WORKSHOP ITENERARY

Workshop title: Reinforcement Learning Workshop

Workshop date: 07/10-11/2024 Start time: 0800 End time: 1600

Workshop location: Classrooms 1 & 2

With the constant evolution of Artificial Intelligence, it is imperative to nail the basics of many of its core principles and apply them to our everyday work and learning. Throughout this workshop, we will learn about the fundamentals of Reinforcement Learning (RL), a subsidiary of Machine Learning. Reinforcement Learning can be used for many things such as optimization systems, autonomous vehicular systems, and general algorithmic enhancement. This workshop will cover fundamental RL concepts such as reward shaping, Epsilon-Greedy Policy, Q-Learning, Deep Q-Learning, and more. After completing the workshop. Attendees will have a grasp on RL concepts as well as their applications to various ongoing projects. Please see last page for computer requirements.

DAY 1

TIME	DAY 1 EVENTS DESCRIPTION	DURATION (MINS)
0800	Kickoff/Preliminary Setup	20
0820	Workshop Introduction	10
0830	Reinforcement Learning: Revolutionizing Decision Making within Defense - Haley Dozier	30
0900	Computer Setup	30
0930	Introduction to Reinforcement Learning	15
0945	Break	10
0955	Introduction to Q-Learning	20

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TIME	DESCRIPTION	DURATION (MINS)
1015	Coding Q-Learning	30
1045	Debugging Break	15
1100	Introduction to Reward Shaping	30
1130	Coding Reward Shaping	15
1145	Apply Algorithms	15
1200	**Lunch Break**	60
1300	Training Q-Learning Model	30
1330	**Interact with Q-Learning Agent in GUI**	10
1340	Debugging Break	15
1355	Drawbacks of Q-Learning	5
1400	Introduction to Minimax Algorithm	20
1420	**Coding Minimax Algorithm**	10
1430	Implement and Play Against Minimax	10
1440	Debugging Break	15

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TIME	DAY 1 EVENTS DESCRIPTION	DURATION (MINS)
1455	Explore Drawbacks of Minimax Algorithm	5
1500	Leveraging Deep Reinforcement Learning to Train Agents for Enhanced Course-of-Action Development and Analysis - William Leonard	30
1530	Day 1 Concluding Thoughts	10

DAY 2

TIME	DAY 2 EVENTS DESCRIPTION	DURATION (MINS)
0800	Load Day 1's Work	20
0820	Advancing Reinforcement Learning Models	10
0830	Reinforcement Learning in Unity: A Practical Guide to Using RL in a Virtual Environment - Jo Jabour	30
0900	Introduction to Deep Learning and Neural Networks	30
0930	Introduction to Deep Q-Learning and DQNs	30
1000	Break	10
1010	Coding Deep Q Networks	60
1110	Training Deep Q Networks	40
1150	Loading GUI to Play Deep Q Network Model	10

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TIME	DAY 2 EVENTS DESCRIPTION	DURATION (MINS)
1200	Lunch Break	60
1300	Drawbacks of Deep Q Networks	5
1305	Introduction to Deep Q-Learning from Demonstrations (DQfDs)	45
1350	Code DQfD Model	15
1405	Debugging Break	15
1420	Train DQfD Model	40
1500	Load DQfD Model and Play Against Agent	5
1505	Load All Models and Play against Agents	15
1520	Where Now? Considerations for the Future	10
1530	Concluding Thoughts	10

General Requirements

TECHNICAL SKILLS	HARDWARE REQUIREMENTS	COMMON TOOLS
Basic statistics knowledge and an intermediate level understanding of python	Computer capable of running the latest versions of Google Chrome or Firefox and Python 3.7 or later.	Github, PyTorch, Numpy, Tkinter, et. al