

# Autonomous Agents 1

## Assignment 1

By Group 4: Gieske, Gornishka, Loor, Radscum

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### Implementation

The current implementation consists of the following classes:

**Predator**

**Prey**

**Environment**

**Game**

### Analysis

#### Simulator for the environment

Avarage run time	Standard deviation
296 rounds	286.580390118

#### Iterative policy evaluation

Predator	Prey	Value	Discount Factor	Iterations to converge
(0, 0)	(5, 5)	0.00335	0.8	33
(2, 3)	(5, 4)	0.19892	0.8	33
(2, 10)	(10, 0)	0.19892	0.8	33
(10, 10)	(0, 0)	1.65066	0.8	33

  

Discount Factor	Iterations to converge
0.1	5
0.5	13
0.7	22
0.9	64

#### Policy iteration

Predator	Prey	Value	Discount Factor	Iterations to converge
(0, 0)	(5, 5)	0.00335	0.8	2
(2, 3)	(5, 4)	0.19892	0.8	2
(2, 10)	(10, 0)	0.19892	0.8	2
(10, 10)	(0, 0)	1.65066	0.8	2

Discount Factor	Iterations to converge
0.1	2
0.5	2
0.7	2
0.9	2

## Value iteration

Prey is located at (5, 5)

Value Iteration Grid in loop 8											
Indices y\x	0	1	2	3	4	5	6	7	8	9	10
0	0.000000	0.000000	0.000027	0.000168	0.001049	0.006554	0.001049	0.000168	0.000027	0.000000	0.000000
1	0.000000	0.000027	0.000168	0.001049	0.006554	0.040960	0.006554	0.001049	0.000168	0.000027	0.000000
2	0.000027	0.000168	0.001049	0.006554	0.040960	0.256000	0.040960	0.006554	0.001049	0.000168	0.000027
3	0.000168	0.001049	0.006554	0.040960	0.256000	1.600000	0.256000	0.040960	0.006554	0.001049	0.000168
4	0.001049	0.006554	0.040960	0.256000	1.600000	10.000000	1.600000	0.256000	0.040960	0.006554	0.001049
5	0.006554	0.040960	0.256000	1.600000	10.000000	0.000000	10.000000	1.600000	0.256000	0.040960	0.006554
6	0.001049	0.006554	0.040960	0.256000	1.600000	10.000000	1.600000	0.256000	0.040960	0.006554	0.001049
7	0.000168	0.001049	0.006554	0.040960	0.256000	1.600000	0.256000	0.040960	0.006554	0.001049	0.000168
8	0.000027	0.000168	0.001049	0.006554	0.040960	0.256000	0.040960	0.006554	0.001049	0.000168	0.000027
9	0.000000	0.000027	0.000168	0.001049	0.006554	0.040960	0.006554	0.001049	0.000168	0.000027	0.000000
10	0.000000	0.000000	0.000027	0.000168	0.001049	0.006554	0.001049	0.000168	0.000027	0.000000	0.000000

Discount Factor	Iterations to converge
0.1	1
0.5	7
0.7	7
0.9	8

Smarter state-space encoding

Conclusion

Files attached

Sources