

Progress Presentation-I

e-Yantra Summer Internship-2019
Reinforcement Learning in drones

Karthik Bilichod
Keshav Kumar
Mentor: Vikrant Fernandes

IIT BOMBAY

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Overview of Project

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Karthik Bilichod
Keshav Kumar
Mentor: Vikrant
Fernandes

Overview of Project

Overview of Task

Task

Accomplished

Challenges Faced

Future Plans

Thank You

- Reinforcement Learning in drones
- Design and develop a Reinforcement Learning (RL) module for Drone navigation
- Drone should hold position using RL

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S.No	key Task	Deadline
1.	Drone tuning(PID)	13/06/2019
2.	RL algorithms implementation	20/06/2019
3.	training the model in simulation(V-REP)	25/06/2019
4.	real world testing with pluto drone	30/06/2019
5.	comparision b/w PID and RL	02/07/2019

Task Accomplished

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- **task 1** PID tuning of Drone in both real world and on simulation platform(V-REP) to hold its position at a particular coordinate.
- **task 2** implementation of RL algorithms for training like Naive Q-learning with descritized states
- **Q-Table**

act	d1410	d1430	d1490	u1600	d1380	d1420	d1390	u1530
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
24	-40.2237832598	-22.1384391695	-33.5278231335	-22.887311525	-84.6546743537	-164.100814697	-195.9558891216	-196.9551732011
25	-51.8976719625	-29.3262713771	-62.4626811067	6.8308899543	-58.954230805	-1.1387112271	-88.2946395139	-74.9648479386
26	19.6222978337	-9.2175201616	-10.6501295075	25.9216344586	-7.9113059766	33.0436401191	-14.7757448276	-7.6549558905
27	58.8539368904	66.1317137525	55.3702297504	72.3849845838	48.498213955	53.3829037459	60.5446605573	59.1864805542
21	0	0	0	0	0	0	0	0
22	293.5645821847	170.3878050473	88.8685301072	89.4632145869	161.0900376304	236.7545447935	235.5285340804	67.1308503009
23	-148.1320971127	-353.0628010288	-86.547073449	-78.1970950724	40.4930446841	35.5401389666	-353.9254553728	-343.9774597457
28	122.6084898438	115.1003711746	160.3910022637	111.0834968484	99.815886928	120.7860980329	117.6234869556	101.3520303356
29	345.2033361738	316.8462466723	328.3373787379	347.1286429029	320.2693531071	304.1814133124	348.6050646523	303.5044268614
40	0	0	0	0	0	0	0	0
41	0	0	0	0	0	709.4616238468	0	0
0	0	0	0	0	0	0	0	0
39	385.2000279627	633.893684034	487.199712303	0	584.8568372244	399.9999999266	639.9999999914	396.2221589005
38	139.7988347544	110.8216219921	137.3053328524	152.3090639992	117.6104858898	156.8680919169	153.3552776778	128.5736154652
33	63.8541050445	69.9851930897	50.0618723118	53.4657457483	64.5912428939	60.6423800207	60.5478866103	64.5026272731
32	141.6760545446	109.5286234689	154.0864841814	150.6761771986	122.7752646946	102.3025571634	129.0402382223	153.1083479009
31	279.282679873	337.3812395042	309.1597162562	283.7135775798	283.4753764064	337.9443513275	341.4355031724	341.0304008241
30	626.1863643588	603.7761621124	639.0712885837	626.5962693081	654.2348703231	654.7136868441	608.9471394869	684.8357336748
37	-241.4573636534	-219.0938042369	-226.9252899867	-227.5173870581	-221.9527647485	-231.897071839	-225.6787649393	-228.1410273934
36	-107.4799570389	-166.3861332397	-110.518157622	-128.2722253684	-164.2045644438	-160.821750139	86.9276457886	-162.7529276926
35	-35.6703505015	-53.1645260653	-55.210615968	-34.261240511	-49.4398567031	-66.3501346652	-53.8080498765	-21.9388919659
34	6.7964495768	16.3971488313	8.9834300022	15.6315752215	16.6696550035	3.6818155465	7.4284549663	18.8599608446

Figure: Trained Q-table

Challenges Faced

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- getting the suitable values of PID parameters(k_p, k_d, k_i) to hold the position of drone at the desired setpoint
- selection of perfect models of RL to accomplish the task
- training of the model takes a lot of time and patience

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- designing and development of RL module for drone navigation in real world
- implementation of DQN and its training for better results

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THANK YOU !!!