```
Last login: Sat Apr 11 00:03:57 on ttys000
Run-Mac:~ mac$ cd ~/.ssh
Run-Mac:.ssh mac$ ssh -i "Runzhe.pem" ubuntu@ec2-35-170-52-244.compute-1.amazonaws.com
The authenticity of host 'ec2-35-170-52-244.compute-1.amazonaws.com (35.170.52.244)' can't be established.
ECDSA key fingerprint is SHA256:Dn36iaGYtt/PCnCELMElEQeiQEX5CofmwqzQSdzKIyE.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-35-170-52-244.compute-1.amazonaws.com,35.170.52.244' (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 Sat Apr 11 14:42:52 UTC 2020

  System load:  1.79               Processes:           821
  Usage of /:   28.0% of 30.96GB   Users logged in:     0
  Memory usage: 0%                 IP address for ens5: 172.31.15.120
  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.py
ubuntu@ip-172-31-15-120:~$ export openblas_num_threads=1; export OMP_NUM_THREADS=1; python EC2.py
10:44, 04/11; num of cores:96
vary_T_sd_15_1_2

Basic setting:[rep_times, sd_O, sd_D, sd_u_O, w_O, w_A, u_O_u_D, sd_R_range, t_func] = [96, None, None, 20, 0.5, 1, 0, [15], None]


---------------------------------------
[pattern_seed, day, sd_R] = [2, 1, 15]

max(u_O) =  145.8
O_threshold = 100
number of reward locations:  9
O_threshold = 105
number of reward locations:  7
O_threshold = 110
number of reward locations:  6
O_threshold = 115
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!

---------------------------------------
Value of Behaviour policy:64.855
O_threshold = 100
MC for this TARGET:[70.758, 0.461]
DR: [68.024, 69.785, nan, 68.356, 72.815, 69.136, 68.542, 71.327, 70.893, 70.828, 72.354, 67.875, 64.69, 68.834, nan, 69.122, 68.954, 70
.08, nan, 69.226, 68.412, 72.051, 70.252, nan, 69.051, 71.14, 66.499, 70.0, 65.942, 67.59, nan, 67.593, 75.309, 66.431, 69.633, 70.91, 7
3.023, 65.64, 64.813, 67.541, 66.654, 68.541, 66.324, 67.231, 67.452, 68.402, 68.535, 65.229, 69.222, 68.739, 66.532, 70.813, 69.159, 67
.868, 72.186, 67.843, 65.742, 69.887, 67.391, 69.787, 70.622, 71.099, 66.455, 66.602, 72.997, 65.68, 70.146, 69.621, 69.04, 65.723, 68.7
29, nan, 67.49, 66.534, 66.225, 70.07, 68.719, 70.193, 69.717, 69.082, nan, 68.068, nan, 66.825, 68.35, nan, 67.961, 66.666, 67.07, 67.8
31, 72.722, 71.271, 68.93, 67.956, 62.561, 62.352]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-2.14, -2.32, -1.65]][[-1.81, -70.76, -5.9]]
std:[[2.28, 2.37, 1.38]][[1.28, 0.0, 0.69]]
MSE:[[3.13, 3.32, 2.15]][[2.22, 70.76, 5.94]]
MSE(-DR):[[0.0, 0.19, -0.98]][[-0.91, 67.63, 2.81]]
==============
O_threshold = 105
MC for this TARGET:[71.752, 0.445]
DR: [67.256, 66.038, 65.985, nan, 65.549, 69.606, 68.235, 69.69, 68.219, 67.789, 70.608, 67.339, 66.715, 66.415, nan, 68.176, 69.785, 69
.822, nan, 67.848, 67.596, 70.636, 71.81, nan, 68.566, 70.263, 61.919, 67.178, 67.021, nan, 63.571, 68.386, 73.83, 66.88, 67.817, 64.999
, 65.756, nan, 66.329, 67.555, 62.866, 67.103, 66.91, 68.968, 66.532, 67.896, 66.623, 65.133, 68.393, 63.802, 66.894, 69.774, 67.099, 64
.863, 73.113, 66.197, 64.332, 66.947, 65.21, 68.01, nan, 71.925, 65.114, 64.993, 71.213, 67.804, 70.167, 67.157, 64.531, 65.786, 67.204,
 nan, 66.575, 64.427, 65.327, 68.45, 66.029, 66.74, 68.793, 70.138, nan, nan, nan, 64.935, 61.46, nan, 64.079, 64.408, 64.044, 72.109, 6
9.305, 67.93, 70.131, 63.87, 65.768, nan]
```

```
   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-4.5, -4.64, -3.87]][[-4.49, -71.75, -6.9]]
std:[[2.44, 2.46, 1.61]][[1.3, 0.0, 0.69]]
MSE:[[5.12, 5.25, 4.19]][[4.67, 71.75, 6.93]]
MSE(-DR):[[0.0, 0.13, -0.93]][[-0.45, 66.63, 1.81]]
==============
O_threshold = 110
MC for this TARGET:[70.843, 0.455]
DR: [66.103, 67.643, 68.094, nan, 62.958, 68.594, 68.957, 72.054, 67.554, 66.346, 68.08, 65.778, 66.341, 65.431, nan, 69.098, 68.698, 70
.304, nan, 69.35, 68.495, 70.721, 72.084, nan, nan, 69.585, 61.171, 65.946, 67.744, nan, 62.185, 70.08, 72.091, 65.445, 65.867, 63.874,
66.71, nan, 67.919, 65.466, 65.634, 66.413, 68.778, 68.683, 66.527, 67.976, 65.583, 65.804, 67.83, 64.424, 67.797, 71.04, 64.578, 65.919
, 72.272, 70.756, 67.723, 68.471, 64.422, 66.008, nan, 72.487, 66.257, 68.294, 67.854, 69.397, 68.404, 69.252, 65.165, 64.801, 65.611, n
an, 65.715, 67.032, 67.637, 68.782, 65.022, 65.486, 68.453, 72.204, nan, nan, nan, 65.167, nan, nan, 61.966, nan, 66.715, 69.638, 68.284
, 67.509, nan, 63.014, 66.38, nan]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.5, -3.82, -3.32]][[-5.13, -70.84, -5.99]]
std:[[2.46, 2.6, 1.74]][[1.29, 0.0, 0.69]]
MSE:[[4.28, 4.62, 3.75]][[5.29, 70.84, 6.03]]
MSE(-DR):[[0.0, 0.34, -0.53]][[1.01, 66.56, 1.75]]
**
==============
O_threshold = 115
MC for this TARGET:[71.779, 0.445]
DR: [65.224, nan, 67.627, nan, nan, 66.115, 68.474, 65.374, 67.561, 63.216, 67.041, 62.379, nan, 61.707, nan, 66.659, nan, 66.352, nan,
69.257, 65.081, 66.086, 68.559, nan, nan, nan, nan, 64.316, 63.796, nan, 64.269, nan, 68.624, 61.284, 64.203, 63.226, 61.772, nan, 67.41
7, 66.145, 69.973, 65.122, nan, 67.66, 64.182, 61.566, 68.691, 65.074, 67.881, 65.949, 65.333, 65.649, 63.511, 61.683, 69.478, nan, nan,
 63.033, 60.22, nan, nan, 69.268, 70.648, 63.594, 62.333, 73.112, 62.631, 65.568, 62.444, 61.72, 60.797, nan, 58.901, 66.727, nan, 66.00
3, 67.553, 65.114, 61.528, 69.488, nan, nan, nan, 62.692, nan, nan, 64.278, nan, nan, 71.575, 64.654, 64.282, nan, 68.268, 66.358, 63.29
7]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.41, -6.45, -5.66]][[-10.04, -71.78, -6.92]]
std:[[2.91, 2.98, 2.11]][[1.38, 0.0, 0.69]]
MSE:[[7.04, 7.11, 6.04]][[10.13, 71.78, 6.95]]
MSE(-DR):[[0.0, 0.07, -1.0]][[3.09, 64.74, -0.09]]
**
==============
[[ 3.13  3.32  2.15  2.22 70.76  5.94]
 [ 5.12  5.25  4.19  4.67 71.75  6.93]
 [ 4.28  4.62  3.75  5.29 70.84  6.03]
 [ 7.04  7.11  6.04 10.13 71.78  6.95]]


time spent until now: 55.6 mins

11:40, 04/11

---------------------------------------
[pattern_seed, day, sd_R] = [2, 2, 15]

max(u_O) =  145.8
O_threshold = 100
number of reward locations:  9
O_threshold = 105
number of reward locations:  7
O_threshold = 110
number of reward locations:  6
O_threshold = 115
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!

---------------------------------------
Value of Behaviour policy:64.828
O_threshold = 100
MC for this TARGET:[70.797, 0.332]
DR: [68.94, 69.686, 73.987, 67.57, 70.628, 69.349, 71.201, 67.8, 69.719, 68.186, 67.928, 68.825, 69.093, 70.401, 69.273, 69.637, 72.39,
74.073, 68.949, 69.778, 71.683, 71.62, 66.862, 68.778, 69.108, 70.355, 72.238, 68.461, 68.783, 68.712, 69.997, 69.014, 69.5, 69.193, 68.
281, 71.422, 71.002, 72.317, 70.918, 69.997, 71.927, 68.894, 72.2, 69.137, 68.093, 70.181, 70.947, 71.879, 70.95, 66.925, 68.163, 70.534
, 68.443, 70.26, 69.422, 67.115, 71.028, 68.89, 71.963, 72.348, 69.563, 67.367, 71.226, 72.885, 71.086, 70.536, 72.349, 69.839, 71.437,
70.131, 69.079, 69.836, 69.824, 71.882, 71.571, 71.337, 69.219, 69.521, 71.569, 68.649, 72.712, 67.078, 67.949, 69.476, 70.487, 68.449,
68.059, 71.351, 69.775, 67.936, 68.53, 71.97, 69.463, 71.18, 68.796, 71.179]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-0.82, -0.87, -1.22]][[-1.61, -70.8, -5.97]]
std:[[1.6, 1.59, 1.01]][[0.82, 0.0, 0.48]]
MSE:[[1.8, 1.81, 1.58]][[1.81, 70.8, 5.99]]
MSE(-DR):[[0.0, 0.01, -0.22]][[0.01, 69.0, 4.19]]
**
==============
O_threshold = 105
MC for this TARGET:[71.795, 0.328]
DR: [67.914, 67.102, 73.612, 68.842, 67.913, 66.712, 70.116, 66.765, 67.584, 65.933, 64.772, 69.682, 70.267, 69.772, 66.789, 67.618, 69.
799, 70.498, 67.239, 69.119, 66.712, 69.828, 67.503, 70.236, 66.237, 67.279, 71.354, 69.168, 66.042, 67.492, 68.644, 64.551, 66.615, 66.
682, 66.933, 68.911, 68.034, 69.708, 69.56, 70.578, 65.532, 67.724, 68.832, 69.229, 68.923, 68.579, 72.041, 70.924, 70.177, 65.983, 68.1
```

98, 66.265, 67.826, 68.98, 68.253, 65.789, 69.475, 67.231, 69.017, 74.128, 68.611, 65.062, 68.928, 70.427, 69.02, 67.023, 70.654, 65.872, 67.499, 67.443, 67.994, 71.629, 69.211, 70.302, 72.564, 70.09, 69.051, 69.38, 70.329, 66.373, 71.655, 65.497, 68.69, 66.755, 68.566, 67.87, 65.661, 69.699, 67.761, 67.419, 66.978, 70.261, 69.205, 70.262, 66.176, 71.282]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.31, -3.37, -3.67]][[-4.27, -71.8, -6.97]]
std:[[1.92, 1.93, 1.02]][[0.79, 0.0, 0.48]]
MSE:[[3.83, 3.88, 3.81]][[4.34, 71.8, 6.99]]
MSE(-DR):[[0.0, 0.05, -0.02]][[0.51, 67.97, 3.16]]
**
==============
O_threshold = 110
MC for this TARGET:[70.893, 0.321]
DR: [66.8, 67.519, 72.255, 67.202, 65.755, 66.06, 70.347, 67.016, 66.442, 64.122, 64.99, 68.669, 70.121, 68.606, 66.651, 69.73, 67.757, 65.924, 68.019, 67.194, 66.167, 68.43, 67.188, 69.004, 67.707, 67.726, 69.367, 69.449, 66.151, 65.164, 67.985, 66.957, 67.124, 67.06, 66.922, 66.126, 66.759, 68.815, 68.271, 68.462, 66.249, 67.099, 66.271, 68.737, 67.529, 68.013, 71.16, 70.672, 68.327, 64.558, 67.05, 64.92, 66.245, 67.416, 66.636, 65.583, 68.397, 67.633, 67.358, 72.028, 66.168, 63.869, 69.407, 70.558, 66.799, 65.893, 70.706, 66.41, 64.188, 63.394, 66.619, 68.929, 69.137, 68.627, 69.155, 68.313, 68.799, 68.694, 69.032, 66.5, 71.277, 66.081, 67.902, 66.993, 67.21, 68.639, 64.661, 68.249, 65.556, 67.297, 66.043, 69.892, 67.818, 71.567, 63.791, 68.134]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-3.33, -3.38, -3.45]][[-4.99, -70.89, -6.06]]
std:[[1.85, 1.84, 0.94]][[0.82, 0.0, 0.48]]
MSE:[[3.81, 3.85, 3.58]][[5.06, 70.89, 6.08]]
MSE(-DR):[[0.0, 0.04, -0.23]][[1.25, 67.08, 2.27]]
**
==============
O_threshold = 115
MC for this TARGET:[71.81, 0.32]
DR: [63.703, 69.44, 66.413, 63.754, 61.601, 63.661, 66.573, 64.688, 64.988, 64.152, 61.65, 68.194, 67.883, 65.357, 64.132, 67.921, 66.493, 62.903, 67.4, 64.953, 63.652, 64.772, 66.516, 63.413, 67.873, 67.172, 67.87, 67.169, 65.629, 64.74, 66.161, nan, 64.669, 64.737, 63.42, 66.965, 65.503, 66.319, 67.032, 65.126, 66.315, 66.104, 67.027, 67.216, 67.506, 64.885, 73.415, 65.544, 66.971, 63.434, 64.731, 64.483, 67.976, 62.528, 64.388, 63.762, 68.441, 65.998, 65.047, 70.788, 64.757, 62.79, 69.909, 71.746, 64.654, 63.285, 68.189, 65.657, 60.957, 60.101, 67.435, 64.293, 64.982, 64.996, 65.95, 65.1, 67.142, 70.078, 64.963, 67.26, 68.281, 64.229, 66.569, 60.057, 64.665, 64.346, 63.342, 68.108, 63.086, 66.667, 65.445, 69.802, 63.789, 69.654, 63.651, 63.838]

   [DR/QV/IS]; [DR_NO_MARL, DR_NO_MF, V_behav]
bias:[[-6.12, -6.19, -5.92]][[-9.84, -71.81, -6.98]]
std:[[2.37, 2.38, 1.38]][[0.76, 0.0, 0.48]]
MSE:[[6.56, 6.63, 6.08]][[9.87, 71.81, 7.0]]
MSE(-DR):[[0.0, 0.07, -0.48]][[3.31, 65.25, 0.44]]
**
==============
[[3.13 3.32 2.15 2.22 70.76 5.94]
 [5.12 5.25 4.19 4.67 71.75 6.93]
 [4.28 4.62 3.75 5.29 70.84 6.03]
 [7.04 7.11 6.04 10.13 71.78 6.95]]

[[1.8   1.81 1.58 1.81 70.8   5.99]
 [3.83 3.88 3.81 4.34 71.8   6.99]
 [3.81 3.85 3.58 5.06 70.89 6.08]
 [6.56 6.63 6.08 9.87 71.81 7.]]

time spent until now: 111.5 mins

12:36, 04/11
ubuntu@ip-172-31-15-120:~$