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Homework 3 Report

U' after Value Iteration in Case 1

-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0
0.0	0.0	0.0	0.0	0.0	0.0	1.0
-1.0	0.0	-1.0	0.0	-1.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	-1.0
-1.0	0.0	-1.0	0.0	-1.0	0.0	0.0

An optimal path for Case 1 would be taking a straight path to the right like so:
(3,0) E to (3,1). (3,1) E to (3,2). (3,2) E to (3,3). (3,3) E to (3,4). (3,4) E to (3,5). (3,5) E to (3,6). This maximizes reward and gets us to the end in optimal number of moves.

Another optimal path for Case 1 might be to zigzag a little, like so:
(3,0) NE to (2,1). (2,1) SE to (3,2). (3,2) SE to (4,3). (4,3) NE to (3,4). (3,4) E to (3,5). (3,5) E to (3,6). This maximizes reward and gets us to the end in optimal number of moves. Essentially, this is a demonstration that moves like NE and SE are often equivalent to E and still maximize reward.

U' after Value Iteration in Case 2

-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	0.0	-1.0	0.0	0.0	0.0	-1.0
0.0	0.0	0.0	0.0	-1.0	0.0	1.0
-1.0	0.0	-1.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	-1.0
-1.0	0.0	-1.0	0.0	-1.0	0.0	0.0

Because there's wind blowing upwards in columns 3, 4 and 5, optimal paths will often involve more moves to the southeast. An optimal path for Case 2 might be the following:
(3,0) SE to (4,1). (4,1) SE to (5,2). (5,2) E to (5,3). (5,3) SE (with wind) to (5,4). (5,4) E (with wind) to (4,5). (4,5) E (with wind) to (3,6).

Another optimal path for Case 2 might be the following: (note the moves at (5,3))
(3,0) SE to (4,1). (4,1) SE to (5,2). (5,2) E to (5,3). (5,3) E (with wind) to (4,4). (4,4) SE (with wind) to (4,5). (4,5) E (with wind) to (3,6).

U' after Value Iteration in Case 3

-1.0	0.0	-1.0	0.0	-1.0	0.0	-1.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
-1.0	0.0	-1.0	0.0	0.0	0.0	-1.0
0.0	0.0	0.0	0.0	0.0	0.0	1.0
-1.0	0.0	-1.0	0.0	-1.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	-1.0
-1.0	0.0	-1.0	0.0	0.0	0.0	0.0

In case 3 the wind is moving north along columns 3-5 strong enough to move the state north by two places, so more moves to the southeast are necessary to maintain an optimal path. The optimal path goes from (3,0) SE to (4,1). (4,1) SE to (5,2). (5,2) SE to (6,3). (6,3) SE (with wind) to (5,4). (5,4) SE (with wind) to (4,5). (4,5) SE (with wind) to (3,6). There is only one optimal path because it is necessary to move SE on every move in order to reach the goal node in the least number of moves.