

mlbd2022fall-small-grid-world

2022机器学习与大数据作业9, code here: <https://github.com/keyork/mlbd2022fall-small-grid-world>

Envs

```
1 python==3.7.13
2 numpy==1.21.6
3 colorlog==6.7.0
```

Usage

```
1 git clone git@github.com:keyork/mlbd2022fall-small-grid-world.git
2 cd mlbd2022fall-small-grid-world
3 python run.py --ws 4 --am 0.25 0.25 0.25 0.25
4
5 usage: run.py [-h] [--ws WS] [--am AM [AM ...]]
6
7 optional arguments:
8   -h, --help            show this help message and exit
9   --ws WS               world size
10  --am AM [AM ...]      agent mind, [left, right, up, down]
```

Result

set agent mind = $[p_{left}, p_{right}, p_{up}, p_{down}]$

- agent mind = [0.25, 0.25, 0.25, 0.25]
 - iter times: 107
 - Result:

```
1 [[ 0.   -13.96 -19.94 -21.94]
2  [-13.96 -17.95 -19.94 -19.94]
3  [-19.94 -19.94 -17.95 -13.96]
4  [-21.94 -19.94 -13.96  0.   ]]
```

- agent mind = [0.1, 0.5, 0.2, 0.2]
 - iter times: 148
 - Result:

```
1 [[ 0.   -26.06 -29.8  -30.22]
2  [-19.17 -24.73 -25.61 -25.45]
3  [-19.45 -19.   -17.25 -15.62]
4  [-15.86 -12.42  -7.11  0.   ]]
```

- `agent mind = [0.9, 0.01, 0.05, 0.04]`
 - `iter times: 462`
 - Result:

```
1  [[ 0.      -3.17   -6.22   -9.12]
2   [-48.6    -48.77  -49.07  -49.32]
3   [-84.43   -84.44  -84.38  -80.21]
4   [-104.33  -104.32 -103.24   0.   ]]
```

Change World Size

set `agent mind` = $[p_{left}, p_{right}, p_{up}, p_{down}] = [0.25, 0.25, 0.25, 0.25]$

- `world size = 3`
 - `iter times: 43`
 - Result:

```
1  [[ 0.    -6.98 -8.98]
2   [-6.98 -7.98 -6.98]
3   [-8.98 -6.98  0.   ]]
```

- `world size = 5`
 - `iter times: 213`
 - Result:

```
1  [[ 0.    -22.95 -34.25 -39.57 -41.56]
2   [-22.95 -30.6  -36.25 -38.91 -39.57]
3   [-34.26 -36.25 -37.25 -36.25 -34.25]
4   [-39.57 -38.91 -36.25 -30.6  -22.95]
5   [-41.56 -39.57 -34.25 -22.95   0.   ]]
```

- `world size = 9`
 - `iter times: 1049`
 - Result:

```
1  [[ 0.    -78.82 -123.76 -151.9  -170.24 -182.21 -189.76 -194.14 -196.14]
2   [-78.82 -108.7  -136.57 -157.7  -172.62 -182.63 -188.94 -192.54 -194.14]
3   [-123.76 -136.57 -152.14 -165.72 -175.92 -182.76 -186.85 -188.94 -189.76]
4   [-151.9  -157.7  -165.72 -173.14 -178.57 -181.66 -182.76 -182.63 -182.21]
5   [-170.24 -172.62 -175.92 -178.57 -179.57 -178.57 -175.92 -172.62 -170.24]
6   [-182.21 -182.63 -182.76 -181.66 -178.57 -173.14 -165.72 -157.7  -151.9  ]
7   [-189.76 -188.94 -186.85 -182.76 -175.92 -165.72 -152.14 -136.57 -123.76]
8   [-194.14 -192.54 -188.94 -182.63 -172.62 -157.7  -136.57 -108.7  -78.82]
9   [-196.14 -194.14 -189.76 -182.21 -170.24 -151.9  -123.76 -78.82   0.   ]]
```

Output in Terminal

```
(mlbd) ckeyork@CdeMacBook-Pro ~/code/mlbd2022fall-small-grid-world % dev.py
thon run.py --ws 4 --am 0.25 0.25 0.25 0.25
[WARNING] Start! (2022-11-22 16:49:08,854)
[INFO] config: (2022-11-22 16:49:08,854)
world size: 4
agent mind: [0.25, 0.25, 0.25, 0.25]
[left, right, up, down]
[INFO] Iter: 0 (2022-11-22 16:49:08,854)
[[ 0. -1. -1. -1.]
 [-1. -1. -1. -1.]
 [-1. -1. -1. -1.]
 [-1. -1. -1. 0.]]
[INFO] Iter: 1 (2022-11-22 16:49:08,855)
[[ 0. -1.75 -2. -2.]
 [-1.75 -2. -2. -2.]
 [-2. -2. -2. -1.75]
 [-2. -2. -1.75 0.]]
[INFO] Iter: 2 (2022-11-22 16:49:08,855)
[[ 0. -2.44 -2.94 -3.]
 [-2.44 -2.88 -3. -2.94]
 [-2.94 -3. -2.88 -2.44]
 [-3. -2.94 -2.44 0.]]
[INFO] Iter: 3 (2022-11-22 16:49:08,856)
[[ 0. -3.06 -3.84 -3.97]
 [-3.06 -3.72 -3.91 -3.84]
 [-3.84 -3.91 -3.72 -3.06]
 [-3.97 -3.84 -3.06 0.]]
[INFO] Iter: 10 (2022-11-22 16:49:08,856)
[[ 0. -6.56 -8.97 -9.66]
 [-6.56 -8.28 -9.04 -8.97]
 [-8.98 -9.05 -8.28 -6.56]
 [-9.66 -8.98 -6.56 0.]]
[INFO] Iter: 100 (2022-11-22 16:49:08,863)
[[ 0. -13.94 -19.92 -21.91]
 [-13.94 -17.93 -19.92 -19.92]
 [-19.92 -19.92 -17.93 -13.94]
 [-21.92 -19.92 -13.94 0.]]
[INFO] Iter: 107 (2022-11-22 16:49:08,865)
[[ 0. -13.96 -19.94 -21.94]
 [-13.96 -17.95 -19.94 -19.94]
 [-19.94 -19.94 -17.95 -13.96]
 [-21.94 -19.94 -13.96 0.]]
[WARNING] Done! (2022-11-22 16:49:08,865)
(mlbd) ckeyork@CdeMacBook-Pro ~/code/mlbd2022fall-small-grid-world % dev.py
thon run.py --ws 4 --am 0.9 0.01 0.05 0.04
[WARNING] Start! (2022-11-22 16:50:48,373)
[INFO] config: (2022-11-22 16:50:48,373)
world size: 4
agent mind: [0.9, 0.01, 0.05, 0.04]
[left, right, up, down]
[INFO] Iter: 0 (2022-11-22 16:50:48,373)
[[ 0. -1. -1. -1.]
 [-1. -1. -1. -1.]
 [-1. -1. -1. -1.]
 [-1. -1. -1. 0.]]
[INFO] Iter: 1 (2022-11-22 16:50:48,374)
[[ 0. -1.1 -2. -2.]
 [-1.95 -2. -2. -2.]
 [-2. -2. -2. -1.96]
 [-2. -2. -1.99 0.]]
[INFO] Iter: 2 (2022-11-22 16:50:48,374)
[[ 0. -1.16 -2.19 -3.]
 [-2.86 -2.81 -3. -3.]
 [-3. -3. -3. -2.92]
 [-3. -3. -2.98 0.]]
[INFO] Iter: 3 (2022-11-22 16:50:48,375)
[[ 0. -1.2 -2.3 -3.27]
 [-3.72 -3.78 -3.88 -4.]
 [-3.99 -4. -4. -3.68]
 [-4. -4. -3.97 0.]]
[INFO] Iter: 10 (2022-11-22 16:50:48,375)
[[ 0. -1.43 -2.77 -4.02]
 [-8.86 -8.93 -9.06 -9.22]
 [-10.71 -10.71 -10.71 -10.32]
 [-10.97 -10.97 -10.87 0.]]
[INFO] Iter: 100 (2022-11-22 16:50:48,382)
[[ 0. -2.62 -5.14 -7.52]
 [-36.05 -36.19 -36.43 -36.65]
 [-59.88 -59.89 -59.85 -59.98]
 [-72.08 -72.08 -71.33 0.]]
[INFO] Iter: 462 (2022-11-22 16:50:48,410)
[[ 0. -3.17 -6.22 -9.12]
 [-48.6 -48.77 -49.07 -49.32]
 [-84.43 -84.44 -84.38 -80.21]
 [-104.39 -104.32 -103.24 0.]]
[WARNING] Done! (2022-11-22 16:50:48,410)
(mlbd) ckeyork@CdeMacBook-Pro ~/code/mlbd2022fall-small-grid-world % dev.py
thon run.py --ws 4 --am 0.1 0.5 0.2 0.2
[WARNING] Start! (2022-11-22 16:50:10,615)
[INFO] config: (2022-11-22 16:50:10,615)
world size: 4
agent mind: [0.1, 0.5, 0.2, 0.2]
[left, right, up, down]
[INFO] Iter: 0 (2022-11-22 16:50:10,615)
[[ 0. -1. -1. -1.]
 [-1. -1. -1. -1.]
 [-1. -1. -1. -1.]
 [-1. -1. -1. 0.]]
[INFO] Iter: 1 (2022-11-22 16:50:10,616)
[[ 0. -1.9 -2. -2.]
 [-1.8 -2. -2. -2.]
 [-2. -2. -2. -1.8]
 [-2. -2. -1.5 0.]]
[INFO] Iter: 2 (2022-11-22 16:50:10,616)
[[ 0. -2.78 -2.99 -3.]
 [-2.58 -2.96 -3. -2.96]
 [-2.96 -3. -2.8 -2.5]
 [-3. -2.75 -1.9 0.]]
[INFO] Iter: 3 (2022-11-22 16:50:10,617)
[[ 0. -3.64 -3.98 -3.99]
 [-3.33 -3.91 -3.93 -3.88]
 [-3.91 -3.84 -3.53 -3.12]
 [-3.87 -3.4 -2.22 0.]]
[INFO] Iter: 10 (2022-11-22 16:50:10,618)
[[ 0. -9.1 -10.2 -10.29]
 [-7.62 -9.27 -9.39 -9.26]
 [-8.49 -8.09 -7.2 -6.4]
 [-7.74 -6.17 -3.64 0.]]
[INFO] Iter: 100 (2022-11-22 16:50:10,625)
[[ 0. -25.67 -29.35 -29.77]
 [-18.92 -24.38 -25.25 -25.1]
 [-19.21 -18.76 -17.03 -15.42]
 [-15.69 -12.3 -7.04 0.]]
[INFO] Iter: 140 (2022-11-22 16:50:10,630)
[[ 0. -26.06 -29.8 -30.22]
 [-19.17 -24.73 -25.61 -25.45]
 [-19.45 -19. -17.25 -15.62]
 [-15.86 -12.42 -7.11 0.]]
[WARNING] Done! (2022-11-22 16:50:10,630)
(mlbd) ckeyork@CdeMacBook-Pro ~/code/mlbd2022fall-small-grid-world % dev.py
thon run.py --ws 3 --am 0.25 0.25 0.25 0.25
[WARNING] Start! (2022-11-22 16:54:09,031)
[INFO] config: (2022-11-22 16:54:09,031)
world size: 3
agent mind: [0.25, 0.25, 0.25, 0.25]
[left, right, up, down]
[INFO] Iter: 0 (2022-11-22 16:54:09,031)
[[ 0. -1. -1.]
 [-1. -1. -1.]
 [-1. -1. 0.]]
[INFO] Iter: 1 (2022-11-22 16:54:09,032)
[[ 0. -1.75 -2.]
 [-1.75 -2. -1.75]
 [-2. -1.75 0.]]
[INFO] Iter: 2 (2022-11-22 16:54:09,032)
[[ 0. -2.44 -2.88]
 [-2.44 -2.75 -2.44]
 [-2.88 -2.44 0.]]
[INFO] Iter: 3 (2022-11-22 16:54:09,033)
[[ 0. -3.02 -3.66]
 [-3.02 -3.44 -3.02]
 [-3.66 -3.02 0.]]
[INFO] Iter: 10 (2022-11-22 16:54:09,034)
[[ 0. -5.47 -6.94]
 [-5.47 -6.25 -5.47]
 [-6.94 -5.47 0.]]
[INFO] Iter: 43 (2022-11-22 16:54:09,037)
[[ 0. -6.98 -6.98]
 [-6.98 -7.98 -6.98]
 [-8.98 -6.98 0.]]
[WARNING] Done! (2022-11-22 16:54:09,037)
```

If you input error `agent mind`, the program will report an error like this:

```
(mlbd) ckeyork@CdeMacBook-Pro ~/code/mlbd2022fall-small-grid-world % dev.py
python run.py --ws 4 --am 0.9 0.9 0.9 0.9
[WARNING] Start! (2022-11-22 16:53:08,984)
[INFO] config: (2022-11-22 16:53:08,984)
world size: 4
agent mind: [0.9, 0.9, 0.9, 0.9]
[left, right, up, down]
[ERROR] The sum of agent mind MUST be 1 but got [0.9, 0.9, 0.9, 0.9], EXIT! (2022-11-22 16:53:08,985)
```