

# 가시화 서버 통합을 위한 다중 교차로 신호 최적화 시각화 설계

2021/08/19

피민규

# 추가 구현 필요 - 테스트용 시뮬레이션 시간 추가

최적화 등록

환경명

EXP\_202108\_00699

설명

...

Region

테스트지역

교차로 ID

SA107,SA101,SA111

선택

선택

시뮬레이션 시작

08/04/2021

12:00 AM

시뮬레이션 종료

08/04/2021

11:59 PM

스크립트

통계 주기

10분

가시화 주기

10 Step

Epoch

10

확인

닫기

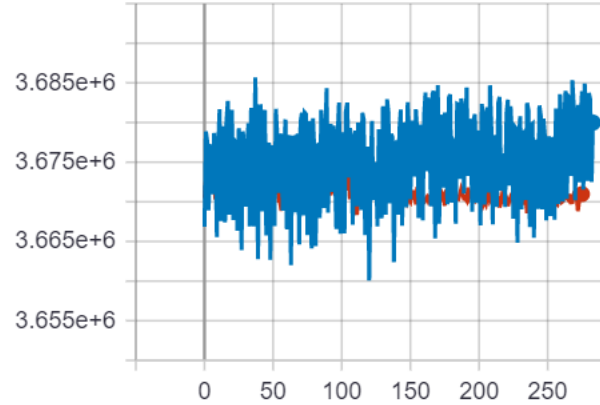
시뮬레이션 시작 / 종료 시간을 학습 시간과 테스트 시간 두 개로 나눠서 할 수 있어야 함  
ex) 24시간으로 학습, 7-9시 두 시간 동안 테스트 및 결과 비교

# 추가 구현 필요 - 최근 40ep 평균 보상 그래프

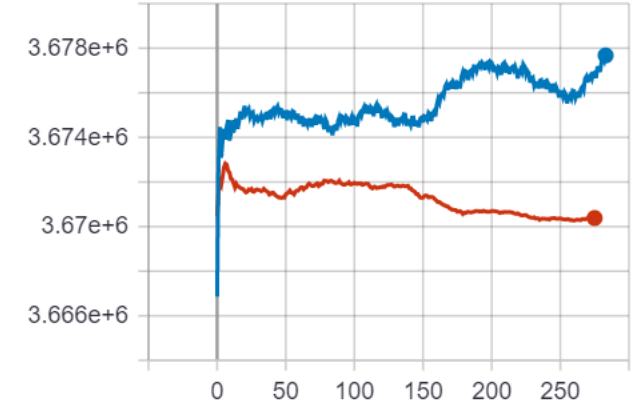
꼭 40이 아닐 수도 있음



train/reward  
tag: train/reward



train/reward\_40ep\_mean  
tag: train/reward\_40ep\_mean



Epoch 수가 많고 reward의 진동이 심한 경우,  
전체적인 추세를 보기 위해 최근 40개 평균 보상도 보여줄 수 있도록 함

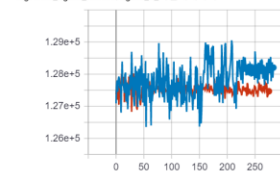
Reward\_40ep\_mean 그래프를

1. 기존의 보상 그래프 아래에 추가하거나
2. 기존 그래프에 라인 하나 더 추가하거나
3. 버튼을 통해 기존 그래프가 그냥 reward와 40ep reward를 전환할 수 있도록  
등등..

# 추가 구현 필요 - 교차로별 보상 추가

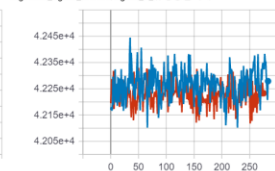
train\_agent\_reward

train\_agent\_reward/agent\_0\_목원대네거리  
tag: train\_agent\_reward/agent\_0\_목원대네거리



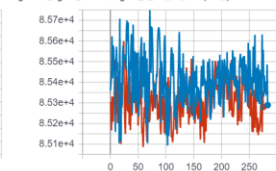
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train\_agent\_reward/agent\_1\_유성중상거리  
tag: train\_agent\_reward/agent\_1\_유성중상거리



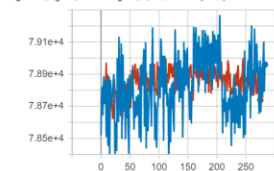
⌵ ⌵ ⌵

train\_agent\_reward/agent\_2\_도안9단지4(10번)  
tag: train\_agent\_reward/agent\_2\_도안9단지4(10번)



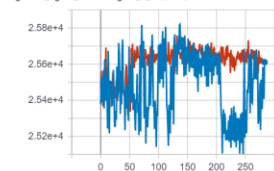
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train\_agent\_reward/agent\_3\_도안네거리(24번)  
tag: train\_agent\_reward/agent\_3\_도안네거리(24번)



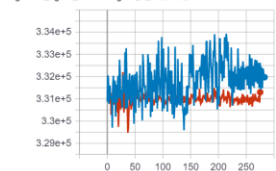
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train\_agent\_reward/agent\_4\_도안28번네거리  
tag: train\_agent\_reward/agent\_4\_도안28번네거리



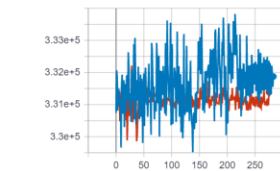
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train\_agent\_reward/agent\_5\_도안12단지네거리  
tag: train\_agent\_reward/agent\_5\_도안12단지네거리



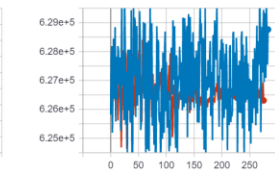
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train\_agent\_reward/agent\_6\_도안지하차도입구4  
tag: train\_agent\_reward/agent\_6\_도안지하차도입구4



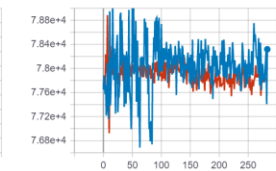
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train\_agent\_reward/agent\_7\_진터네거리  
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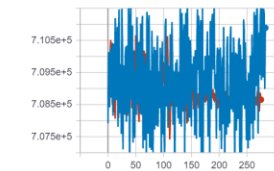
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train\_agent\_reward/agent\_8\_인상골네거리  
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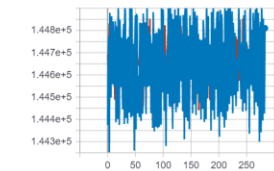
⌵ ⌵ ⌵

train\_agent\_reward/agent\_9\_도안5단지네거리  
tag: train\_agent\_reward/agent\_9\_도안5단지네거리



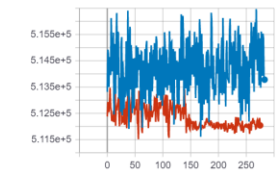
⌵ ⌵ ⌵

train\_agent\_reward/agent\_10\_상대네거리  
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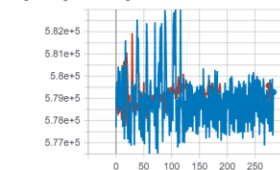
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train\_agent\_reward/agent\_11\_도안1단지네거리  
tag: train\_agent\_reward/agent\_11\_도안1단지네거리



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train\_agent\_reward/agent\_12\_원골네거리  
tag: train\_agent\_reward/agent\_12\_원골네거리



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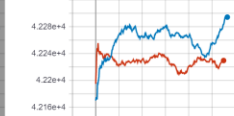
train\_agent\_reward\_40ep\_mean

train\_agent\_reward\_40ep\_mean/agent\_0\_목원대네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_0\_목원대네거리



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train\_agent\_reward\_40ep\_mean/agent\_1\_유성중상거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_1\_유성중상거리



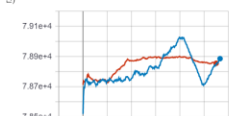
⌵ ⌵ ⌵

train\_agent\_reward\_40ep\_mean/agent\_2\_도안9단지4(10번)  
tag: train\_agent\_reward\_40ep\_mean/agent\_2\_도안9단지4(10번)



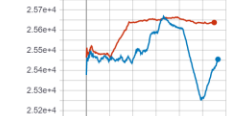
⌵ ⌵ ⌵

train\_agent\_reward\_40ep\_mean/agent\_3\_도안네거리(24번)  
tag: train\_agent\_reward\_40ep\_mean/agent\_3\_도안네거리(24번)



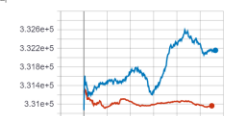
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train\_agent\_reward\_40ep\_mean/agent\_4\_도안28번네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_4\_도안28번네거리



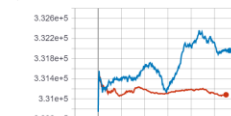
⌵ ⌵ ⌵

train\_agent\_reward\_40ep\_mean/agent\_5\_도안12단지네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_5\_도안12단지네거리



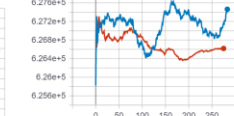
⌵ ⌵ ⌵

train\_agent\_reward\_40ep\_mean/agent\_6\_도안지하차도입구4  
tag: train\_agent\_reward\_40ep\_mean/agent\_6\_도안지하차도입구4



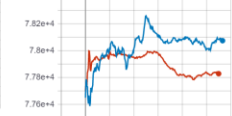
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train\_agent\_reward\_40ep\_mean/agent\_7\_진터네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_7\_진터네거리



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train\_agent\_reward\_40ep\_mean/agent\_8\_인상골네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_8\_인상골네거리



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train\_agent\_reward\_40ep\_mean/agent\_9\_도안5단지네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_9\_도안5단지네거리



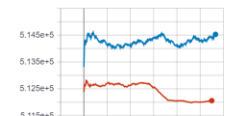
⌵ ⌵ ⌵

train\_agent\_reward\_40ep\_mean/agent\_10\_상대네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_10\_상대네거리



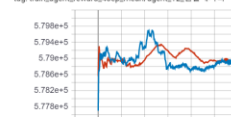
⌵ ⌵ ⌵

train\_agent\_reward\_40ep\_mean/agent\_11\_도안1단지네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_11\_도안1단지네거리



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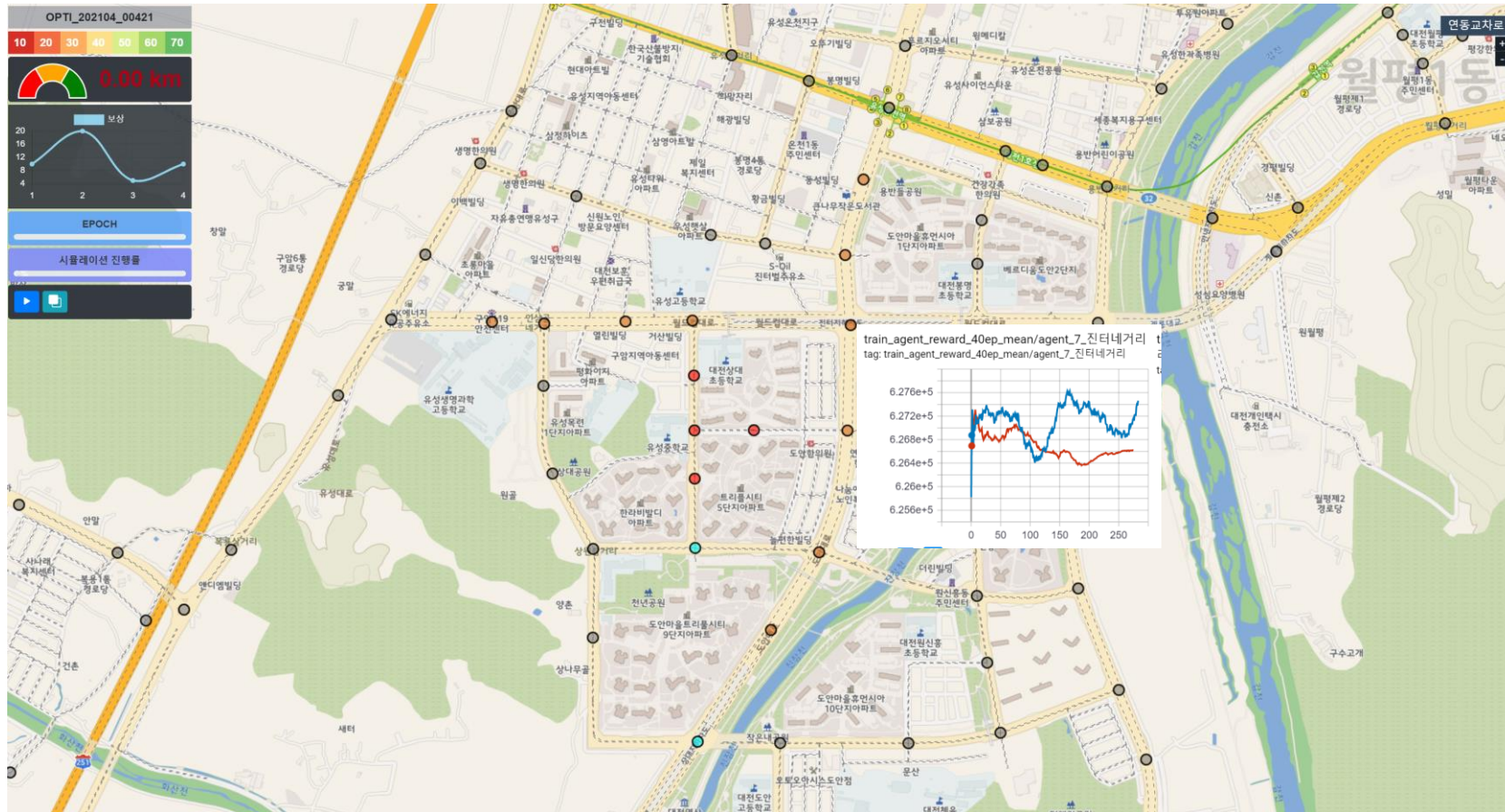
train\_agent\_reward\_40ep\_mean/agent\_12\_원골네거리  
tag: train\_agent\_reward\_40ep\_mean/agent\_12\_원골네거리



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# 추가 구현 필요 - 교차로별 보상 추가(1안)

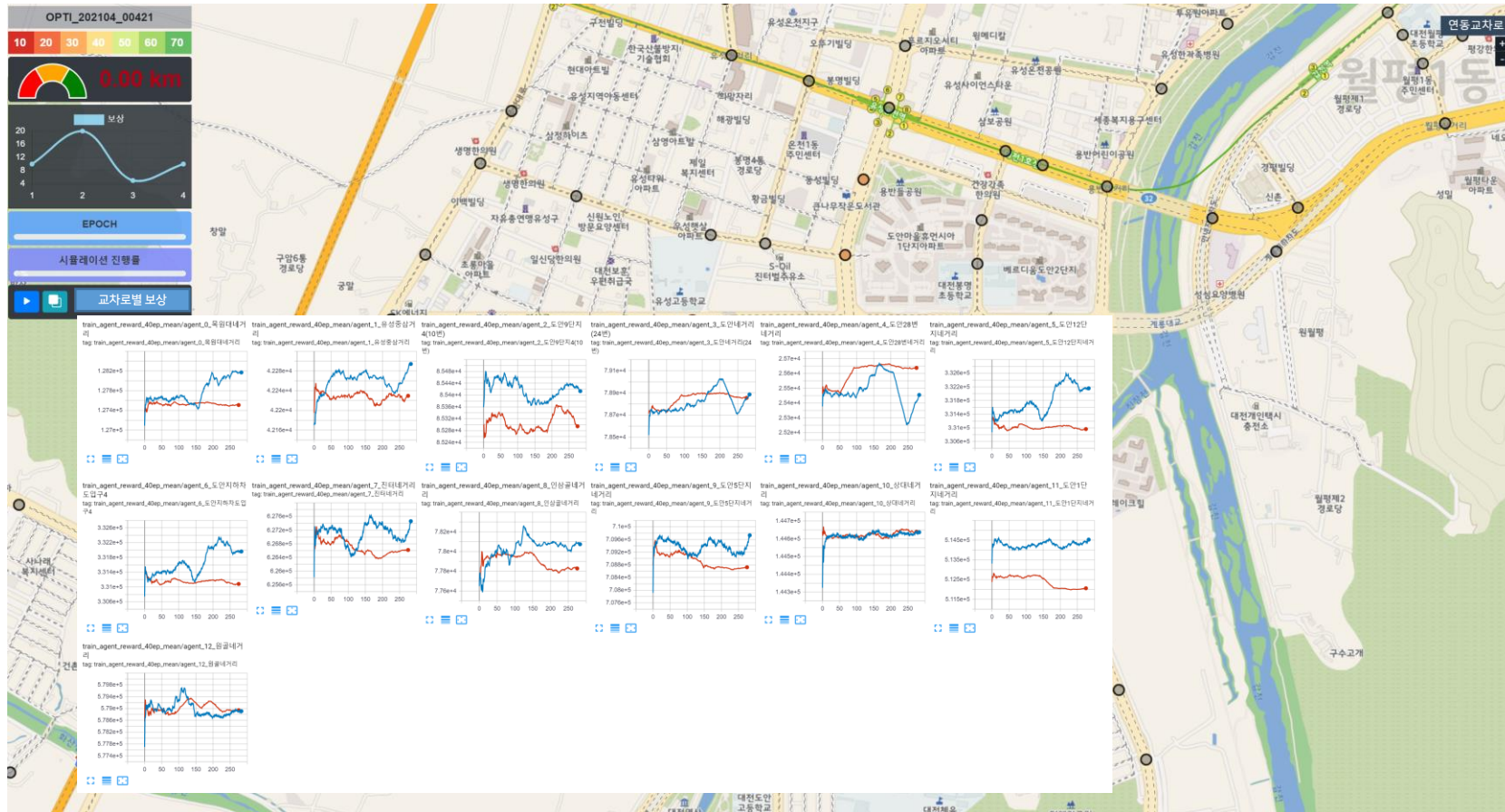
1안. 노드를 누르면 해당하는 교차로에 대한 보상 그래프 팝업



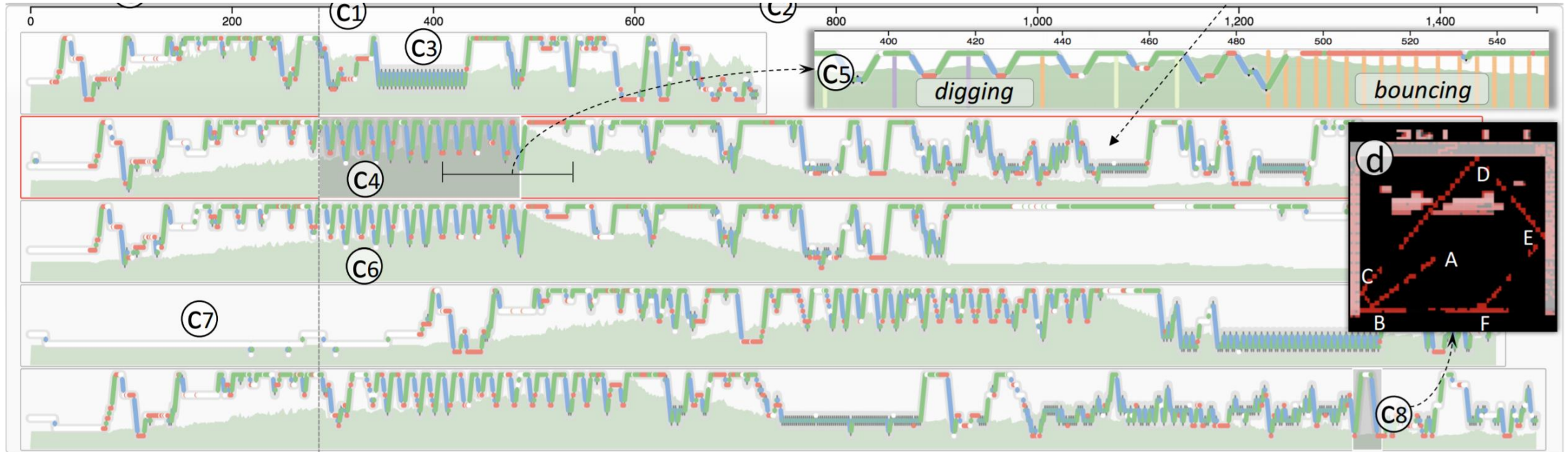


# 추가 구현 필요 - 교차로별 보상 추가(2안)

버튼을 추가해서 버튼을 누르면 다른 레이어에서 전체 그래프 팝업



# 추가 구현 필요 - 신호 비교(DQNVIS 참고)



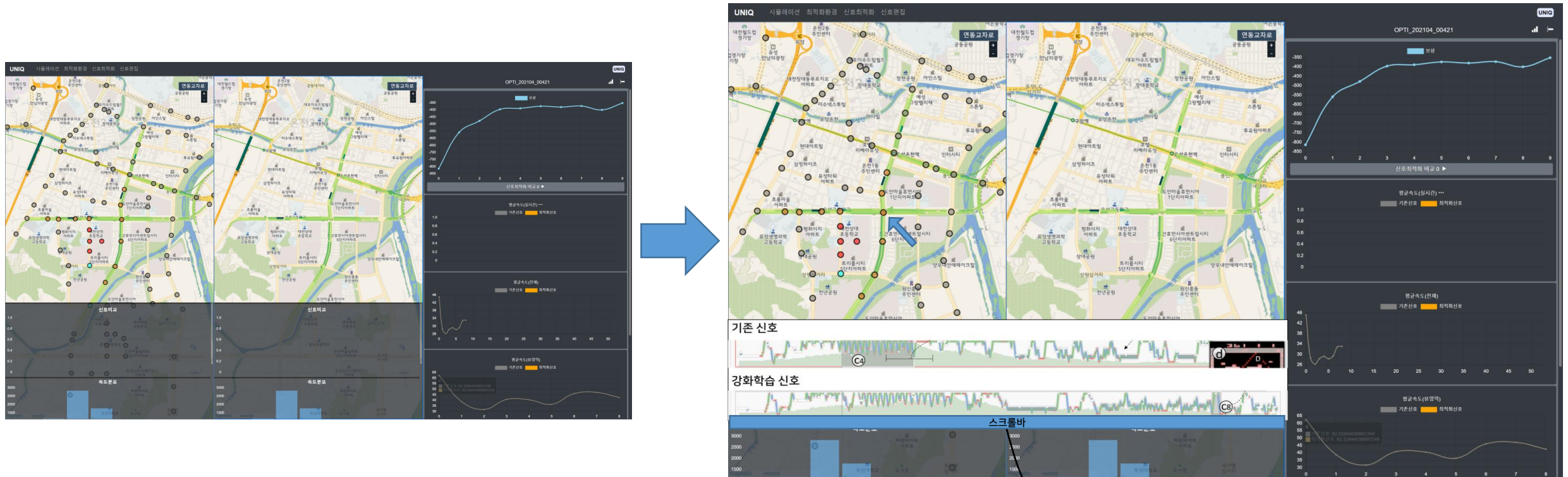
Line - phase

Area - reward

강화학습을 통해 변경되는 phase에 따라 reward가 어떻게 변하는지 볼 수 있음

# 추가 구현 필요 - 신호 비교(1안)

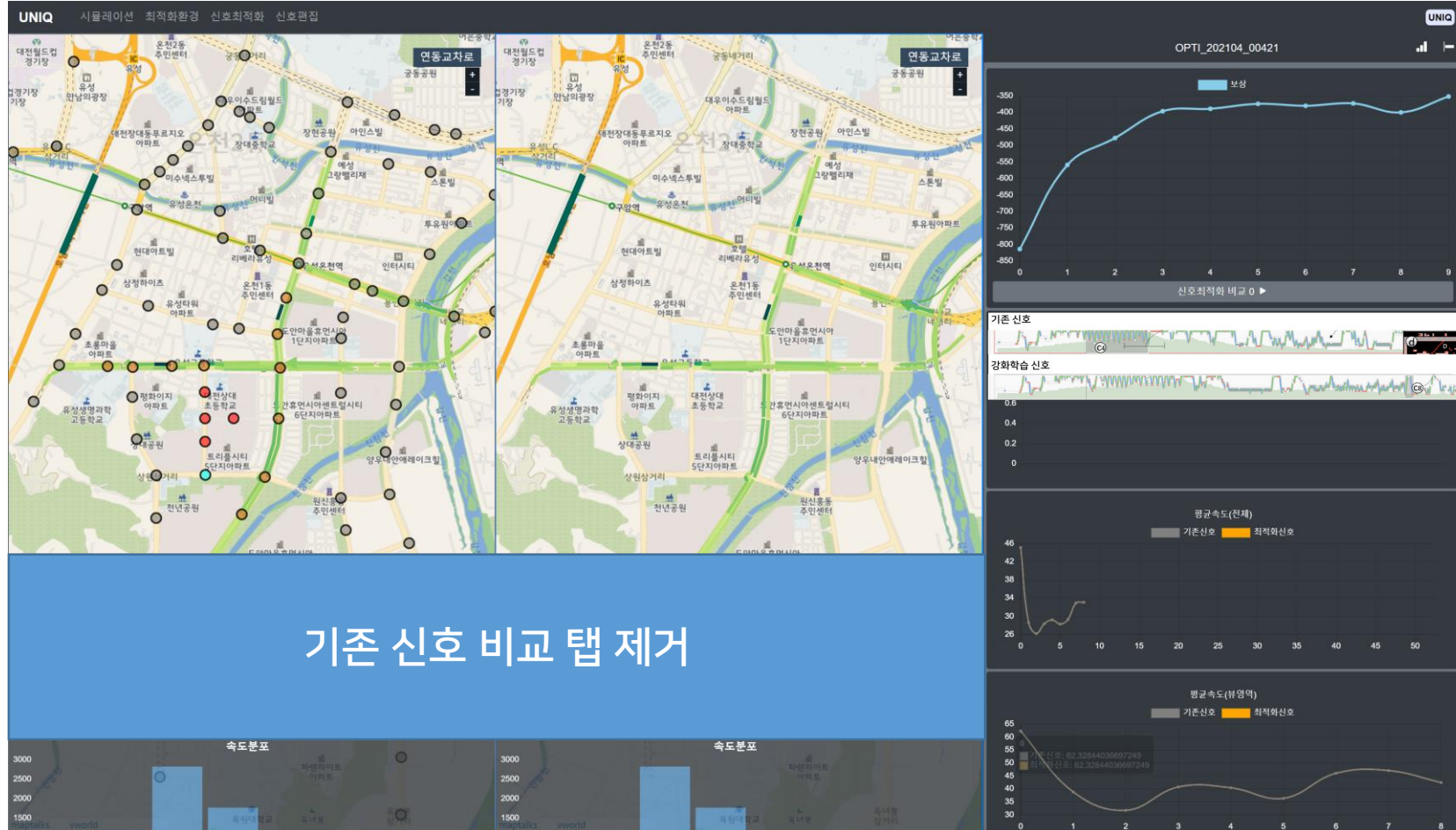
교차로 노드를 클릭하면 해당 교차로의 신호 비교



시뮬레이션 step이 길어서 한 화면에 다 안 보인다면..  
스크롤 바를 만들어서 옆으로 넘길 수 있게..



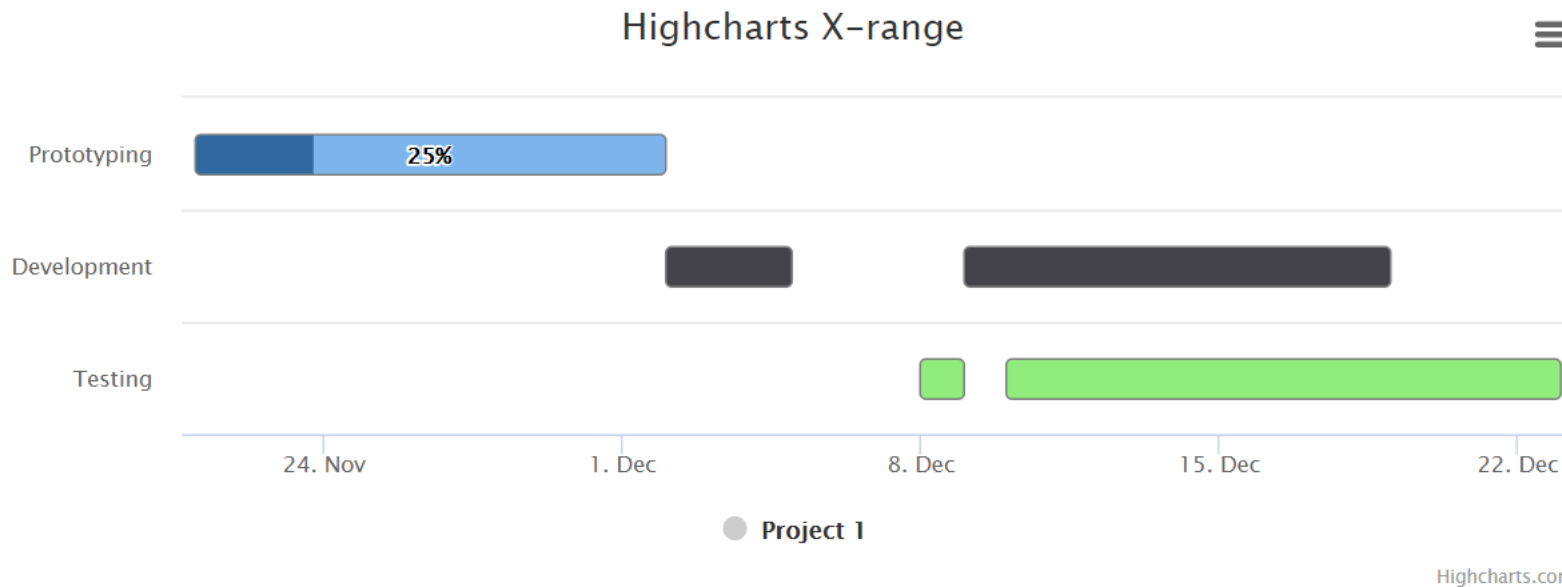
# 추가 구현 필요 - 신호 비교(2안)



1안에 비해 너무 작게 보이는 것 같기도..

# 참고 사이트 - phase chart(Gantt chart)

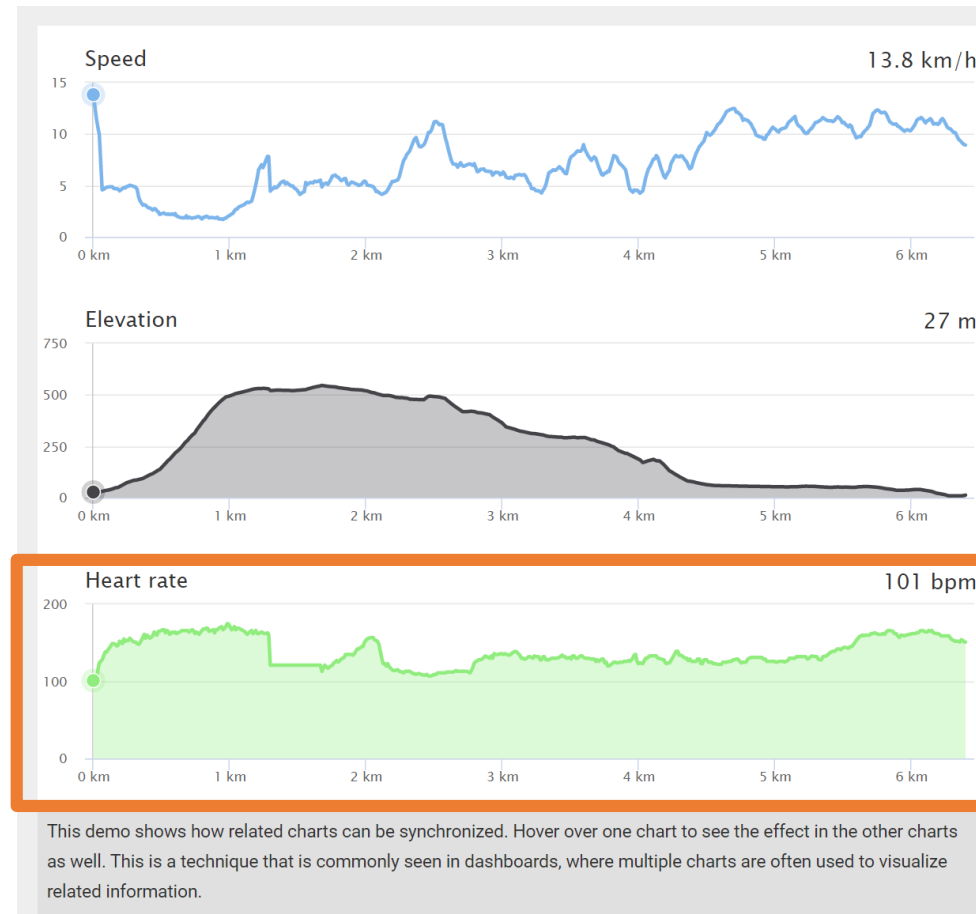
- <https://jsfiddle.net/gh/get/library/pure/highcharts/highcharts/tree/master/samples/highcharts/demo/x-range>



X-range charts are used to visualize a range on the X-axis. This is often used in Gantt charts, as seen in this example. The X-range data series forms the basis of Highcharts Gantt, but is also available with Highcharts.

# 참고 사이트 - reward chart(area chart)

- <https://jsfiddle.net/gh/get/library/pure/highcharts/highcharts/tree/master/samples/highcharts/demo/synchronized-charts>



# 참고 사이트 - multi axes

- <https://jsfiddle.net/gh/get/library/pure/highcharts/highcharts/tree/master/samples/highcharts/demo/combo-multi-axes>

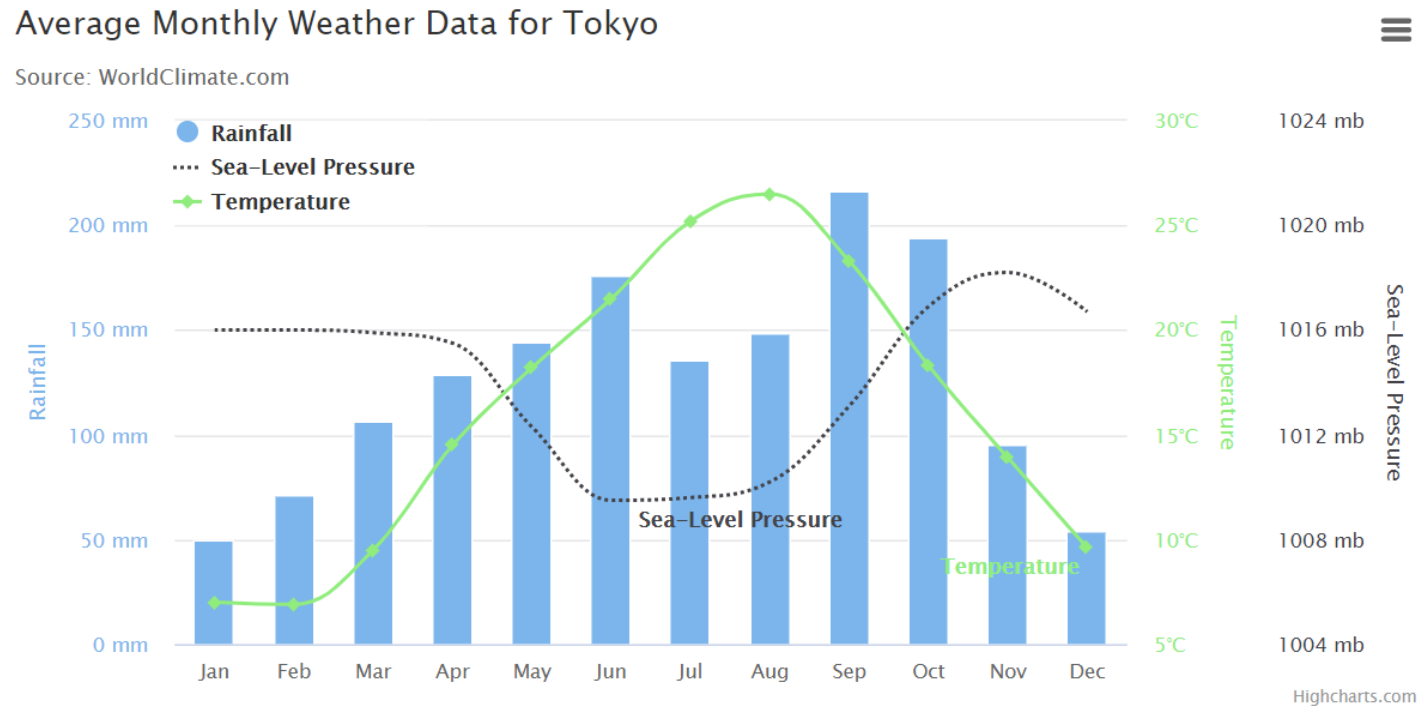
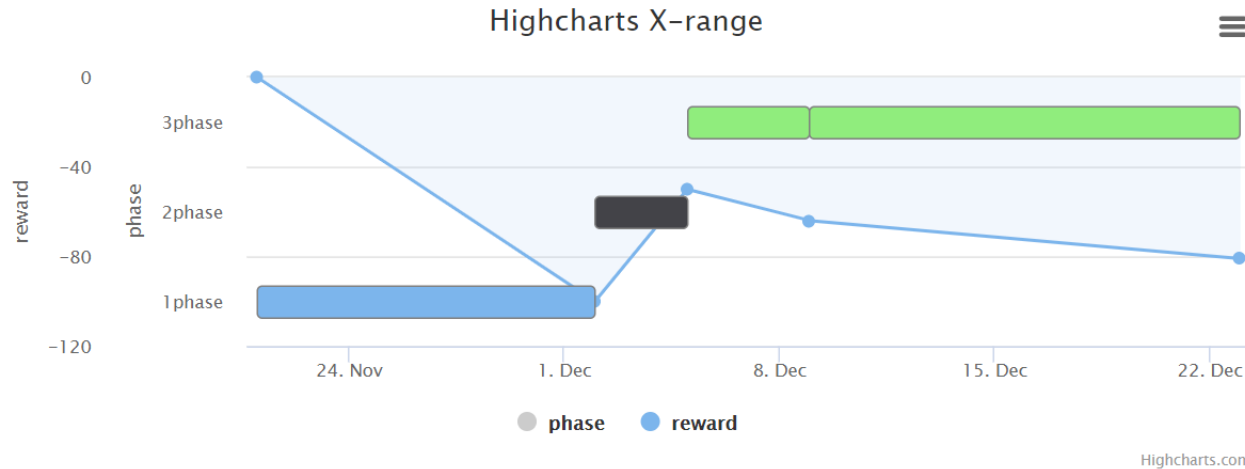


Chart showing use of multiple y-axes, where each series has a separate axis. Multiple axes allows data in different ranges to be visualized together. While this in some cases can cause charts to be hard to read, it can also be a powerful tool to illustrate correlations.

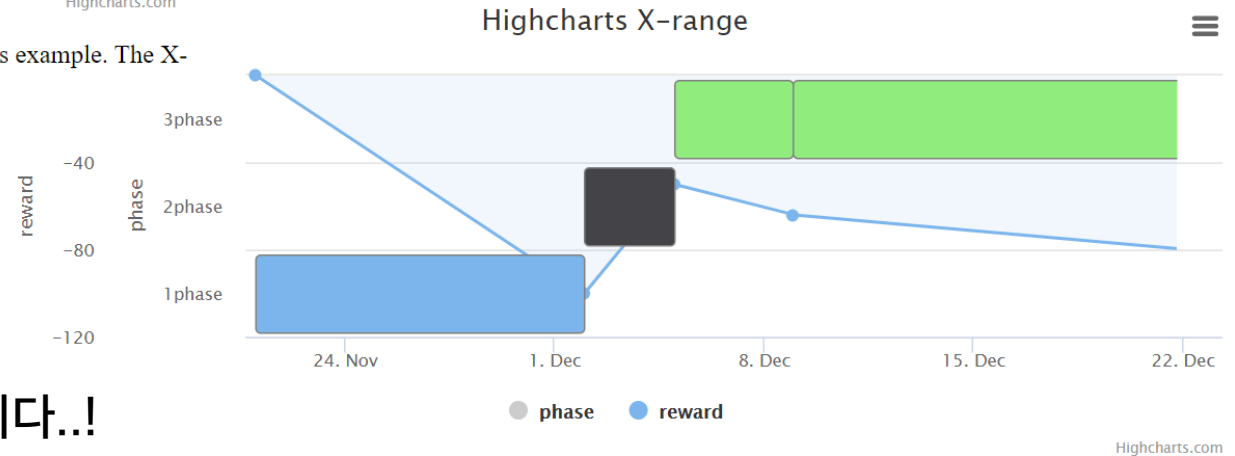


# 참고 사이트 - 위 3개 혼합

- <https://jsfiddle.net/pmg9405/hqm1r4bw/44/>



X-range charts are used to visualize a range on the X-axis. This is often used in Gantt charts, as seen in this example. The X-range data series forms the basis of Highcharts Gantt, but is also available with Highcharts.



대충 이런 느낌으로..? 굳이 highcharts가 아니어도 됩니다..!

X-range charts are used to visualize a range on the X-axis. This is often used in Gantt charts, as seen in this example. The X-range data series forms the basis of Highcharts Gantt, but is also available with Highcharts.

# 참고

rl\_phase\_reward\_output.txt - Windows 메모장

파일(F) 편집(E) 서식(O) 보기(V) 도움말(H)

step,tl\_name,actions,phase,reward

3,목원대네거리,0,1,0,13.0

3,유성중삼거리,1,2,0,1.0

3,도안9단지4(10번),0,0,0,1.0

3,도안네거리(24번),0,0,0,11.0

3,도안28번네거리,0,0,0,8.0

3,도안12단지네거리,1,2,0,16.0

3,도안지하차도입구4,1,2,0,16.0

3,진터네거리,2,4,0,2.0

3,인삼골네거리,1,2,0,35.0

3,도안5단지네거리,1,2,0,1.0

3,상대네거리,3,6,0,4.0

3,도안1단지네거리,3,6,0,27.0

3,원골네거리,3,6,0,5.0

21,목원대네거리,0,1,0,26.0

21,유성중삼거리,1,2,0,0.0

21,도안9단지4(10번),0,0,0,6.0

21,도안네거리(24번),3,6,0,20.0

21,도안28번네거리,1,2,0,17.0

21,도안12단지네거리,1,2,0,44.0

21,도안지하차도입구4,1,2,0,32.0

21,진터네거리,4,8,0,31.0

21,인삼골네거리,0,0,0,18.0

21,도안5단지네거리,1,2,0,34.0

21,상대네거리,0,0,0,15.0

21,도안1단지네거리,0,0,0,28.0

21,원골네거리,1,2,0,16.0

39,목원대네거리,1,3,0,4.0

39,유성중삼거리,1,2,0,0.0

39,도안9단지4(10번),0,0,0,3.0

39,도안네거리(24번),0,0,0,19.0

39,도안28번네거리,0,0,0,15.0

39,도안12단지네거리,1,2,0,31.0

39,도안지하차도입구4,1,2,0,12.0

39,진터네거리,1,2,0,27.0

39,인삼골네거리,1,2,0,49.0

39,도안5단지네거리,4,8,0,17.0

39,상대네거리,1,2,0,5.0

39,도안1단지네거리,3,6,0,25.0

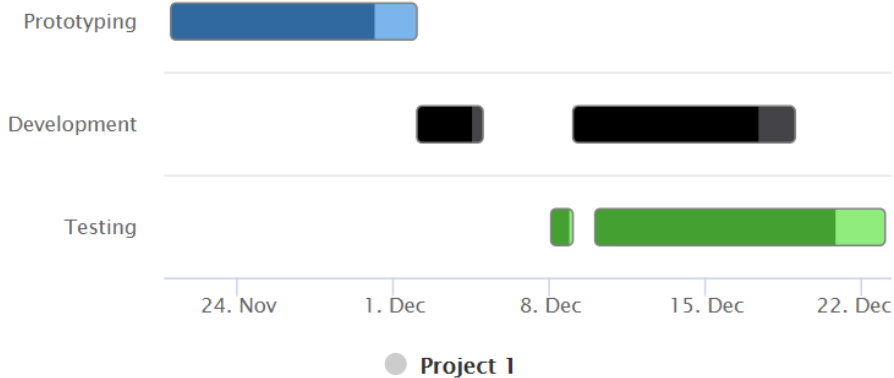
39,원골네거리,1,2,0,15.0

39,목원대네거리,0,1,0,26.0

JavaScript + No-Library (pure JS) ▼

```
33 // groupPadding: 0,
34 borderColor: 'gray',
35 pointWidth: 20,
36 data: [{
37     x: step
38     x2: step+1t
39     y: phase
40     partialFill: 0.833
41 }, {
42     x: Step+1t
43     x2: step+2t
44     y: phase
45     partialFill: 0.833
46 }, {
47     x: Step+2t
48     x2: step+3t
49     y: phase
50     partialFill: 0.833
51 }, {
52     x: Step+3t
53     x2: step+4t
54     y: phase
55     partialFill: 0.833
56 }, {
57     x: Step+4t
58     x2: step+5t
59     y: phase
60     partialFill: 0.833
61 }],
62 dataLabels: {
63     enabled: false
64 }
65 }
```

## Highcharts X-range



Highcharts.com

X-range charts are used to visualize a range on the X-axis. This is often used in Gantt charts, as seen in this example. The X-range data series forms the basis of Highcharts Gantt, but is also available with Highcharts.

# 신호 최적화 스크립트

- Docker image로 제공 예정
- docker input params
  - TargetList - 교차로 아이디 or 군
  - Mode - train or test
  - model number - mode==test 때만, 학습된 모델 번호
  - Start\_time, end\_time - 시뮬레이션 시작 및 종료 시간

# 결과물 output 파일

- 학습 관련
  - 에피소드 별 전체 평균 리워드
  - 에피소드 별 교차로별 평균 리워드
- 테스트 관련
  - 신호 결과 비교(phase와 reward 함께 비교)