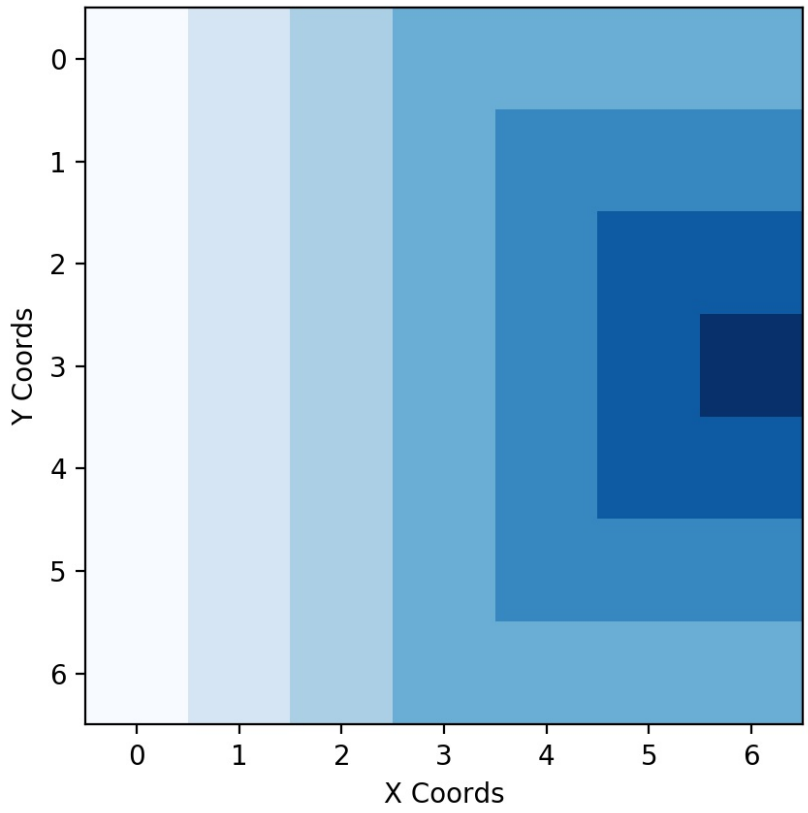
ValueIteration

Case I: Windless

Value Function:

	00	01	02	03	04	05	06
00	-6.0	-5.0	-4.0	-3.0	-3.0	-3.0	-3.0
01	-6.0	-5.0	-4.0	-3.0	-2.0	-2.0	-2.0
02	-6.0	-5.0	-4.0	-3.0	-2.0	-1.0	-1.0
03	-6.0	-5.0	-4.0	-3.0	-2.0	-1.0	0.0
04	-6.0	-5.0	-4.0	-3.0	-2.0	-1.0	-1.0
05	-6.0	-5.0	-4.0	-3.0	-2.0	-2.0	-2.0
06	-6.0	-5.0	-4.0	-3.0	-3.0	-3.0	-3.0

Gradient Visualization of the Value Function:



An Optimal Policy for Case 1:

	00	01	02	03	04	05	06
00	E	E	E	SE	S	S	S
01	E	E	E	E	SE	S	S
02	E	E	E	E	E	SE	S
03	E	E	E	E	E	E	.
04	E	E	E	E	E	NE	N
05	E	E	E	E	NE	N	N
06	E	E	E	NE	N	N	N

Path from 3,0 to 3,6 for Case 1:

- ((3,0):E), ((3,1):E), ((3:2):E), ((3,3):E), ((3,4):E), ((3,5):E), ((3,6):.)

Another Path from 3,0 to 3,6 for Case 1:

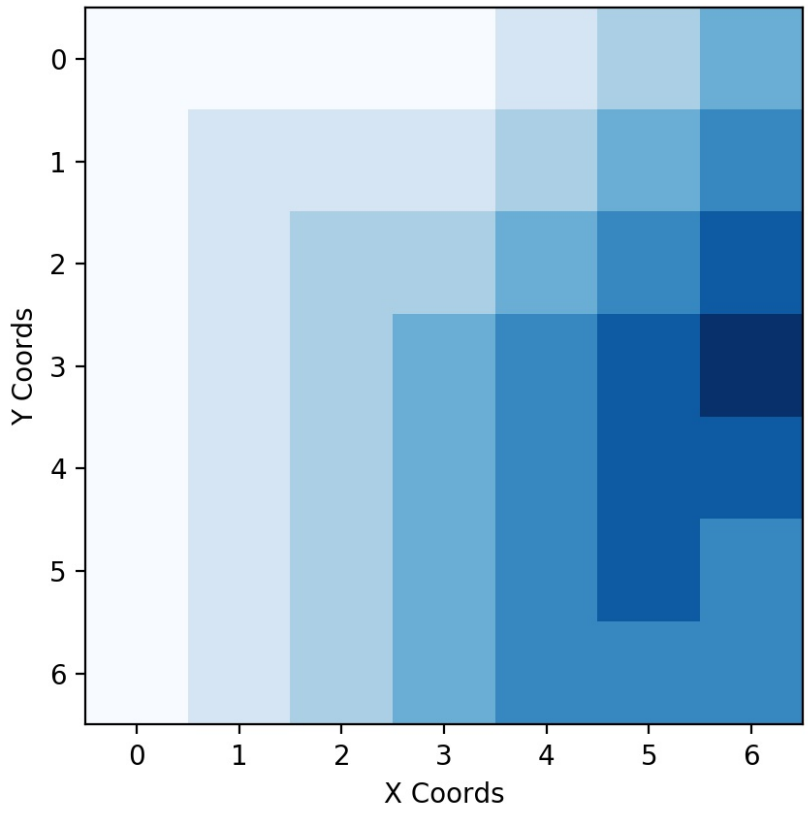
- ((3,0):NE), ((2,1):E), ((2:2):SE), ((3,3):E), ((3,4):E), ((3,5):E), ((3,6):.)

Case II: Weak Wind

Value Function:

	0	1	2	3	4	5	6
0	-6.0	-6.0	-6.0	-6.0	-5.0	-4.0	-3.0
1	-6.0	-5.0	-5.0	-5.0	-4.0	-3.0	-2.0
2	-6.0	-5.0	-4.0	-4.0	-3.0	-2.0	-1.0
3	-6.0	-5.0	-4.0	-3.0	-2.0	-1.0	0.0
4	-6.0	-5.0	-4.0	-3.0	-2.0	-1.0	-1.0
5	-6.0	-5.0	-4.0	-3.0	-2.0	-1.0	-2.0
6	-6.0	-5.0	-4.0	-3.0	-2.0	-2.0	-2.0

Gradient Visualization of the Value Function:



An Optimal Policy for Case 2:

	0	1	2	3	4	5	6
0	SE	SE	SE	SE	SE	SE	S
1	E	SE	SE	SE	SE	SE	S
2	E	E	SE	SE	SE	SE	S
3	E	E	E	SE	SE	SE	0.0
4	E	E	E	E	E	E	N
5	E	E	E	E	E	NE	N
6	E	E	E	E	E	E	N

3,0 to 3,6 for Case 2:

- ((3,0):E), ((3,1):E), ((3:2):E), ((3,3):SE), ((3,4):SE), ((3,5):SE), ((3,6):.)

Another 3,0 to 3,6 for Case 2:

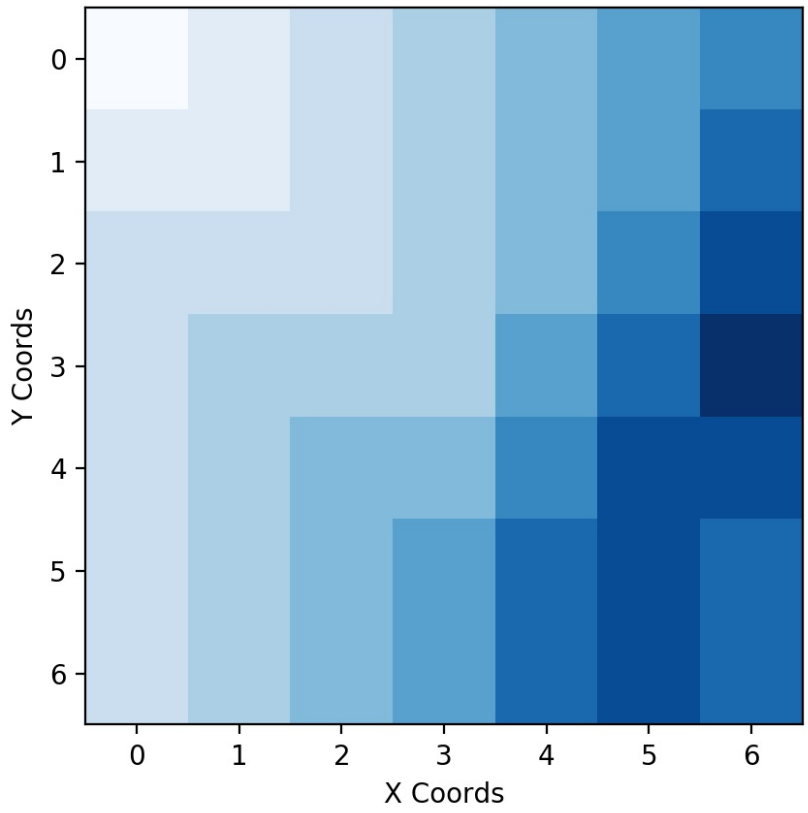
- ((3,0):NE), ((2,1):SE), ((3:2):E), ((3,3):SE), ((3,4):SE), ((3,5):SE), ((3,6):.)

Case III: Strong Wind

Value Function:

	0	1	2	3	4	5	6
0	-9.0	-8.0	-7.0	-6.0	-5.0	-4.0	-3.0
1	-8.0	-8.0	-7.0	-6.0	-5.0	-4.0	-2.0
2	-7.0	-7.0	-7.0	-6.0	-5.0	-3.0	-1.0
3	-7.0	-6.0	-6.0	-6.0	-4.0	-2.0	0.0
4	-7.0	-6.0	-5.0	-5.0	-3.0	-1.0	-1.0
5	-7.0	-6.0	-5.0	-4.0	-2.0	-1.0	-2.0
6	-7.0	-6.0	-5.0	-4.0	-2.0	-1.0	-2.0

Gradient Visualization of the Value Function:



An Optimal Policy for Case 3:

	0	1	2	3	4	5	6
0	SE	SE	SE	SE	SE	SE	S
1	SE	SE	SE	SE	SE	SE	S
2	SE	SE	SE	SE	SE	SE	S
3	SE	SE	SE	SE	SE	SE	0.0
4	E	SE	SE	SE	SE	SE	N
5	E	E	SE	SE	SE	E	N
6	E	E	E	E	E	NE	N

3,0 to 3,6 for Case 3:

- ((3,0):SE), ((4,1):SE), ((5:2):SE), ((6,3):E), ((4,4):SE), ((3,5):SE), ((2,6):S, ((3,6):.)

Changing the Wind Factor

To modify the wind factor (0 for none, 1 for 1 offset, 2 for 2, etc…), open valueIteration.py in your favorite editor and modify the value of the variable windFactor on line 9.

Some General Notes:

- for policies, the actions to be taken are given in cardinal directions N, S, E, W, NE, SE, NW, and SW. A period . means stay.
- if you want to see the plots, feel free to turn SHOW_PLOT on
- you should also be able to change the FINAL_STATE this way if you want
- all coordinates are given in (row, col) fashion
- we assume that if you are in a column with wind and you move into a column without wind, that the wind affected you before the move. In other words, with you and the wind being players in a game, you select an action, the wind offsets you, and then your action is performed

Compilation and Run

- We compiled the project with Python 3.6.0
- To run the project, run the command ./run.sh
  - note: this may install a few packages if you don't already have them
- Our script assumes your python 3 is aliased as 'python3'

Authors

- Hasan Khan hk4cd
- Zachary Danz zsd4yr