CS 767

Boston University MET College 2025
Department of Computer Science

Advanced Machine Learning and Neural Networks (CS 767)

Syllabus

Time & Location: Th 6 PM - 8:45 PM, MET 101 (1010 Commonwealth Avenue)

Instructor: Avi Mohan (avimohan@bu.edu)
TA: Aryan Meena (aryan18@bu.edu)

Syllabus (tentative)

Lecture Number	Lecture date	Topics	Homework	Comments on lectures or homework	Readings/Misc.
1	Jan 22nd	Discussion of Prerequisites, Homework Structure, Mid-term date etc. **Review of Supervised Learning and basic matrix algebra.** Tutorials: NumPy, MatplotLib, Seaborn, Pandas, and Scikit-Learn	HW 1		
	Jan 29th	Decision Trees (brief review of Classification trees and Regression trees)	HW 2		
2	Feb 5th	Bagging, Boosting (AdaBoost and XGBoost), and Random Forests	HW 3		
	Feb 12th				
3	Feb 19th	Feedforward Neural Networks	HW 4	HW 5 submission deadline will fall after the midterm.	
	Feb 26th	Optimization Algorithms (SDG and its variants)	HW 5		
4	March 5th	**Mid-term Exam**			
	March 12th	Spring Break			
5	March 19th	Optimization Algorithms contd.	HW 6		
	March 26th	Backpropagation	HW 7		
4	April 2nd	Convolutional Neural Networks	HW 8		
5	April 9th	Convolutional Neural Networks (contd.)	HW 9		
	April 16th	Attention Mechanisms	HW 10		
	April 23rd	Attention Mechanisms (contd.)	HW 11		
6	April 30th	Advanced topics			

Required Textbook:

[G22] Géron, A., 2022. "***Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow.***" O'Reilly Media, Inc.
ISBN-13: 978-1098104030

Additional Material

1. [GBC16] Ian Goodfellow, Yoshua Bengio, and Aaron Courville, "***Deep learning,***" The MIT Press, 2016.
   ISBN- **13:** 978-0262035613

2. [ZLLS21] Zhang, A., Lipton, Z.C., Li, M. and Smola, A.J., 2021. "***Dive Into Deep Learning***." *arXiv preprint arXiv:2106.11342*.
   Link: https://d2l.ai/index.html

3. [BB22] Bishop, C.M. and Bishop, H., 2024, "***Deep Learning: Foundations and Concepts***." Springer Nature.
   Online version available for free at: https://www.bishopbook.com/
   ISBN- **13:** 978-3031454677

4. [DFO20] Deisenroth, Marc Peter, A. Aldo Faisal, and Cheng Soon Ong. ***Mathematics for Machine Learning.*** Cambridge University Press, 2020.
   ISBN- **13:** 978-1108455145

5. [J24] James, Gareth, Daniela Witten, Trevor Hastie, Robert Tibshirani, and Jonathan Taylor. ***An Introduction to Statistical Learning: With Applications in Python***. Springer Nature, 2024.
   ISBN- **13: 978-3031387463**

6. [NFI21] Navlani, Avinash, Armando Fandango, and Ivan Idris. ***Python Data Analysis: Perform data collection, data processing, wrangling, visualization, and model building using Python***. Packt Publishing Ltd, 2021.
   ISBN- **13:** 978-1787127487