Supplementary material for ”Deep reinforcement learning and adaptive strategies for adversarial active hypothesis testing”

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TABLE II: $[V^{l-}_{MAP}, V^{u-}_{MAP}]$

T	$s = 0.05$	$s = 0.1$
1	[0.52,0.55]	[0.52,0.58]
2	[0.4,0.4375]	[0.44,0.51]
3	[0.3664,0.4094]	[0.3984,0.4806]
4	[0.3040,0.3461]	[0.3459,0.4306]
5	[0.2572,0.0.3039]	[0.3057,0.3977]
6	[0.2238,0.2683]	[0.2720,0.3637]
7	[0.1886,0.2317]	[0.2422,0.3339]
8	[0.1668,0.2073]	[0.2191,0.3085]
9	[0.1420,0.1796]	[0.1969,0.2833]
10	[0.1242,0.1604]	[0.1777,0.2626]

TABLE III: Average belief on the true hypothesis at the end of the horizon(for games against random adversaries)

(a) $s = 0.05$

	random each ep.	uniform	constantly active	constantly inactive
NAR	0.9970	0.99912	0.998	0.9998
CAR	0.99747	0.99915	0.99843	0.99872
EJSAR	0.9999	0.999967	0.99943	0.99996
MGAR	0.999995	0.9999991	0.999993	0.9999991
DQN	0.99985	0.9961	0.99972	0.9999
PPO	0.9999	0.99983	0.9994	0.99992

(b) $s = 0.1$

	random each ep.	uniform	constantly active	constantly inactive
NAR	0.9959	0.99693	0.9929	0.99994
CAR	0.9981	0.9986	0.9956	0.99936
EJSAR	0.9995	0.99983	0.9981	0.999942
MGAR	0.999995	0.9999997	0.9999994	0.999995
DQN	0.994	0.998	0.9971	0.9999
PPO	0.99	0.99974	0.9965	0.99992

I. Another example of AD where $V^{l-}_{MAP} \neq V^{u-}_{MAP}$

There are two random processes and two sensors $\mathcal{A}, \mathcal{B}$. Each sensor monitors one of the processes. Each process is abnormal with a prior probability of 0.3. The prior probability of both being abnormal is 0.2, and the prior probability of both being normal is 0.2. Therefore $\rho_1 = [0.2, 0.3, 0.3, 0.2]$. The adversary can either attack $\mathcal{A}$ or $\mathcal{B}$. The observation model can be seen in table I

TABLE I: Conditional probabilities $P[Y = 1|X, a, u]$

(a) $u = \mathcal{A}$

	$X = 0$	$X = 1$	$X = 2$	$X = 3$
$\mathcal{A}$	$1 - \nu + s$	$\nu - s$	$1 - \nu + s$	
$\mathcal{B}$	$1 - \nu$	$1 - \nu$	ν	ν

(b) $u = \mathcal{B}$

	$X = 0$	$X = 1$	$X = 2$	$X = 3$
$\mathcal{A}$	$1 - \nu$	ν	$1 - \nu$	ν
$\mathcal{B}$	$1 - \nu + s$	$1 - \nu + s$	$\nu - s$	$\nu - s$

We fixed $\nu = 0.8$ and considered two values of s, 0.05 and 0.1. We consider horizons 1-10. The interval $[V^{l-}_{MAP}, V^{u-}_{MAP}]$ is displayed in table II

II. Average beliefs on the true hypothesis

see tables III and IV

TABLE IV: Average belief on the true hypothesis at the final time step (for games against randomised intelligent adversaries)

(a) $s = 0.05$

	confidence	error
NFIA	0.991925	0.999932
CFIA	0.999968	0.99995
EJFIA	0.99984	0.99931
MGFIA	0.695	0.64
VPG	0.999398	0.9974334
DQN	0.999972	0.99991
PPO	0.999871	0.999929
Upper Bound	0.0001234	0.0001234

(b) $s = 0.1$

	confidence	error
NFIA	0.99873	0.997457
CFIA	0.99893	0.98495
EJSFIA	99923	999076
MGFIA	0.645	0.63
VPG	9955345	987450
DQN	0.999765	0.997588
PPO	0.99583	0.998864
Upper Bound	0.0001234	0.0001234