Artificial Intelligence (CS 4710) – Homework 3: Value Iteration

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The general approach employed in this homework assignment revolved around diagonally iterating outwards from the end state in some designated pattern fit to the particular wind settings. In case one, with no wind impact, diagonal lines were drawn going right to left from the middle of the matrix outwards. Each increment on the line was followed by a decrement to the value function of in the matrix. After all the rows in the column were expanded, the column was decremented alongside the value function.

In the second case, the process was almost identical, differing only when iterating upwards diagonally and along columns greater than 3 where the value function was instead decremented by two versus the regular one. Edge cases in the bottom right six states did exist due to the boundaries and were appropriately accounted for.

In the third and final case, in which the wind blew with twice the strength as the prior case, a somewhat different iterating function was established more fit to the pattern of the matrix. Diagonal lines were drawn going right to left as before but only downwards from the top of the matrix to the middle. Once the diagonals hit the bounds at the third column, the process was reversed, and the diagonals were redrawn going upwards. The remaining portions of the matrix were serviced independently.

None

```
-6 -5 -4 -3 -3 -3 -3
-6 -5 -4 -3 -2 -2 -2
-6 -5 -4 -3 -2 -1 -1
-6 -5 -4 -3 -2 -1  0
-6 -5 -4 -3 -2 -1 -1
-6 -5 -4 -3 -2 -2 -2
-6 -5 -4 -3 -3 -3 -3

[3, 0] ( NE ) [2, 1] ( NE ) [1, 2] ( NE ) [0, 3]
( SE ) [1, 4] ( SE ) [2, 5] ( SE ) [3, 6]
[3, 0] ( E ) [3, 1] ( NE ) [2, 2] ( NE ) [1, 3]
( SE ) [2, 4] ( SE ) [3, 5] ( E ) [3, 6]
```

Weak

```
-6 -6 -6 -6 -5 -4 -3
-6 -5 -5 -5 -4 -3 -2
-6 -5 -4 -4 -3 -2 -1
-6 -5 -4 -3 -2 -1  0
-6 -5 -4 -3 -2 -1 -1
-6 -5 -4 -3 -2 -1 -2
-6 -5 -4 -3 -2 -2 -2
```

[3, 0] (NE) [2, 1] (E) [2, 2] (SE) [3, 3]
(SE) [3, 4] (SE) [3, 5] (SE) [3, 6]
[3, 0] (E) [3, 1] (E) [3, 2] (SE) [4, 3]
(SE) [4, 4] (SE) [4, 5] (E) [3, 6]

Strong

```
-9 -9 -8 -7 -6 -5 -3
-8 -8 -8 -7 -6 -4 -2
-7 -7 -7 -7 -5 -3 -1
-6 -6 -6 -6 -4 -2  0
-6 -5 -5 -5 -3 -1 -1
-6 -5 -4 -4 -2 -1 -2
-6 -5 -4 -3 -2 -1 -2
```

[3, 0] (SE) [4, 1] (SE) [5, 2] (SE) [6, 3]
(SE) [5, 4] (SE) [4, 5] (SE) [3, 6]