```
Last login: Thu Apr  9 16:31:10 on ttys000
Run-Mac:~ mac$ cd ~/.ssh
Run-Mac:.ssh mac$ ssh -i "Runzhe.pem" ubuntu@ec2-54-236-39-76.compute-1.amazonaws.com
The authenticity of host 'ec2-54-236-39-76.compute-1.amazonaws.com (54.236.39.76)' can't be established.
ECDSA key fingerprint is SHA256:9PZjsAP/1vo+NgEKFw+K/LVIyD8iy9EjNA1+a33Neoo.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-54-236-39-76.compute-1.amazonaws.com,54.236.39.76' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 18.04.3 LTS (GNU/Linux 4.15.0-1060-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Thu Apr  9 20:37:12 UTC 2020

  System load:  0.72               Processes:           380
  Usage of /:   28.0% of 30.96GB   Users logged in:     0
  Memory usage: 0%                 IP address for ens5: 172.31.13.99
  Swap usage:   0%

 * Kubernetes 1.18 GA is now available! See https://microk8s.io for docs or
   install it with:

     sudo snap install microk8s --channel=1.18 --classic

 * Multipass 1.1 adds proxy support for developers behind enterprise
   firewalls. Rapid prototyping for cloud operations just got easier.

     https://multipass.run/

 * Canonical Livepatch is available for installation.
   - Reduce system reboots and improve kernel security. Activate at:
     https://ubuntu.com/livepatch

89 packages can be updated.
39 updates are security updates.


Last login: Fri Apr  3 19:45:17 2020 from 107.13.161.147
export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.pyubuntu@ip-172-31-13-99:~$ export openblas_num_threads=1; export OM
P_NUM_THREADS=1; python EC2.py
16:38, 04/09; num of cores:36

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, sd_R_range, t_func] = [36, None, None, 30, 0.5, 1, 10, [0, 10, 20, 30],
 None]


---------------------------------------
[pattern_seed, day, sd_R] = [100, 14, 0]

max(u_O) =  148.6
O_threshold = 70
number of reward locations:  22
O_threshold = 80
number of reward locations:  21
O_threshold = 90
number of reward locations:  17
O_threshold = 100
number of reward locations:  13
O_threshold = 110
number of reward locations:  10
^CProcess Process-28:
Process Process-4:
Traceback (most recent call last):
Process Process-35:
  File "EC2.py", line 90, in <module>
Process Process-30:
Process Process-12:
Process Process-13:
Process Process-20:
Process Process-24:
Process Process-7:
Process Process-1:
Process Process-25:
Process Process-21:
Process Process-23:
Process Process-15:
Process Process-36:
Process Process-22:
Process Process-18:
Process Process-11:
Process Process-10:
Process Process-26:
Process Process-9:
Process Process-17:
Process Process-29:
Process Process-34:
    with_MF = with_MF, with_NO_MARL = with_NO_MARL, with_IS = with_IS,
  File "/home/ubuntu/simu_funs.py", line 64, in simu
```

```
Process Process-27:
Process Process-19:
Process Process-3:
Process Process-32:
    value_reps = parmap(once, range(OPE_rep_times), n_cores)
  File "/home/ubuntu/_uti_basic.py", line 80, in parmap
    [q_in.put((None, None)) for _ in range(nprocs)]
  File "/home/ubuntu/_uti_basic.py", line 80, in <listcomp>
    [q_in.put((None, None)) for _ in range(nprocs)]
Process Process-33:
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/queues.py", line 82, in put
Process Process-8:
Process Process-16:
Process Process-2:
Process Process-31:
Process Process-6:
Process Process-5:
Process Process-14:
    if not self._sem.acquire(block, timeout):
KeyboardInterrupt
ubuntu@ip-172-31-13-99:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
16:41, 04/09; num of cores:36

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, sd_R_range, t_func] = [36, None, None, 30, 0.5, 1, 10, [0, 10, 20, 30],
 None]


----------------------------------------
[pattern_seed, day, sd_R] = [100, 14, 0]

max(u_O) =  148.6
O_threshold = 80
number of reward locations:  21
O_threshold = 90
number of reward locations:  17
O_threshold = 100
number of reward locations:  13
O_threshold = 110
number of reward locations:  10
O_threshold = 120
number of reward locations:  7
target 1 in 5 DONE!
target 2 in 5 DONE!
target 3 in 5 DONE!
target 4 in 5 DONE!
target 5 in 5 DONE!

----------------------------------------
Value of Behaviour policy:64.143
O_threshold = 80
MC for this TARGET:[73.305, 0.063]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[2.19, 1.98, 0.79]][[4.4, -73.31, -9.16]]
std:[[0.5, 0.51, 0.27]][[0.22, 0.0, 0.16]]
MSE:[[2.25, 2.04, 0.83]][[4.41, 73.31, 9.16]]
MSE(-DR):[[0.0, -0.21, -1.42]][[2.16, 71.06, 6.91]]
**
==============
O_threshold = 90
MC for this TARGET:[76.989, 0.055]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-0.94, -1.2, -2.67]][[0.28, -76.99, -12.85]]
std:[[0.37, 0.36, 0.22]][[0.2, 0.0, 0.16]]
MSE:[[1.01, 1.25, 2.68]][[0.34, 76.99, 12.85]]
MSE(-DR):[[0.0, 0.24, 1.67]][[-0.67, 75.98, 11.84]]
==============
O_threshold = 100
MC for this TARGET:[75.521, 0.05]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-1.47, -1.67, -2.59]][[-2.01, -75.52, -11.38]]
std:[[0.27, 0.28, 0.17]][[0.2, 0.0, 0.16]]
MSE:[[1.49, 1.69, 2.6]][[2.02, 75.52, 11.38]]
MSE(-DR):[[0.0, 0.2, 1.11]][[0.53, 74.03, 9.89]]
***
==============
O_threshold = 110
MC for this TARGET:[75.496, 0.044]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-4.41, -4.57, -4.91]][[-5.36, -75.5, -11.35]]
std:[[0.31, 0.31, 0.19]][[0.17, 0.0, 0.16]]
MSE:[[4.42, 4.58, 4.91]][[5.36, 75.5, 11.35]]
MSE(-DR):[[0.0, 0.16, 0.49]][[0.94, 71.08, 6.93]]
***
==============
O_threshold = 120
MC for this TARGET:[74.57, 0.047]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.81, -6.89, -6.56]][[-8.8, -74.57, -10.43]]
std:[[0.35, 0.35, 0.21]][[0.14, 0.0, 0.16]]
```

```
MSE:[[6.82, 6.9, 6.56]][[8.8, 74.57, 10.43]]
MSE(-DR):[[0.0, 0.08, -0.26]][[1.98, 67.75, 3.61]]
**
==============
[[ 2.25  2.04  0.83  4.41 73.31  9.16]
 [ 1.01  1.25  2.68  0.34 76.99 12.85]
 [ 1.49  1.69  2.6   2.02 75.52 11.38]
 [ 4.42  4.58  4.91  5.36 75.5  11.35]
 [ 6.82  6.9   6.56  8.8  74.57 10.43]]


time spent until now: 124.9 mins

18:46, 04/09

---------------------------------------
[pattern_seed, day, sd_R] = [100, 14, 10]

max(u_O) =  148.6
O_threshold = 80
number of reward locations:  21
O_threshold = 90
number of reward locations:  17
O_threshold = 100
number of reward locations:  13
O_threshold = 110
number of reward locations:  10
O_threshold = 120
number of reward locations:  7
target 1 in 5 DONE!
^CProcess Process-63:
Process Process-72:
Process Process-47:
Process Process-61:
Process Process-41:
Process Process-45:
Traceback (most recent call last):
Process Process-62:
Process Process-43:
  File "EC2.py", line 90, in <module>
    with_MF = with_MF, with_NO_MARL = with_NO_MARL, with_IS = with_IS,
  File "/home/ubuntu/simu_funs.py", line 64, in simu
    value_reps = parmap(once, range(OPE_rep_times), n_cores)
  File "/home/ubuntu/_uti_basic.py", line 80, in parmap
    [q_in.put((None, None)) for _ in range(nprocs)]
  File "/home/ubuntu/_uti_basic.py", line 80, in <listcomp>
Process Process-50:
Process Process-57:
    [q_in.put((None, None)) for _ in range(nprocs)]
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/queues.py", line 82, in put
    if not self._sem.acquire(block, timeout):
KeyboardInterrupt
Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
Process Process-54:
Process Process-51:
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 79, in getOneRegionValue
    CV_QV = CV_QV, penalty_range = penalty, spatial = True)
  File "/home/ubuntu/main.py", line 303, in computeQV
    validation_set = valid_tuples)
  File "/home/ubuntu/main.py", line 419, in computeQV_basic
    KQ = SA_GRBF(Z_tilde, gamma_q)
  File "/home/ubuntu/main.py", line 349, in SA_GRBF
    I_A = (Z[:, dim * 2].reshape(-1,1) == Z2[:, dim * 2].reshape(1,-1))
KeyboardInterrupt
Process Process-38:
Process Process-37:
Process Process-68:
Traceback (most recent call last):
Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
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  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 79, in getOneRegionValue
    CV_QV = CV_QV, penalty_range = penalty, spatial = True)
  File "/home/ubuntu/main.py", line 79, in getOneRegionValue
    CV_QV = CV_QV, penalty_range = penalty, spatial = True)
  File "/home/ubuntu/main.py", line 303, in computeQV
    validation_set = valid_tuples)
  File "/home/ubuntu/main.py", line 303, in computeQV
    validation_set = valid_tuples)
  File "/home/ubuntu/main.py", line 419, in computeQV_basic
    KQ = SA_GRBF(Z_tilde, gamma_q)
  File "/home/ubuntu/main.py", line 430, in computeQV_basic
    left = (ECKQ1.T.dot(ECKQ1) + np.vstack((np.hstack((T * lam * KQ, zeros((2 * T, 1)))), zeros((1, 2 * T + 1))))) # Left part of (\hat{
\alpha}, \hat{\eta})
  File "/home/ubuntu/main.py", line 353, in SA_GRBF
    return np.multiply(K, I_A)
KeyboardInterrupt
KeyboardInterrupt
Process Process-48:
Traceback (most recent call last):
Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/main.py", line 114, in getOneRegionValue
    spatial = False)
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/main.py", line 262, in getWeight
    epsilon = epsilon, spatial = spatial, mean_field = mean_field)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/weight.py", line 301, in train
    self.policy_ratio2: policy_ratio2
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 950, in run
    run_metadata_ptr)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1173, in _run
    feed_dict_tensor, options, run_metadata)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1350, in _do_run
    run_metadata)
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1356, in _do_call
    return fn(*args)
  File "/home/ubuntu/main.py", line 114, in getOneRegionValue
    spatial = False)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1341, in _run_fn
    options, feed_dict, fetch_list, target_list, run_metadata)
  File "/home/ubuntu/main.py", line 262, in getWeight
```

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    epsilon = epsilon, spatial = spatial, mean_field = mean_field)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1429, in _call_tf_sessionrun
    run_metadata)
  File "/home/ubuntu/weight.py", line 301, in train
    self.policy_ratio2: policy_ratio2
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 950, in run
    run_metadata_ptr)
KeyboardInterrupt
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1173, in _run
    feed_dict_tensor, options, run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1350, in _do_run
    run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1356, in _do_call
    return fn(*args)
Traceback (most recent call last):
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1341, in _run_fn
    options, feed_dict, fetch_list, target_list, run_metadata)
Traceback (most recent call last):
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1429, in _call_tf_sessionrun
    run_metadata)
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
KeyboardInterrupt
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 114, in getOneRegionValue
    spatial = False)
  File "/home/ubuntu/main.py", line 262, in getWeight
    epsilon = epsilon, spatial = spatial, mean_field = mean_field)
  File "/home/ubuntu/weight.py", line 301, in train
    self.policy_ratio2: policy_ratio2
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 950, in run
    run_metadata_ptr)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1173, in _run
    feed_dict_tensor, options, run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1350, in _do_run
    run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1356, in _do_call
    return fn(*args)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1341, in _run_fn
    options, feed_dict, fetch_list, target_list, run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1429, in _call_tf_sessionrun
    run_metadata)
KeyboardInterrupt
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 114, in getOneRegionValue
    spatial = False)
  File "/home/ubuntu/main.py", line 262, in getWeight
    epsilon = epsilon, spatial = spatial, mean_field = mean_field)
  File "/home/ubuntu/weight.py", line 301, in train
    self.policy_ratio2: policy_ratio2
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 950, in run
    run_metadata_ptr)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1173, in _run
    feed_dict_tensor, options, run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1350, in _do_run
    run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1356, in _do_call
    return fn(*args)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1341, in _run_fn
    options, feed_dict, fetch_list, target_list, run_metadata)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1429, in _call_tf_sessionrun
    run_metadata)
KeyboardInterrupt
Process Process-44:
Process Process-39:
```

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Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 79, in getOneRegionValue
    CV_QV = CV_QV, penalty_range = penalty, spatial = True)
  File "/home/ubuntu/main.py", line 303, in computeQV
    validation_set = valid_tuples)
  File "/home/ubuntu/main.py", line 433, in computeQV_basic
    alpha_eta = np.linalg.lstsq(left, np.expand_dims(right,1))[0]
  File "/home/ubuntu/anaconda3/lib/python3.7/site-packages/numpy/linalg/linalg.py", line 2236, in lstsq
    x, resids, rank, s = gufunc(a, b, rcond, signature=signature, extobj=extobj)
KeyboardInterrupt
Process Process-60:
Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 114, in getOneRegionValue
    spatial = False)
  File "/home/ubuntu/main.py", line 262, in getWeight
    epsilon = epsilon, spatial = spatial, mean_field = mean_field)
  File "/home/ubuntu/weight.py", line 301, in train
    self.policy_ratio2: policy_ratio2
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 950, in run
    run_metadata_ptr)
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 1176, in _run
    return fetch_handler.build_results(self, results)
KeyboardInterrupt
Process Process-58:
Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 107, in getOneRegionValue
    CV_QV = CV_QV, penalty_range = penalty, spatial = False)
  File "/home/ubuntu/main.py", line 303, in computeQV
    validation_set = valid_tuples)
  File "/home/ubuntu/main.py", line 427, in computeQV_basic
    CKQ_1 = np.hstack((C.dot(KQ), -vec1))
KeyboardInterrupt
Traceback (most recent call last):
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 297, in _bootstrap
    self.run()
  File "/home/ubuntu/anaconda3/lib/python3.7/multiprocessing/process.py", line 99, in run
    self._target(*self._args, **self._kwargs)
  File "/home/ubuntu/_uti_basic.py", line 67, in fun
    q_out.put((i, f(x)))
  File "/home/ubuntu/simu_funs.py", line 62, in once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/simu_funs.py", line 214, in simu_once
    inner_parallel = inner_parallel)
  File "/home/ubuntu/main.py", line 158, in V_DR
    r = arr([getOneRegionValue(i) for i in range(N)])
  File "/home/ubuntu/main.py", line 158, in <listcomp>
    r = arr([getOneRegionValue(i) for i in range(N)])
```

```
  File "/home/ubuntu/main.py", line 114, in getOneRegionValue
    spatial = False)
  File "/home/ubuntu/main.py", line 263, in getWeight
    computeWeight.close_Session()
  File "/home/ubuntu/weight.py", line 108, in close_Session
    self.sess.close()
  File "/home/ubuntu/.local/lib/python3.7/site-packages/tensorflow/python/client/session.py", line 747, in close
    tf_session.TF_CloseSession(self._session)
KeyboardInterrupt
Process Process-66:
ubuntu@ip-172-31-13-99:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
19:19, 04/09; num of cores:36

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, sd_R_range, t_func] = [16, None, None, 20, 0.5, 1, 0, [40, 50], None]


--------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 40]

max(u_O) =  145.8
O_threshold = 90
number of reward locations:  14
O_threshold = 100
number of reward locations:  9
O_threshold = 110
number of reward locations:  6
O_threshold = 120
number of reward locations:  3
target 1 in 4 DONE!
target 2 in 4 DONE!
target 3 in 4 DONE!
target 4 in 4 DONE!
Rep 5 DONE
Rep 10 DONE
Rep 15 DONE

--------------------------------------
Value of Behaviour policy:64.788
O_threshold = 90
MC for this TARGET:[73.975, 0.471]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[1.18, 1.02, -0.57]][[1.02, -73.97, -9.19]]
std:[[1.19, 1.18, 0.89]][[0.97, 0.0, 0.35]]
MSE:[[1.68, 1.56, 1.06]][[1.41, 73.97, 9.2]]
MSE(-DR):[[0.0, -0.12, -0.62]][[-0.27, 72.29, 7.52]]
==============
O_threshold = 100
MC for this TARGET:[70.839, 0.474]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-0.31, -0.38, -1.25]][[-1.44, -70.84, -6.05]]
std:[[1.67, 1.74, 1.11]][[0.78, 0.0, 0.35]]
MSE:[[1.7, 1.78, 1.67]][[1.64, 70.84, 6.06]]
MSE(-DR):[[0.0, 0.08, -0.03]][[-0.06, 69.14, 4.36]]
==============
O_threshold = 110
MC for this TARGET:[70.937, 0.469]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-2.23, -2.33, -3.27]][[-4.86, -70.94, -6.15]]
std:[[1.98, 2.02, 1.11]][[0.83, 0.0, 0.35]]
MSE:[[2.98, 3.08, 3.45]][[4.93, 70.94, 6.16]]
MSE(-DR):[[0.0, 0.1, 0.47]][[1.95, 67.96, 3.18]]
***
==============
O_threshold = 120
MC for this TARGET:[71.861, 0.467]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-5.66, -5.65, -5.8]][[-9.73, -71.86, -7.07]]
std:[[2.14, 2.07, 1.72]][[0.87, 0.0, 0.35]]
MSE:[[6.05, 6.02, 6.05]][[9.77, 71.86, 7.08]]
MSE(-DR):[[0.0, -0.03, 0.0]][[3.72, 65.81, 1.03]]
***
==============
[[ 1.68  1.56  1.06  1.41 73.97  9.2 ]
 [ 1.7   1.78  1.67  1.64 70.84  6.06]
 [ 2.98  3.08  3.45  4.93 70.94  6.16]
 [ 6.05  6.02  6.05  9.77 71.86  7.08]]


time spent until now: 22.7 mins

19:42, 04/09

--------------------------------------
[pattern_seed, day, sd_R] = [2, 7, 50]

max(u_O) =  145.8
O_threshold = 90
number of reward locations:  14
O_threshold = 100
```

```
number of reward locations:  9
O_threshold = 110
number of reward locations:  6
O_threshold = 120
number of reward locations:  3
target 1 in 4 DONE!
target 2 in 4 DONE!
target 3 in 4 DONE!
target 4 in 4 DONE!
Rep 5 DONE
Rep 10 DONE
Rep 15 DONE

---------------------------------------
Value of Behaviour policy:64.774
O_threshold = 90
MC for this TARGET:[73.991, 0.585]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[1.3, 1.17, -0.48]][[1.09, -73.99, -9.22]]
std:[[1.45, 1.45, 1.03]][[1.21, 0.0, 0.46]]
MSE:[[1.95, 1.86, 1.14]][[1.63, 73.99, 9.23]]
MSE(-DR):[[0.0, -0.09, -0.81]][[-0.32, 72.04, 7.28]]
==============
O_threshold = 100
MC for this TARGET:[70.855, 0.587]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-0.33, -0.42, -1.26]][[-1.49, -70.86, -6.08]]
std:[[2.14, 2.2, 1.46]][[0.98, 0.0, 0.46]]
MSE:[[2.17, 2.24, 1.93]][[1.78, 70.86, 6.1]]
MSE(-DR):[[0.0, 0.07, -0.24]][[-0.39, 68.69, 3.93]]
==============
O_threshold = 110
MC for this TARGET:[70.952, 0.583]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-2.22, -2.25, -3.38]][[-4.93, -70.95, -6.18]]
std:[[2.57, 2.55, 1.43]][[1.02, 0.0, 0.46]]
MSE:[[3.4, 3.4, 3.67]][[5.03, 70.95, 6.2]]
MSE(-DR):[[0.0, 0.0, 0.27]][[1.63, 67.55, 2.8]]
***
==============
O_threshold = 120
MC for this TARGET:[71.876, 0.581]
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-5.51, -5.57, -5.76]][[-9.76, -71.88, -7.1]]
std:[[2.68, 2.58, 2.19]][[1.08, 0.0, 0.46]]
MSE:[[6.13, 6.14, 6.16]][[9.82, 71.88, 7.11]]
MSE(-DR):[[0.0, 0.01, 0.03]][[3.69, 65.75, 0.98]]
***
==============
[[ 1.68  1.56  1.06  1.41 73.97  9.2 ]
 [ 1.7   1.78  1.67  1.64 70.84  6.06]
 [ 2.98  3.08  3.45  4.93 70.94  6.16]
 [ 6.05  6.02  6.05  9.77 71.86  7.08]]


[[ 1.95  1.86  1.14  1.63 73.99  9.23]
 [ 2.17  2.24  1.93  1.78 70.86  6.1 ]
 [ 3.4   3.4   3.67  5.03 70.95  6.2 ]
 [ 6.13  6.14  6.16  9.82 71.88  7.11]]


time spent until now: 45.4 mins

20:05, 04/09
ubuntu@ip-172-31-13-99:~$
```