	12041			4.95458922	1		88	1		LINESTRING	389	2	2		1
13334	12033	12035			7	1		88	1		LINESTRING	389	1	0		1
13335	12035	12037			7	1		88	1		LINESTRING	389	1	0		1
13336	12037	12039			7	1		88	1		LINESTRING	389	1	0		1
13337	12039	12041			3.50684393	1		88	1		LINESTRING	389	1	0		1
13347	12033	12034			7.82623792	1		88	1		LINESTRING	389	2	2		1

link1

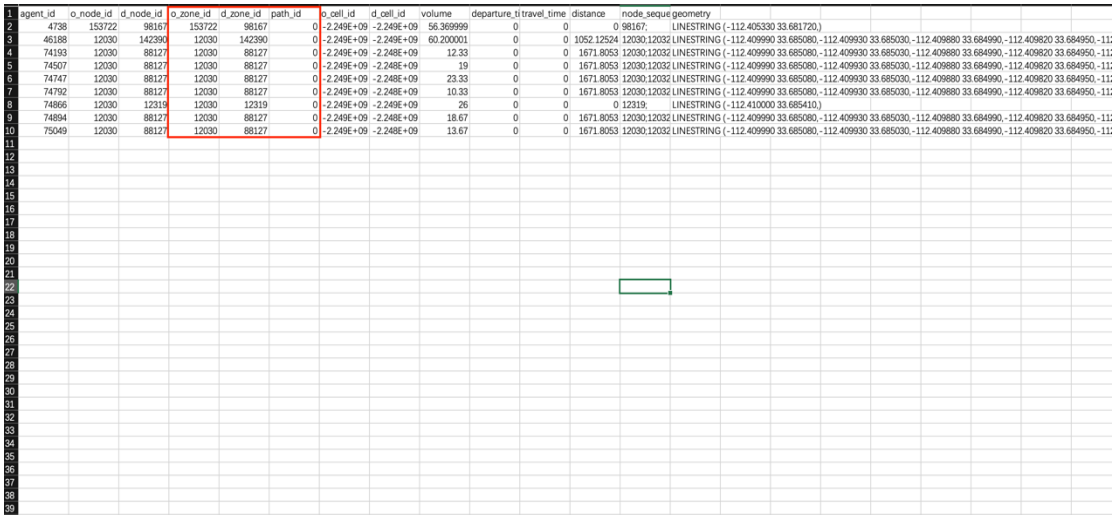
FIG. 7 SELECTED LINK.CSV

2. Demand Generation

Use trace2route to generate cell based paths based on macro network data. Here are some detailed steps.

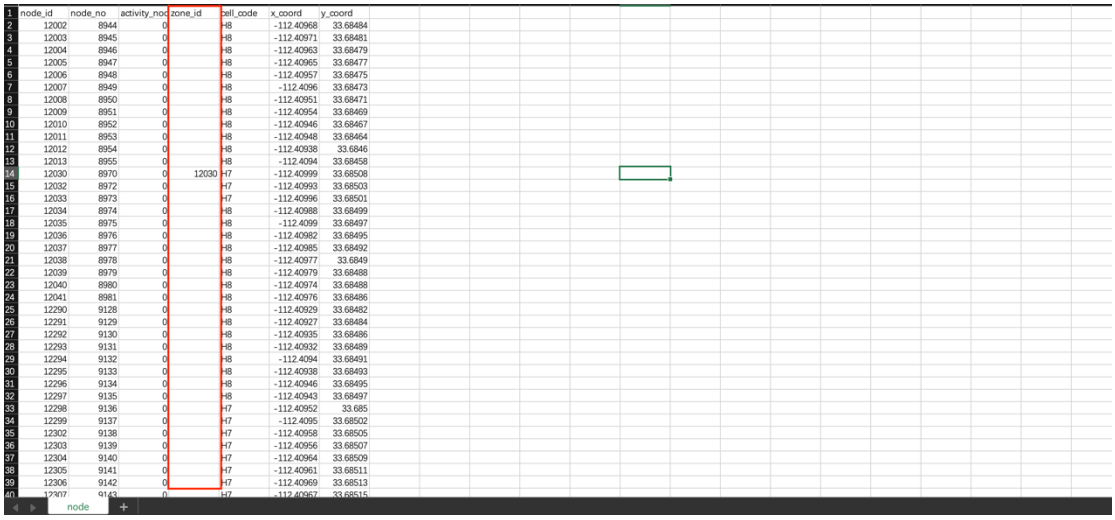
- Obtain input_agent.csv from the macroscopic regional network from or GPS traces
- Use trace2route to generate the map matched sequence in output_agent.csv
- Rename output_agent.csv to input_path.csv add path_id field, according to settings.csv and add fields, o_zone_id, d_zone_id as the node numbers
- Add values for zone_id for those selected origin and destination nodes in input_path.csv

(DTALite computes shortest path trees for all zone-to-zone pairs, other than node-to-node pairs)



agent_id	o_node_id	d_node_id	o_zone_id	d_zone_id	path_id	o_cell_id	d_cell_id	volume	departure_ti	travel_time	distance	node_seque	geometry
4738	153722	98167	153722	98167	0	-2.249E+09	-2.249E+09	56.369999	0	0	0	98167;	LINESTRING (-112.405330 33.681720,)
46188	12030	142390	12030	142390	0	-2.249E+09	-2.249E+09	60.200001	0	0	1052.12524	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11
74193	12030	88127	12030	88127	0	-2.249E+09	-2.248E+09	12.33	0	0	1671.8053	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11
74507	12030	88127	12030	88127	0	-2.249E+09	-2.248E+09	19	0	0	1671.8053	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11
74747	12030	88127	12030	88127	0	-2.249E+09	-2.248E+09	23.33	0	0	1671.8053	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11
74792	12030	88127	12030	88127	0	-2.249E+09	-2.248E+09	10.33	0	0	1671.8053	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11
74866	12030	12319	12030	12319	0	-2.249E+09	-2.249E+09	26	0	0	0	12319;	LINESTRING (-112.410000 33.685410,)
74894	12030	88127	12030	88127	0	-2.249E+09	-2.248E+09	18.67	0	0	1671.8053	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11
75049	12030	88127	12030	88127	0	-2.249E+09	-2.248E+09	13.67	0	0	1671.8053	12030;12032	LINESTRING (-112.409990 33.685080,-112.409930 33.685030,-112.409880 33.684990,-112.409820 33.684950,-11

FIG. 8 INPUT_PATH.CSV



node_id	node_no	activity_nod	zone_id	cell_code	x_coord	y_coord
12002	8944	0		H8	-112.40968	33.68484
12003	8945	0		H8	-112.40971	33.68481
12004	8946	0		H8	-112.40963	33.68479
12005	8947	0		H8	-112.40965	33.68477
12006	8948	0		H8	-112.40957	33.68475
12007	8949	0		H8	-112.4096	33.68473
12008	8950	0		H8	-112.40951	33.68471
12009	8951	0		H8	-112.40954	33.68469
12010	8952	0		H8	-112.40946	33.68467
12011	8953	0		H8	-112.40948	33.68464
12012	8954	0		H8	-112.40938	33.6846
12013	8955	0		H8	-112.4094	33.68458
12030	8970	0	12030	H7	-112.40999	33.68508
12032	8972	0		H7	-112.40993	33.68503
12033	8973	0		H7	-112.40996	33.68501
12034	8974	0		H8	-112.40988	33.68499
12035	8975	0		H8	-112.4099	33.68497
12036	8976	0		H8	-112.40982	33.68495
12037	8977	0		H8	-112.40985	33.68492
12038	8978	0		H8	-112.40977	33.6849
12039	8979	0		H8	-112.40979	33.68488
12040	8980	0		H8	-112.40974	33.68488
12041	8981	0		H8	-112.40976	33.68486
12290	9128	0		H8	-112.40929	33.68482
12291	9129	0		H8	-112.40927	33.68484
12292	9130	0		H8	-112.40935	33.68486
12293	9131	0		H8	-112.40932	33.68489
12294	9132	0		H8	-112.4094	33.68491
12295	9133	0		H8	-112.40938	33.68493
12296	9134	0		H8	-112.40946	33.68495
12297	9135	0		H8	-112.40943	33.68497
12298	9136	0		H7	-112.40952	33.685
12299	9137	0		H7	-112.4095	33.68502
12302	9138	0		H7	-112.40958	33.68505
12303	9139	0		H7	-112.40956	33.68507
12304	9140	0		H7	-112.40964	33.68509
12305	9141	0		H7	-112.40961	33.68511
12306	9142	0		H7	-112.40969	33.68513
12307	9143	0		H7	-112.40967	33.68515

node

FIG. 9 NODE.CSV

3. Traffic Signal

We already have signal control (vol2timing) modules to read the signal timing. Here are main_node_id field and movement field in link.csv. Then, use vol2timing to read timing.csv to simulate signal timing.

4. Traffic assignment and simulation

Work on cell-based path. Use 0.1 sec as simulation interval and simple spatial queue (CA). in addition, we also need a simple strategy to determine reaction time tau to consider time-dependent speed reduction.

Run DTALite.exe

We could obtain some key information about traffic assignment simulation, such as assignment mode, agent types, link types, simulation time period, input file name, file format and so on in setting.csv

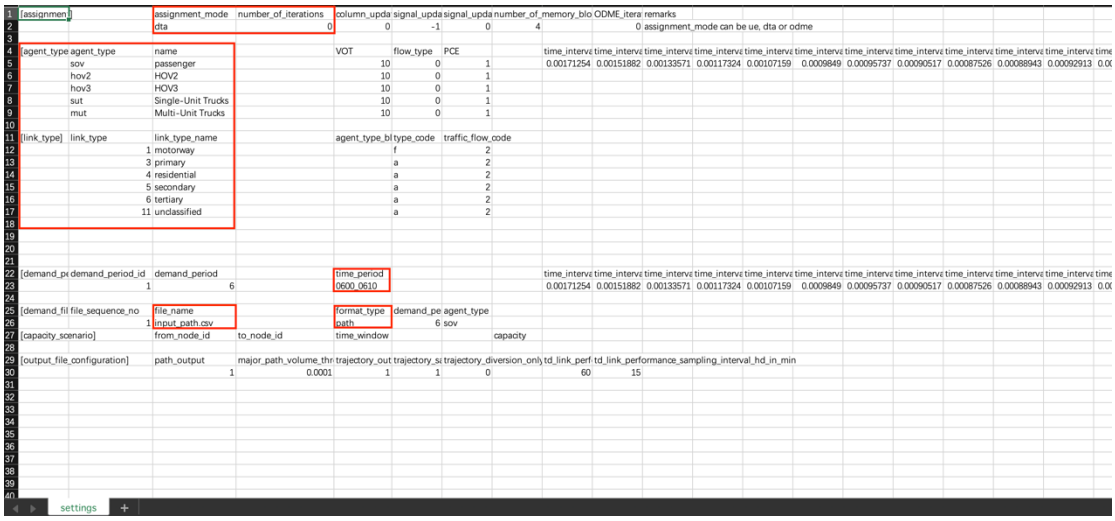


FIG. 10 SETTING.CSV

5. Check different levels of input and output

The following input and output files need to be checked systematically.

a. node.csv, link.csv.

b. input_path.csv, timing.csv, settings.csv

c. link_performance.csv, TD_link_performance.csv (link volume, aggregated speed and so on).

d. path.csv (assignment or given input file, both of them need to be visualized in Nexta ->agent diaglog)

e. agent.csv (with different vehicles with different departure times from simulation step (visualized in nexta ->agent dialog)

f. trajectory.csv

6. Load node.csv in Nexta

Before Loading node.csv in Nexta, we need to export satellite map from QGIS as an image file. Here are some detailed steps.

Click Project -> click Import/Export -> Export Map to Image…

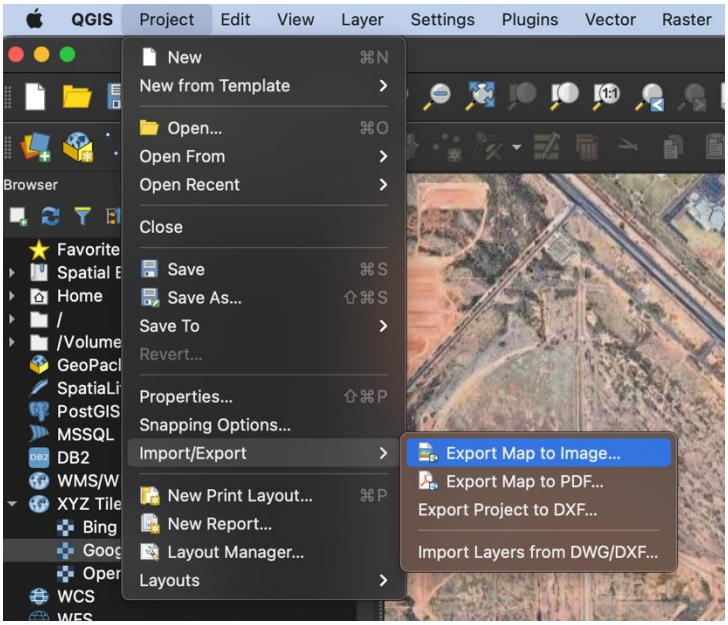


FIG. 11 EXPORT MAP TO IMAGE

Adjust Resolution to 600 dpi.

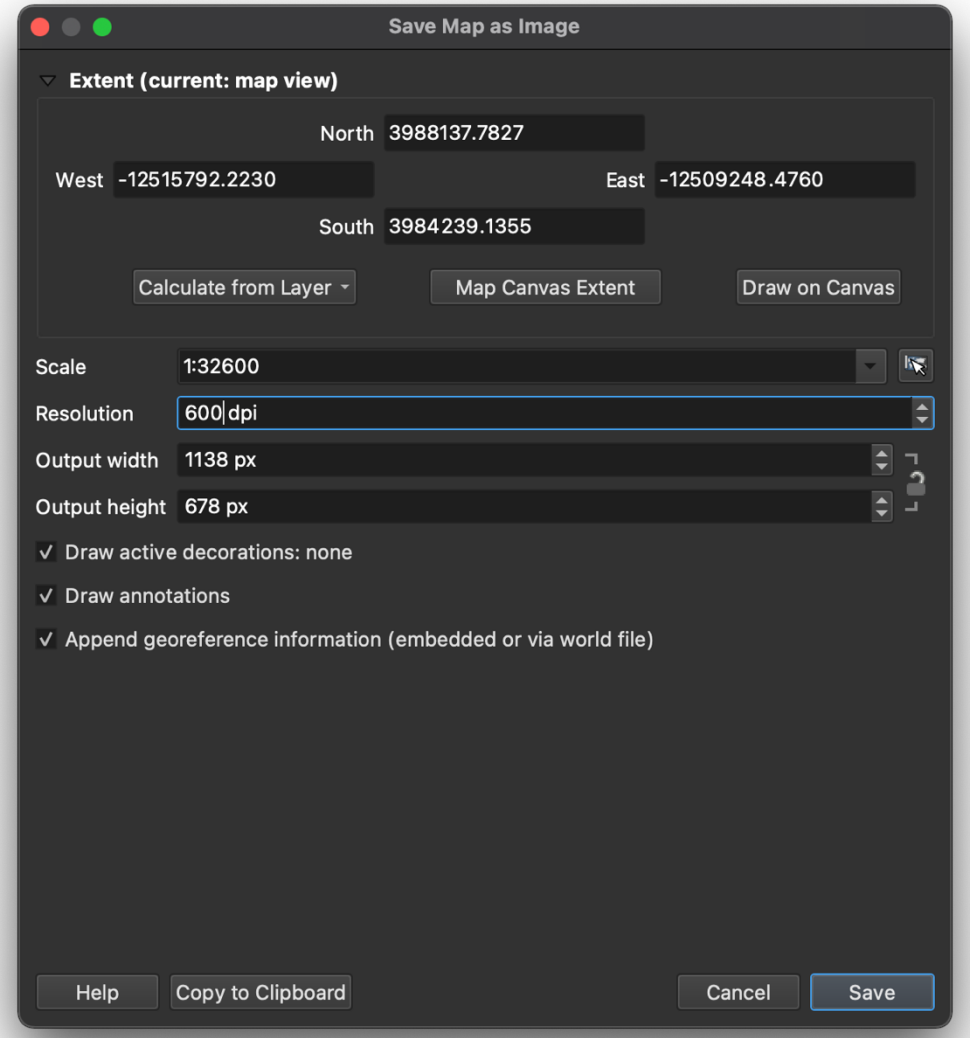


FIG. 12 ADJUST THE RESOLUTION

Then, save this image.bmp in the current directory.

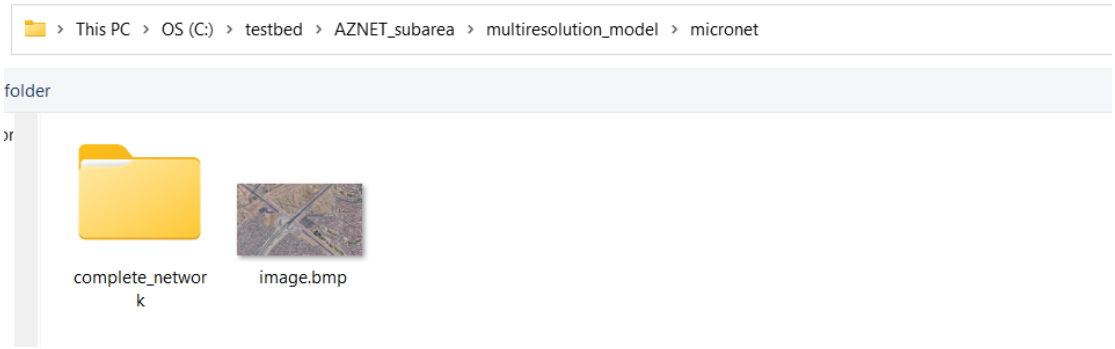


FIG. 13 SAVE IT IN THE CURRENT DIRECTORY

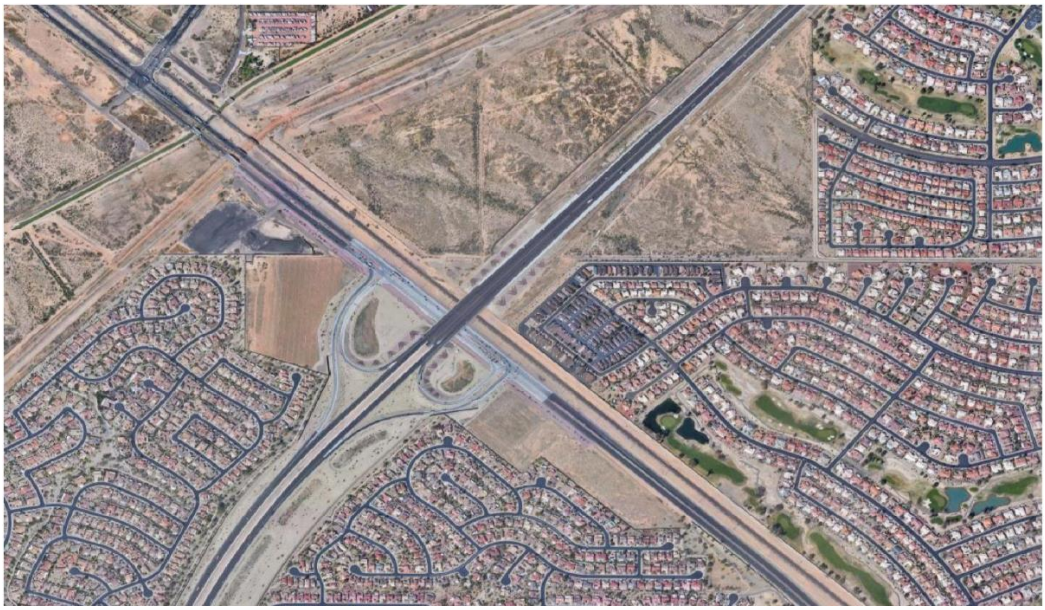


FIG. 14 IMAGE.BMP

After that, we could visualize results in Nexta.

We could obtain more information about simulation by clicking on the “agent” button.

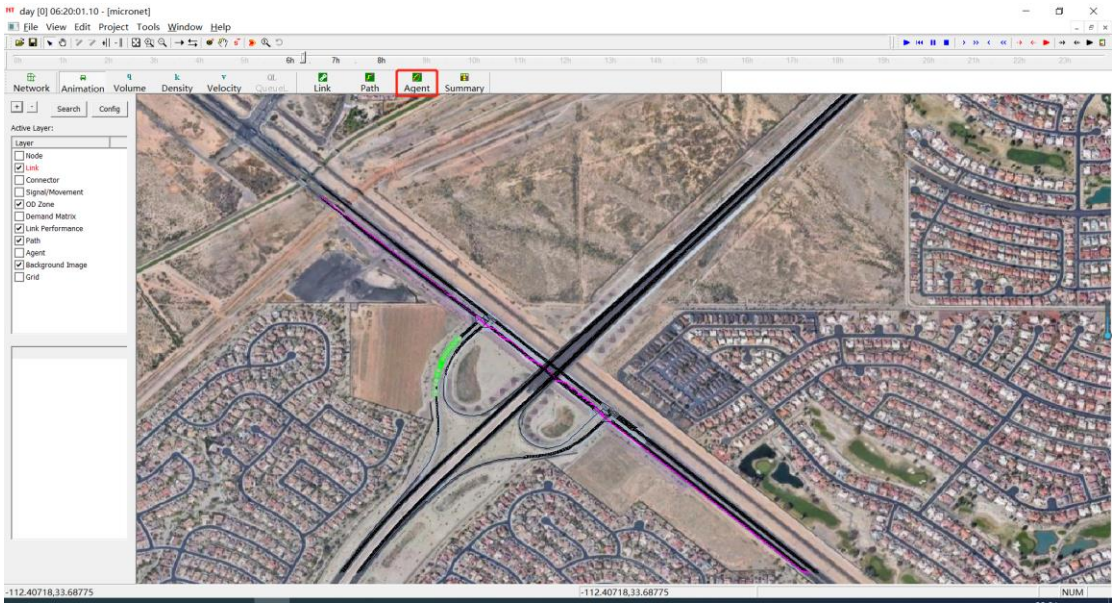


FIG. 15 VISUALIZATION IN NEXTA

Then, we could know the OD pair, OD list and path information for this simulation.

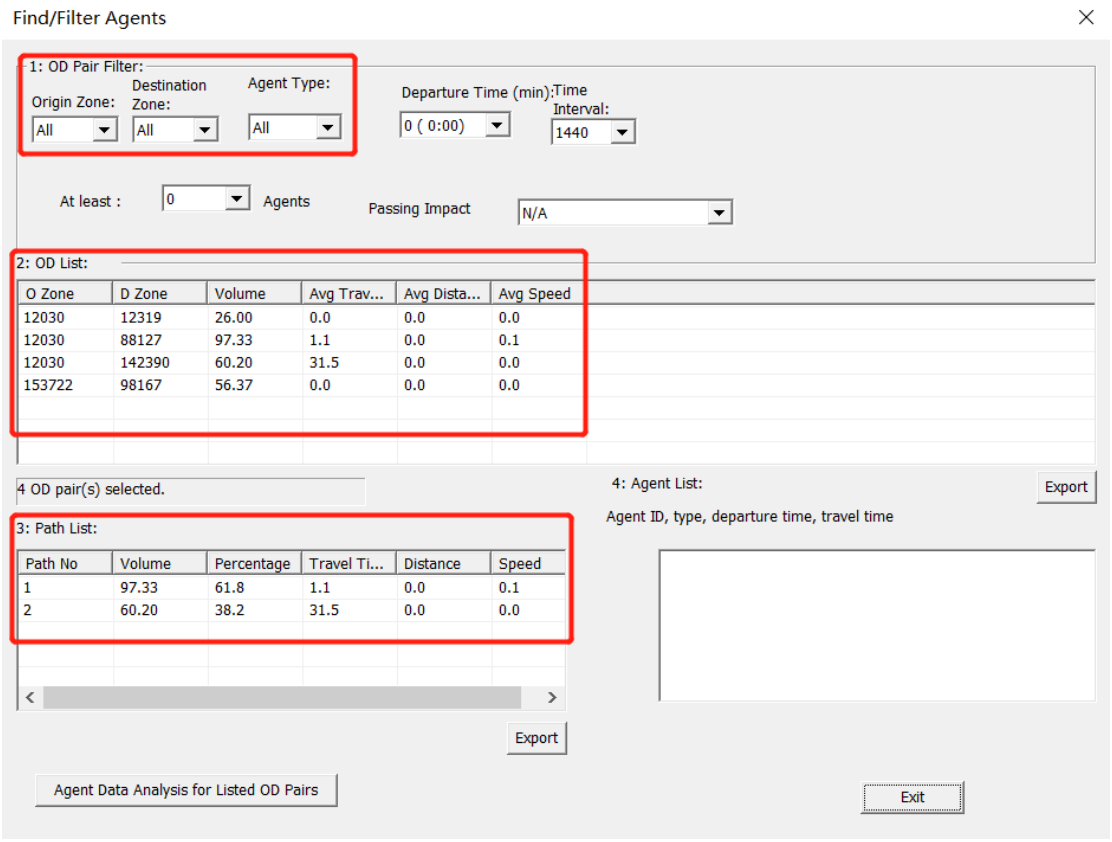


FIG. 16 AGENT INFORMATION

Before visualizing the animation in Nexta, we should set the start time at 6AM (which is marked by red rectangle) because we have already set time period from 6AM to 6h 10 mins in setting.csv.

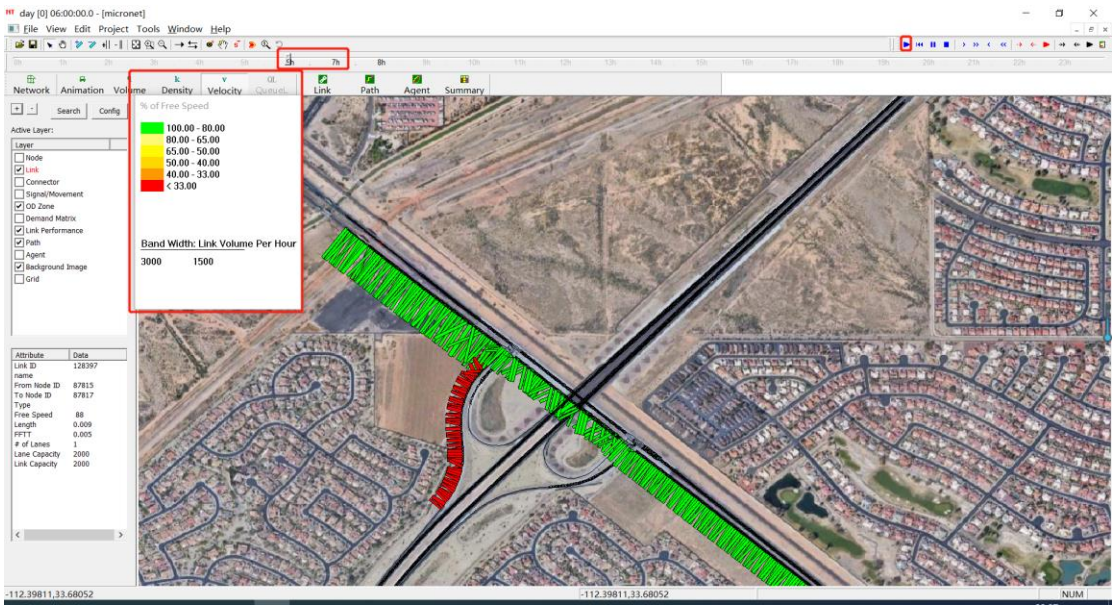


FIG. 17 SIMULATION IN NEXTA

7. PRIORITY AND CONFLICT AREA

Add node-based logic to consider capacity request and allocation for agents from incoming links, with priority of different types of agents (pax, bike, cars, trucks. Buses).

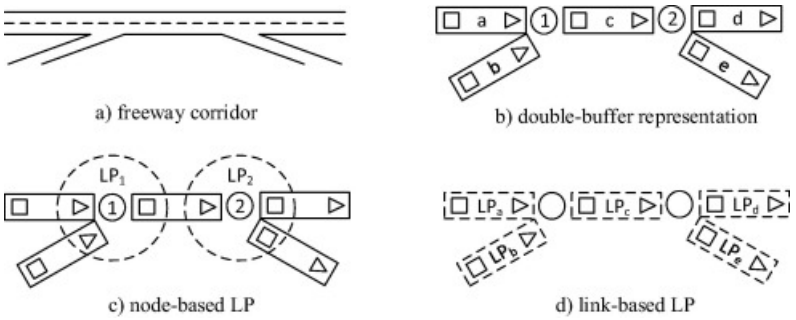


FIG. 18 PRIORITY AND CONFLICT

8. Trajectory optimization