Implementing Value Iteration

1. Make it work
2. Make it right
3. Make it fast

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Problem 4

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Problem 5

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First step for making it fast (in any language, not just julia):

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Problem 5

First step for making it fast (in any language, not just julia):

Find out what is slow (by profiling)!

Bellman Operator

$$U' = B[U]$$

$$B[U](s) = \mathrm{max}_a \underbrace{\left(R(s, a) + \gamma \sum_{s'} T(s' \mid s, a) U(s') \right)}_{Q(s,a)}$$

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i = index of s; j = index of s'

Naive implementation:

$$U'[i] = \max_a \left(R[a][i] + \gamma \sum_j T[a][i,j] U[j] \right)$$

Dict of vectors

Dict of matrices

is, js, values

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Naive implementation:

$$U'[i] = \max_a \underbrace{\left(R[a][i] + \gamma \sum_j T[a][i,j] U[j]\right)}_{Q_a[i]}$$

$$Q_a = R[a] + \gamma T[a] U$$

$$y = Mx$$

$$y[i] = \sum_j M[i,j] x[i]$$