Summer of Science 2020

Plan of Action

An Overview of Machine Learning, Neural Networks, and Deep Learning

Ankit Kumar Misra
Roll No: 190050020
Computer Science and Engineering
IIT Bombay

Mentor: Soumya Chatterjee

June 14, 2020

1 Learning Objectives

Through this project, I aim to make myself familiar with various algorithms and techniques related to machine learning and deep learning. To achieve this, I plan to first learn about the basics of machine learning, and then dive into the more specific area of deep learning. Later on, I also plan to learn about the applications of neural networks in the field of Computer Vision.

2 Project Timeline

Week 1 (Apr 11 - Apr 17)	Linear regression (for both single and multiple variables), logistic regression, regularization, representation of neural networks, backpropagation algorithm.
Week 2 (Apr 18 - Apr 24)	Machine learning system design, SVMs, unsupervised learning, dimensionality reduction, anomaly detection, recommender systems, large scale machine learning.
Week 3 (Apr 25 - May 1)	Introduction to neural networks and deep learning, hyperparameter tuning, regularization, optimization. Midterm report writing and submission by Apr 30.
Week 4 (May 2 - May 8)	Structuring machine learning projects, convolutional neural networks.
Week 5 (May 9 - May 15)	Sequence models, image classification, loss functions and optimization, training neural networks for CV.
Week 6 (May 16 - May 22)	Deep learning software, CNN architectures, recurrent neural networks, detection and segmentation, visualizing and understanding features.
Week 7 (May 23 - May 29)	Generative models, reinforcement learning, deep reinforcement learning.
Week 8 (May 30 - Jun 5)	Efficient methods and hardware for deep learning, adversarial examples and adversarial training.
Week 9 (Jun 6 - Jun 10)	Endterm report writing and final submission.

3 Resources

1. Andrew Ng's Machine Learning Course on Coursera
2. Andrew Ng's Deep Learning Specialization on Coursera
3. Stanford University's CS231n Course Material
4. 'Deep Learning' by MIT Press
5. 'Pattern Recognition and Machine Learning' by Christopher Bishop