

# コミュニティサイクル導入による 横浜市交通状況変化の 空間的把握

Network evaluation by  
community cycle

Kobe university

S.Yasuda, Y.Koyama, Y.Sawamura,

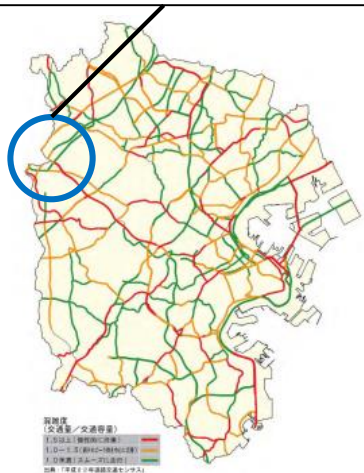
H.Harada, R.Kawase



# Traffic problem in YOKOHAMA

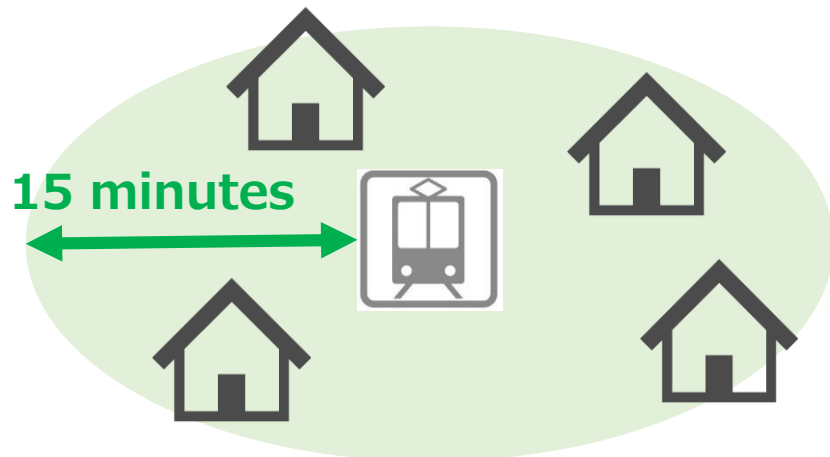
## Congestion

Hodohaya bypass



- Average speed at commuting is lower than national average.
- Hodogaya bypass is famous for heavy congestion.

## 15-minute walk from station



## Community Cycle (Bay-Bike)



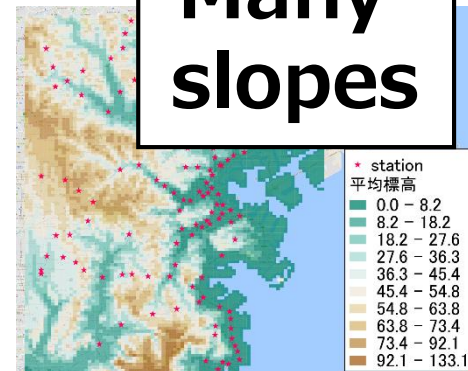
- People can use cycle!
- With electric assist!
- Dedicated park.

## Park is full



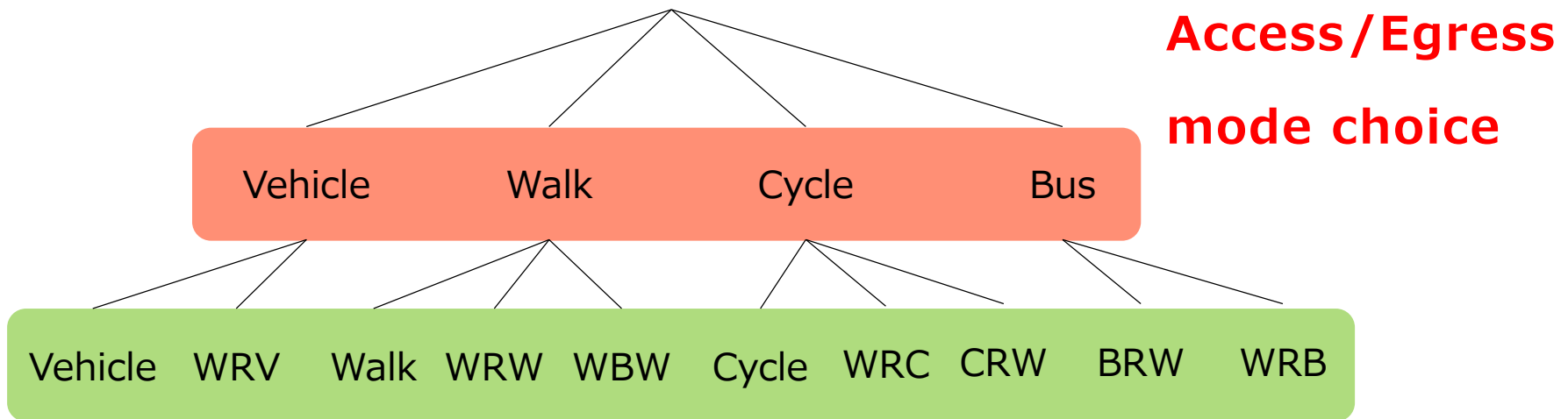
収容台数上位30駅の駐輪場利用状況

## Many slopes



横浜市の駅と標高

# Mode choice model (NL model)



$$V_v = \beta_1 x_{time} + \beta_2 x_{cost}$$

$$V_w = \beta_w + \beta_1 x_{time} + \beta_3 x_{slope}$$

$$V_c = \beta_c + \beta_1 x_{time} + \beta_3 x_{slope}$$

$$V_{wbw} = \beta_{wbw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{wrw} = \beta_{wrw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{wrv} = \beta_{wrv} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{wrc} = \beta_{wrc} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work} + \beta_7 \delta_{park}$$

$$V_{crw} = \beta_{crw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work} + \beta_7 \delta_{park}$$

$$V_{wrb} = \beta_{wrb} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{brw} = \beta_{brw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

Variables	Parameters	t-value
Constant (cycle)	19.98	0.04
Constant (walk)	1.71	9.09 *
Constant (bus)	0.36	0.94
Constant (WRW)	2.99	9.28 *
Constant (WRC)	19.11	0.04
Constant (WRB)	5.34	8.36 *
Constant (WRV)	-3.10	-4.07 *
Constant (CRW)	-4.68	-0.01
Constant (BRW)	-24.69	-6.E-05
Travel Time	-0.95	-8.21 *
Cost	-0.38	-1.19
Slope	-10.11	-4.16 *
Access Time	-2.01	-8.62 *
Egress Time	-1.50	-9.52 *
Commute dummy	1.73	5.56 *
Park congestion dummy	-0.65	-0.42
Scale parameter	1.66	8.41 *
Number of samples		1,086
L(0)		-1405.36
LL		-570.99
Rho-square		0.594
Adjusted rho-square		0.582

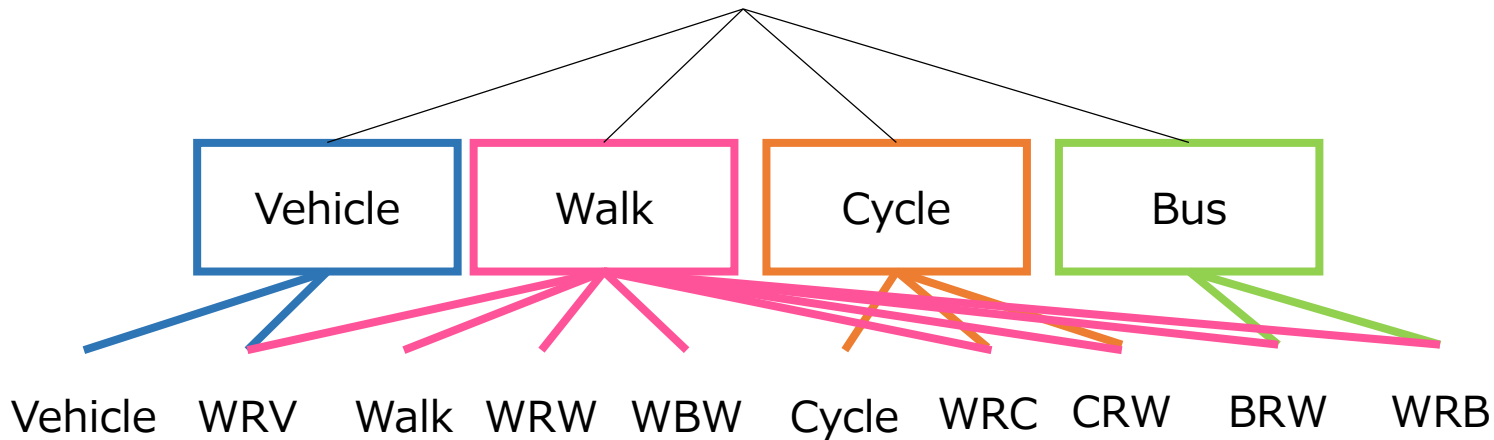
• **Cycle and Bus remain in doubt.**

• **The signs of parameters is reasonable.**

• **Decision-making tree should be improved.**

significance \*5%

# Mode choice model (CNL model)



$$V_v = \beta_1 x_{time} + \beta_2 x_{cost}$$

$$V_w = \beta_w + \beta_1 x_{time} + \beta_3 x_{slope}$$

$$V_c = \beta_c + \beta_1 x_{time} + \beta_3 x_{slope}$$

$$V_{wbw} = \beta_{wbw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{wrw} = \beta_{wrw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{wrv} = \beta_{wrv} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{wrc} = \beta_{wrc} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work} + \beta_7 \delta_{park}$$

$$V_{crw} = \beta_{crw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work} + \beta_7 \delta_{park}$$

$$V_{wrb} = \beta_{wrb} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

$$V_{brw} = \beta_{brw} + \beta_1 x_{time} + \beta_2 x_{cost} + \beta_3 x_{slope} + \beta_4 x_{ac} + \beta_5 x_{eg} + \beta_6 \delta_{work}$$

Variables	Parameters	t-value		Parameters	t-value
Constant (cycle)	31.78	0.05			
Constant (walk)	0.94	3.28	*	0.17	0.66
Constant (bus)	-0.06	-0.13		-0.60	-1.33
Constant (WRW)	3.08	8.77	*	2.54	8.48 *
Constant (WRC)	30.84	0.05			
Constant (WRB)	6.54	7.52	*	5.86	7.36 *
Constant (WRV)	-5.13	-4.37	*	-4.77	-4.43 *
Constant (CRW)	-7.80	-2.E-03			
Constant (BRW)	-0.25	-0.07		-1.99	-0.29
Travel Time	-0.99	-6.79	*	-0.76	-5.83 *
Cost	-0.29	-0.81		0.12	0.32
Slope	-10.91	-3.97	*	-7.41	-3.18 *
Access Time	-2.11	-8.32	*	-1.86	-8.31 *
Egress Time	-1.69	-8.91	*	-1.64	-9.14 *
Commute dummy	1.81	5.55	*	1.77	6.09 *
Park congestion dummy	-0.50	-0.29		0.92	0.76
man_dummy					
Scale parameter	2.17	7.53	*	1.91	7.14 *
Number of samples		1,086			1,086
L(0)		-1275.86			-1275.86
LL		-509.70			-627.65
Rho-square		0.601			0.508
Adjusted rho-square		0.587			0.497

significance \*5%

Variables	Parameters	t-value	Parameters	t-value
Constant (cycle)	6.12	7.20 *	2.87	8.44 *
Constant (walk)	0.79	2.48 *	0.69	3.07 *
Constant (bus)	-0.65	-1.16	0.42	1.83
Constant (WRW)	2.91	8.25 *	1.71	6.22 *
Constant (WRC)				
Constant (WRB)	6.63	7.27 *	3.20	6.55 *
Constant (WRV)	-6.97	-5.57 *	-0.57	-2.27 *
Constant (CRW)				
Constant (BRW)	0.73	0.30		
Travel Time	-1.15	-7.70 *	-0.33	-6.51 *
Cost	-0.35	-0.88	0.15	0.56
Slope	-11.42	-4.02 *	-3.39	-2.10 *
Access Time	-2.04	-8.23 *	-1.06	-8.07 *
Egress Time	-1.75	-8.94 *	-0.99	-8.92 *
Commute dummy	1.83	5.44 *	1.09	5.76 *
Park congestion dummy	2.40	1.16	2.10	3.33 *
man_dummy			0.08	0.37
Scale parameter	2.65	9.10 *	0.51	11.08 *
Number of samples		1,086		1,086
L(0)		-1275.86		-1121.05
LL		-524.55		-614.68
Rho-square		0.589		0.452
Adjusted rho-square		0.577		0.438

# LOS Data

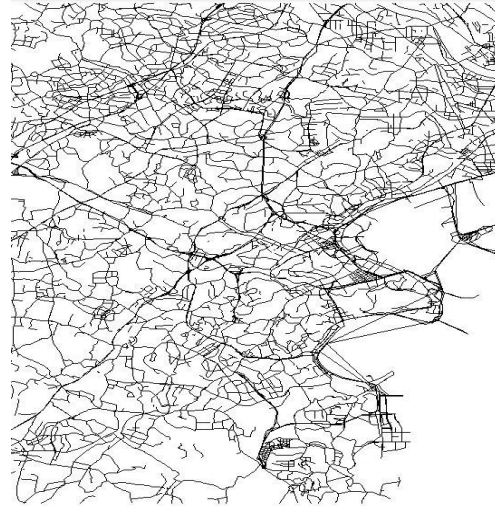
- From Google Map API
  - ORIGIN,DESTINATION:CENTROID
  - The nearest station:Google Map
- From 国土数値情報
  - Altitude in average of mesh.
- From H.28 Yokohama cycle survey
  - How many cycles was used?
  - How many cycles can be accommodated?



# Traffic Assignment



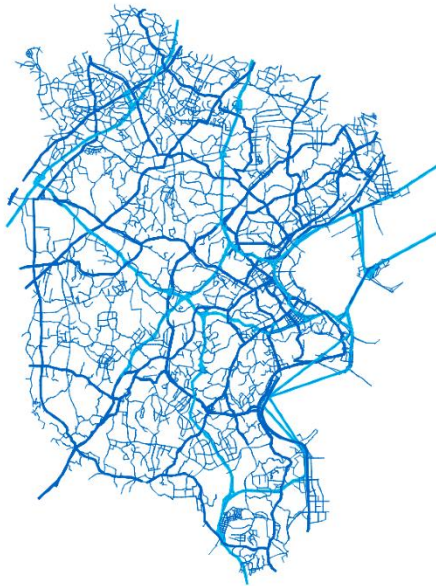
Remove  
small road



{ Remove  
Connect Link

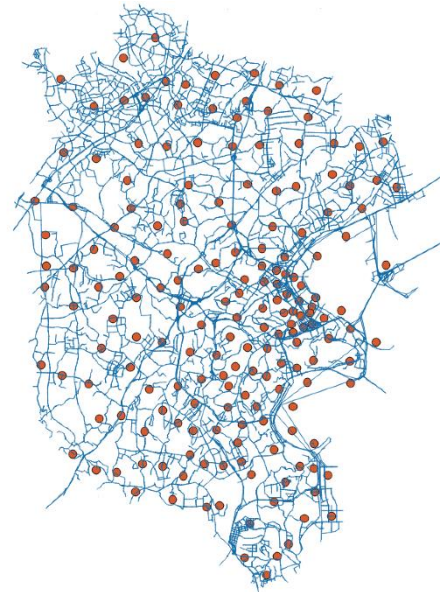
Remove 90% Link!

About 400 Link!



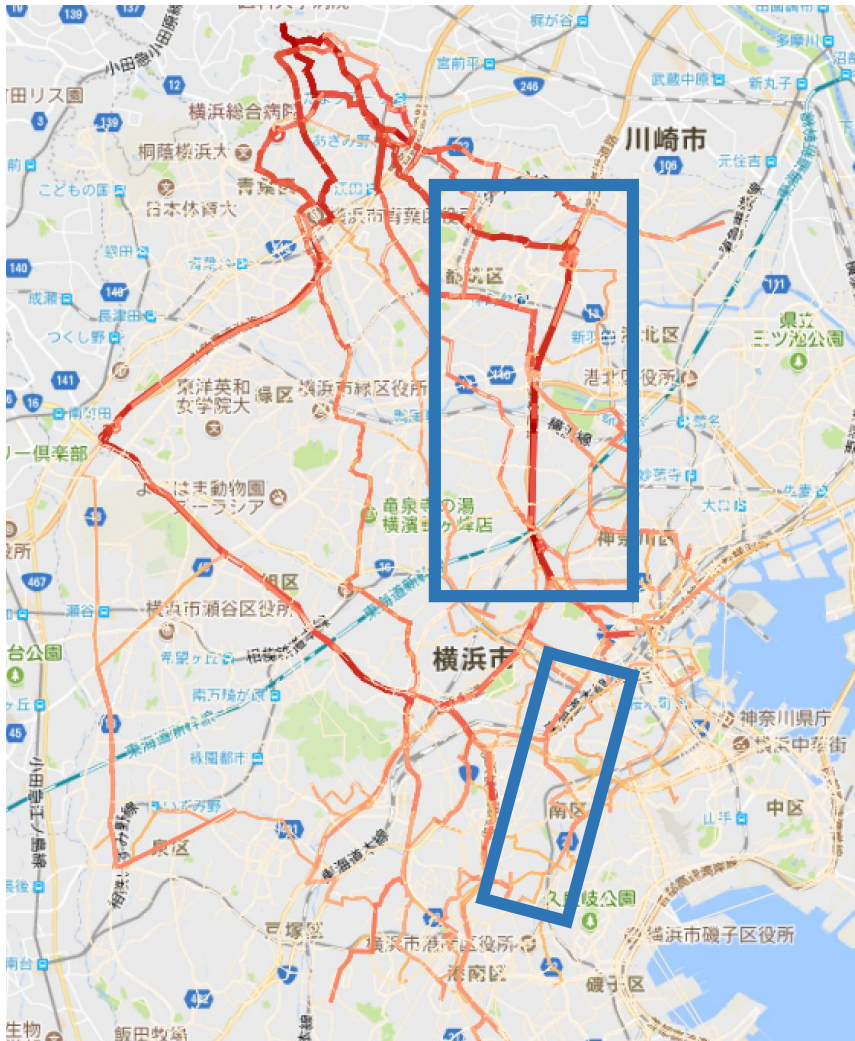
Connect Centroid  
to Node

About 700 Node!



# Analysis Area

Assign PT-data (Before Policy & Transportation:Car)



Policy Target Road  
• The third Keihin Road



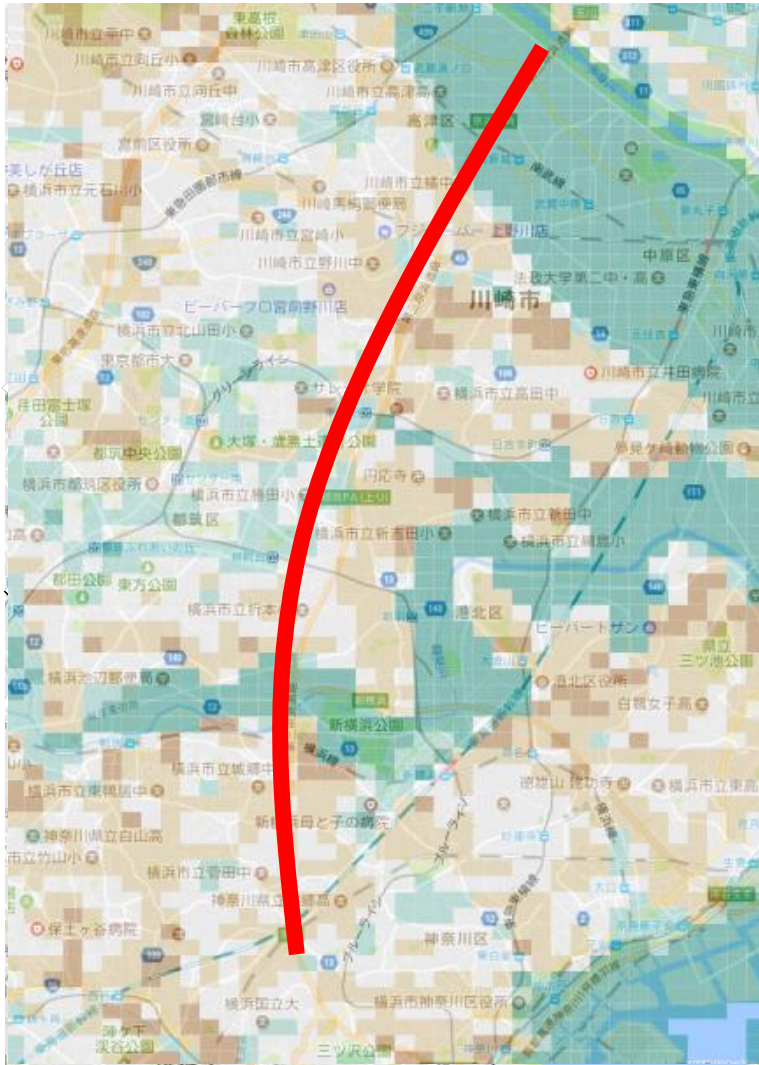
[http://www.geocities.jp/nocty\\_bypass/gazou/douro/3\\_kantou/R466/R466-5.jpg](http://www.geocities.jp/nocty_bypass/gazou/douro/3_kantou/R466/R466-5.jpg)

• Prefectural Road 21



<http://tossy.road.jp/gallery/03121406-2.jpg>

# Analysis Area



## 1st Target Area The Third Keihin Road

- Heavy Traffic in simulation
- Location of Station
- Many Slopes

# Analysis Area



## 2nd Target Area Prefectural Road 21

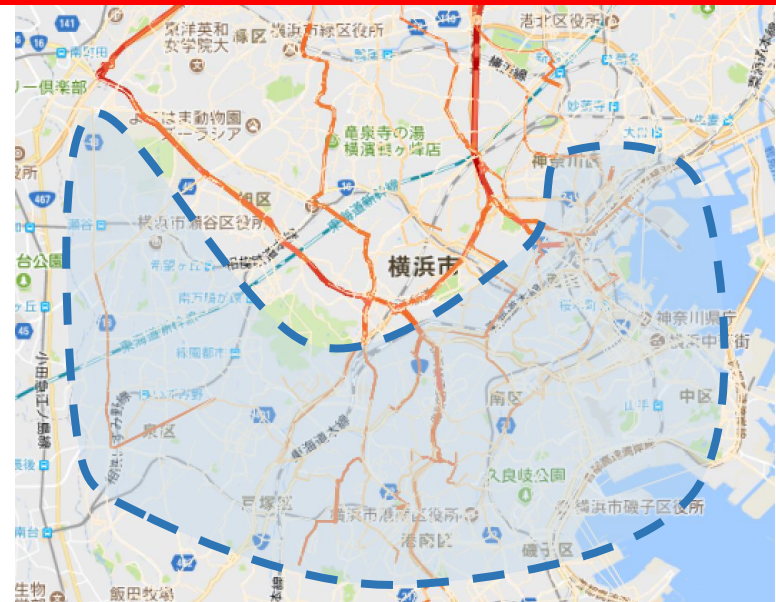
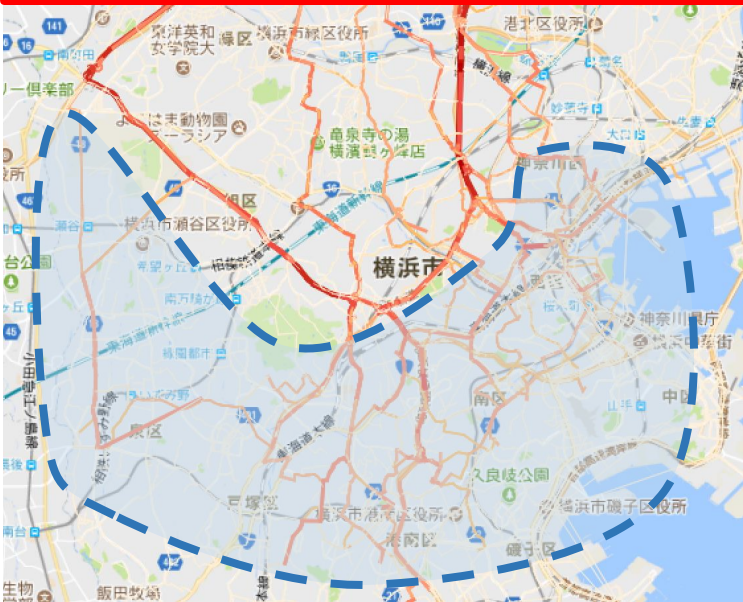
- Traffic in simulation
  - Location of Station
  - Many Slopes
  - Illegal Bycycke Parking
- : Station (Illegal Park)

# Result

- Impact of Policy on a Whole Network

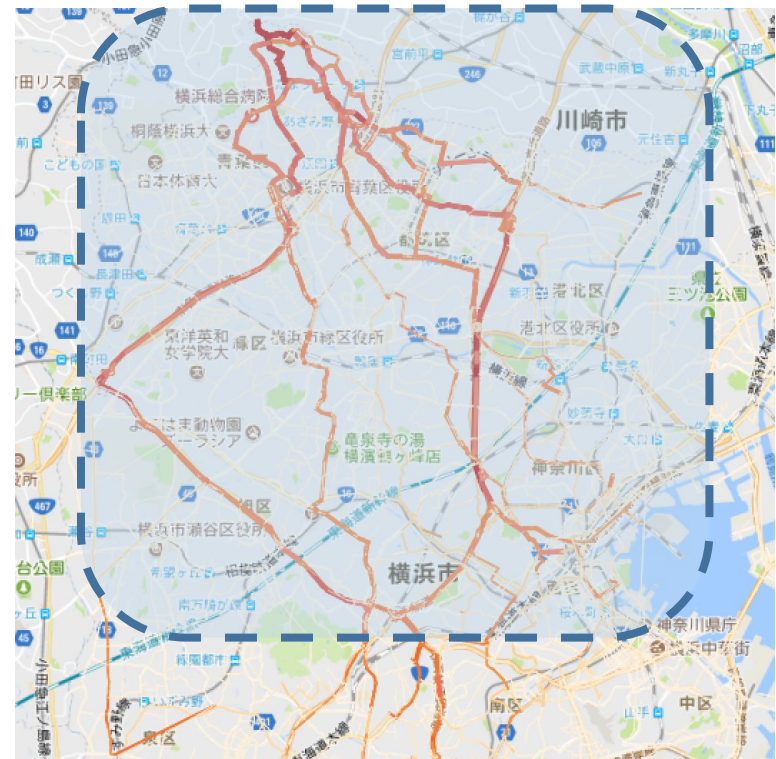
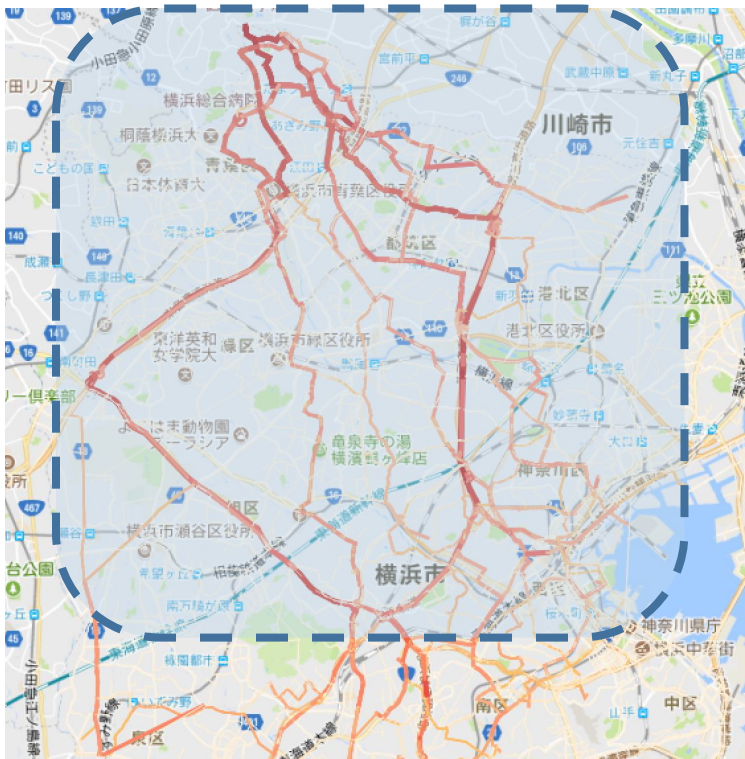


Congestion of the local streets mitigate



# Result

- Impact of Policy on a Whole Network



Congestion of the Highway **not** mitigate

# Summary

- Model
  - Mode Choice Model
  - Likelihood ratio **0.601**
  - Choices have a correlation
- Traffic Assignment
  - Construct Yokohama Network
  - We could Traffic Assignment!!!
  - Find Congested Route
- Simulation
  - Congestion of the local streets mitigate
  - Congestion of the Highway **not** mitigate