

Guru Tegh Bahadur Institute of Technology, New Delhi
Department of Computer Science & Engineering

Lecture Plan for Reinforcement Learning and Deep Learning

Class:7th Sem. (CSE)

Subject Code: ML-409T

Total Lecture classes available: 36

S.No.	TOPICS TO BE COVERED	No. of Lectures
1	Introduction to Reinforcement learning and its terms, features and elements of RL.	1
2	Defining RL Framework and Markov decision process and polices.	1
3	Value Functions and Bellman Equations, Exploration vs. Exploitation.	2
4	Code Standards and Libraries used in RL (Python/Keras/Tensorflow)	2
5	Tabular Methods and Q-networks	1
6	Planning through the use of Dynamic Programming and Monte Carlo	1
7	Temporal-Difference learning methods (TD(0), SARSA, Q-Learning)	2
8	Deep Q-networks (DQN, DDQN, Dueling DQN, Prioritised Experience Replay)	2
9	Introduction to policy-based methods, Vanilla Policy Gradient	1
10	REINFORCE algorithm and stochastic policy search, Actor-critic methods (A2C, A3C), Advanced policy gradient (PPO, TRPO, DDPG),	2
11	Model-based RL approach, Meta-learning. Multi-Agent Reinforcement Learning,	2
12	Partially observable Markov Decision Process, Applying RL for real-world problems	2
	Total Hours	19hrs
	2nd TERM END	
13	Introduction to deep learning and its application, examples of deep learning	1
14	Introduction to Neural Network its types and application, introduction to keras, introduction to ANN perceptron and its uses	2
15	Multilayer perceptron and deep neural network, Activation function and its working TanH function,sigma ,relu etc	2
16	Feed forward network, Cost function, Backpropagation, Gradient Descent, Regularization and dropout technique, Batch normalization	2
17	Convolutional Neural network, CNN Pooling, CNN Layers, Flattening and Full connection, Preparing a fully connected neural network	2
18	Introduction to RNN, Deep RNN, Long Short-Term memory, GRU, Transfer Learning,	2
19	Introduction to NLP and Vector Space Model of Semantics	1
20	Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Words model (CBOW), Glove, Evaluations and Applications in word similarity, analogy reasoning	2
21	Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks	2
22	video to text with LSTM models. Attention models for	1

	computer vision tasks.	
	Total Hours	17 hrs

Textbook(s):

1. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", 2nd Edition, MIT Press, 2019
2. Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. "Deep learning." MIT press, 2016.
3. Antonio Gulli and Sujit Pal, "Deep learning with Keras"

References:

1. Wiering, Marco, and Martijn Van Otterlo. "Reinforcement learning: Adaptation, Learning, and Optimization" (2012)
2. Daniel Slater, Gianmario Spacagna and Peter Roelants, "Python Deep Learning", Packt Publication.